Framework for user sentiment analysis to improve the usability of applications for generation z and young adults

By

Yang Cao

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Approved by

Dr. Cheryl D. Seals, Chair, Professor of Computer Science and Software Engineering
Dr. Xiao Qin, Professor of Computer Science and Software Engineering
Dr. Bo Liu, Assistant Professor of Computer Science and Software Engineering
Dr. Marisha Speights Atkins, Assistant Professor of Communication Disorders
Dr. Dallin Bailey, Assistant Professor of Communication Disorders

Abstract

Three studies were conducted to explore machine learning support of novel learning problems. The first was a study of a computer-supported online learning website, which was designed to support teachers improving their pedagogy and this work created a data-first approach for Linguistic pedagogy, and to support improved pedagogy delivery and evaluation; the other two studies are supporting a participatory design project to create more youth-centered applications (i.e. an Android learning application), which is divided into two phases - the user interface information design phase to ascertain patterns in the data set, and phase two applied these pattern to support user sentiment analysis (i.e. collaborative and content-based filtering) to better support user experience in finding youth-centric content. The main objective of this work was to create frameworks that can be used to design usable applications and the proposed frameworks were evaluated through empirical experiments. We applied a framework for the design of online learning systems. This research will result in user sentiment analysis for generation z and other populations. Our goal was to validate the proposed framework and impact on designing online educational applications for these particular populations.

In the field of human-computer interaction, we work to define the process of working with humans to find better solutions to support their computer interactions through technology. HCI as defined "improves the design and uses of computer technology, and focused on the interfaces between people (users) and computers. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways" (Card, Moran, & Newell, 1980). We have studied and worked with

many communities in a process of participatory design and during the course of this work, we have gained a novel perspective on two communities of practice and their usage of computers and problems they may encounter. After studying these communities, we gathered functional requirements, created designs, and developed solutions to satisfy their requirements. In this manuscript, we will discuss work with two communities through three essays to document three studies. Our work was to support educational partners, gather requirements, and develop systems to better support their needs. In study one, we worked with teachers and found that they needed a better mechanism for returning results efficiently to their students. We studied the literature and found that the existing learning management systems are a great support to improve educational practice and provide an effective reinforcement that goes far beyond traditional classroom instruction (Ellis, 2009), but did not provide support for the needs of our teachers in the field of communications disorders. The faculty wanted to provide quicker and more robust feedback, to support an increase in student's confidence in learning in this problem area. Secondly, we aimed to provide support for teachers in this area, we endeavored to develop a smarter way to generate exams to optimize their usage of time to give them more time to devote to other higher-level instructional activities instead of spending great amounts of time on rote activities (i.e. grading by hand and creating exams). Recently there has been a resurgence of interest by academic institutions and companies, in the use of specialized algorithms to better solve problems. Some have emphasized an understanding of machine learning, the scientific study of algorithms and statistical models that computer systems use in order to perform a specific task effectively without using explicit instructions, relying on patterns and inference instead (Bishop, 2016). This field has

been very beneficial to a multitude of systems where there is some amount of ambiguity. In our first study, we believed that the creation of specialized evaluations was an ambiguous (i.e. or not exact) process and planned to use techniques to generate smart evaluations through machine learning support.

In studies two and three, we worked with professionals from university extension and found that they needed a better user interface that was more supportive of younger students from generation z. Their existing web presence supports all age groups and though they do have some support for youth audiences, it is hard to discover on their web site (i.e. it is obscure and hard to navigate to). Their solution was to request the creation of a more youth-friendly website and with the prevalence of mobile technology use by youth (Druin, Bederson, Hourcade, Sherman, Revelle, Planter, & Weng, 2003), we were also requested to develop a mobile application to support this effort. We delivered a website and an Android-based mobile application to support our users' needs and requirements to provide more youth-friendly access. We created 3 versions of the mobile application and each mobile application had higher user acceptance rate as accessed through user studies and evaluation. Secondly, we aimed to provide support for users to find more relevant articles in their interest area, we endeavored to develop a smarter way to provide relevant materials instead of pre-determining our users' choices. Recently there has been great interest by companies and academic institutions in the use of crawler-based technologies and sentiment analysis to return better results (e.g. Amazon and Netflix). For example, as a person utilizing Amazon for online shopping and to procure an item, at the end of that experience the system will suggest another item to the customer that they think will match their interest or needs (i.e. sentiments). In Human-

Computer Interaction, we can also refer to this an improving User Experience. Theoretically, this collaborative filtering (Pandey, 2019) or content-based filtering (Pandey, 2019) can be utilized to calculate group sentiment (e.g. sentiment analysis) and we perform this work to provide better results to our users based on their preferences to return better results. In machine learning, we create better methods by relying on patterns and inference and we utilized this method to improve results returned by our application (Bishop, 2016).

Essay 1

The Automated Phonetic Transcription Grading Tool (APT-GT) is an online learning web application that is an interactive and engaging examination tool for students in the Department of Communication Disorder at Auburn University. The teachers will generate online exams for students to take. It aims to improve student's efficacy in learning phonetic transcription when dealing with recognizing and translating disordered speech, and also aims to improve the quality of teacher's pedagogical experiences by reducing the task of manual grading of phonetic transcriptions that can be a very arduous and time-consuming task. This system will save the teachers from grading the exam, which is not easily done manually. Teachers to date in this area have had little support from online educational assistance, because of the complexity of the process of transcription analysis (Speights-Atkins, Seals, & Bailey, 2018; Speights-Atkins, Seals, & Bailey, 2019). This research proposes an automatic question difficulty classification module and an automatic exam generation module, based on teacher's requirements to replace the existing modules, which needs the teacher to manually tell the difficulty level of each question, and upload the question every time when it is used. With proving such modules, we can relieve teachers of

having to spend lots of time recognizing the difficulty level of questions and then uploading questions repeatedly. With a reusable question bank, each question needs to be created and store only once. This also saves the server's storage space.

Essay 2

Through a participatory design project with members of the For Youth For Life Learning network that supports eXtension, we were tasked to evaluate the usefulness of their existing website eXtension.org and to assess whether it was supportive of the youth population. The existing team members had found that many adults utilized the software, but the developers were not satisfied with the use of this tool by younger populations. They discussed that it was underutilized by generation z populations. We performed a heuristic evaluation of the extension.org site and found that based upon the current design, navigation was challenging and difficult to even find content that was specifically crafted for youth audiences. The location of youth content on the application was even hard for us to find until indicated by the website design and development group. We proposed that developing an app would be more supportive of youth and more user-friendly, as many young people are mainly accessing content though their smart devices (e.g. phones and tablets). We designed the application, I Want to Know "IWant2Know" to support the inquisitive nature of young people and to provide them an easy access to extension content that removed some of the cognitive baggage of having to navigate through an entire site. This simplification included presenting key elements ready for young people consumption. The participatory design team designed and developed this application to improve user experience by providing a more accessible system for finding STEM content in extension that was crafted

specifically for the youth audience. This work will discuss the design, development and analysis of the iWant2Know application.

Essay 3

Generation z and young adults are the groups in the stage that will decide what they will do in the future. It is valuable to help them find and develop their potential interests. Since they are growing up in the era of information overload, digging and obtaining meaningful information for those young people have been increasingly difficult (Benselin, & Ragsdell, 2016). This work will discuss an educational app for generation z to explore their interests in different areas and topics based on the user's preferences and actions.

The proposed study is an extension from the previous work, in which we validated that users were highly satisfied with user-centric design. For this work, we aim to improve user experience and the usability of the application utilizing multiple strategies as a mechanism to assess user sentiment and preference. We will utilize a crawler system to gather specialized database content, refresh that content, and a recommendation system to analyze users' sentiment and provide corresponding data to dive into users' interesting areas.

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Table of Contents

List of Figures

List of Abbreviations

APT-GT	Automatic Phonetic Transcription Grading Tool
HCI	Human Computer Interaction
CSCL	Computer Supported Collaborative Learning
LMS	Learning Management System
IPA	International Phonetic Alphabet
UI	User Interface
PDAs	Personal Digital Assistants
MLES	Mobile Learning Environment System
OS	Operating System
IMDB	Internet Movie Database
NLU	Natural Language Understand
LSA	Latent Semantic Analysis
pLSA	Probabilistic Latent Semantic
LDA	Latent Dirichlet Allocation
SVD	Singular Value Decomposition
KNN	K-Nearest Neighbors

Essay 1: Supporting Teachers in a DataFirst approach to refined stochastic analysis: An approach utilizing difficulty classification to support automatic generation of exams supporting Linguistics pedagogy

Introduction

The digital revolution and the computer boom have revolutionized the way we access, use, share and discuss digital content (Collins, & Halverson, 2018). This same revolution is also true for developing supportive alternatives for delivering learning pedagogy (Beetham, & Sharpe, 2014). Technology has played a vital role in the classroom and with more students being digital natives, teachers' infusion of technology into their teaching is an essential element to more meaningful educational experiences (Collins, & Halverson, 2018). Technology helps young people chasing promising careers. The use of technology allows educators to present more information in more creative forms. In this modern era of technology, it is no longer acceptable to educate and empower students only through traditional learning approaches. The development of the Internet has changed the way people learn and has had a profound impact on the development of applications and computing technologies (Kozma, & Voogt, 2003). This, in turn, has spawned a need for the development of new learning technologies.

Computer Supported Collaborative Learning (CSCL) is one of the most significant new teaching methods (Stahl, Koschmann, & Suthers, 2006). It promotes the teaching and learning processes of schools around the world. These technologies enable us to deliver personalized and comprehensive learning content anytime, anywhere. Students are no longer bound by the time and place constraints of traditional classroom learning methods and will sustain their passion for learning. CSCL does not replace traditional classroom teaching methods, but creates an augmented and enriched learning environment. It promotes the integration of instructional techniques and

maximizes students' participation in the learning process. This approach saves time for students and teachers and is a more efficient technique for sharing feedback, before and after the submission of their work products. CSCL enhances students learning interest and learning abilities through interaction (Laurillard, Oliver, Wasson, & Hoppe, 2009).

Automatic grading aims at improving the level of the feedback given to students and optimizing the professors' time. Several researchers have reported the development of software tools to support this process. However, the lack of a specific grading model for phonetic symbols (i.e., diphthongs, diacritics, double consonants considered as one, etc.) in the existing tools shows a gap in tools available in this content area and encourages the birth of the Automatic Phonetic Transcription Grading Tool (APT-GT). APT-GT as a web-based application on a language learning system for phonetic transcription courses offered at the Communication and Disorders department in the College of Liberal Arts, Auburn University. This learning technology application has been developed to support new students in the area of communications disorders, in the development of their abilities to perform transcription and to provide reinforcement to their practical exercises of transcription. The APT-GT application assists students to identify problems in their transcription and provides more support as compared to the traditional hand-derived manual transcription in phonetic transcription courses. Similar to a Learning Management System (LMS), but enhanced to provide specialized support of the Linguistics area, this application is designed to upload exercises and exams by professors, and students perform phonetic transcription exercises and take exams online and are provided immediate feedback about the success of their transcription to better support their learning of linguistic practice (Speights-Atkins, Seals, & Bailey, 2018; Speights-Atkins, Seals, & Bailey, 2019).

We have had a previous and accurate grading module for APT-GT that is an adaptation of the Levenshtein distance algorithm (Speights-Atkins, Seals, & Bailey, 2019). In this study, we are extending the developed APT-GT with the design and development of modules to assess question difficulty classification and to automatically generate exam modules. The rule-based classification process replaces the manual creation of an exam module with the auto-generation of exams, which saves the professor's effort of manually calculating question difficulty level and solves the question reusability problem. We will discuss CSCL platforms, classification systems, data visualization and analysis for the developing software to improve user experience. In the methodology section, we discuss the existing problem and proposed solution. The next section covers the detailed implementation of the application and section 5 discusses the system evaluation and corresponding results. We will complete this work with conclusions of the study and proposed future work.

Literature Review

There are many popular Learning Management Systems, such as Moodle, Coursera, Canvas, and they do not currently support the challenge of specific phonetic symbol transcription and automatic grading of assignments. We have identified that providing support for automatic grading in this specialized content area would significantly improve timely and effective feedback for students and greatly improve student efficacy of learning these materials. This innovation also will greatly aid teachers in that it will reduce their effort in the area of route grading activities and give them more time to devote to developing more interesting and meaningful course activities. To ensure that this is a gap in the field of CSCL and currently provided systems, we will first study a few popular CSCL platforms to see what we can learn from them, and as our current system has some Data Visualization support, we will also likewise investigate several neoteric Data Visualization technologies to assist our design and development. After learning about the current

platforms and visualization, we need to find ways to design and develop a solution to support the data that we have, in a data-first approach (Shenfeld, 2019). Therefore, in the following section, we will discuss CSCW/CSCL platforms, data visualization and analysis, and classification systems for developing software to improve user experience.

CSCW/CSCL

Moodle

Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environments (Chris, n.d.). To use Moodle, educational institutions must download the installation package and install it on a web server, either on a personal computer or at a web hosting company. It is installed on any computer that runs PHP and supports any SQL type database. It is compatible for Windows, Mac and Linux operating systems.

The word Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment and is useful for programmers and educators with advanced computer skills. It also means a process of twisting through a place slowly without any resistance to the tasks that present themselves. This description applies both to the way Moodle was developed, and to the way a student or teacher might approach studying or teaching an online course. Anyone who uses Moodle is a Moodler (Trochim, & Donnelly, 2008).

MOOC

MOOC is an open-access platform where any student having an Internet connection can enroll for an online course. The method of delivering learning material is video lectures, usually for 8-15 minutes, designed with keeping the student's view in mind. Most of the courses offered

are free and can prove as a critical medium to provide education in remote areas where enough expertise is not available (Thakkar, & Joshi, 2015).

a. Coursera

Coursera partners with top universities and organizations worldwide and teachers from top universities post their courses on Coursera. This platform provides video lectures, homework, and a quiz each week when the course is in open status. Students can choose either to purchase the courses or to audit the course only. For those who purchased the course, they can earn specified certification for the course if they finish all the homework and quizzes on time and get a qualified score for the quizzes and exams. If a student has any question on some points, they can post their question online and immediate feedback will be provided (Online Courses & Credentials by Top Educators. Join for Free., n.d.). The personalized dashboard of Coursera is shown in Figure 1.

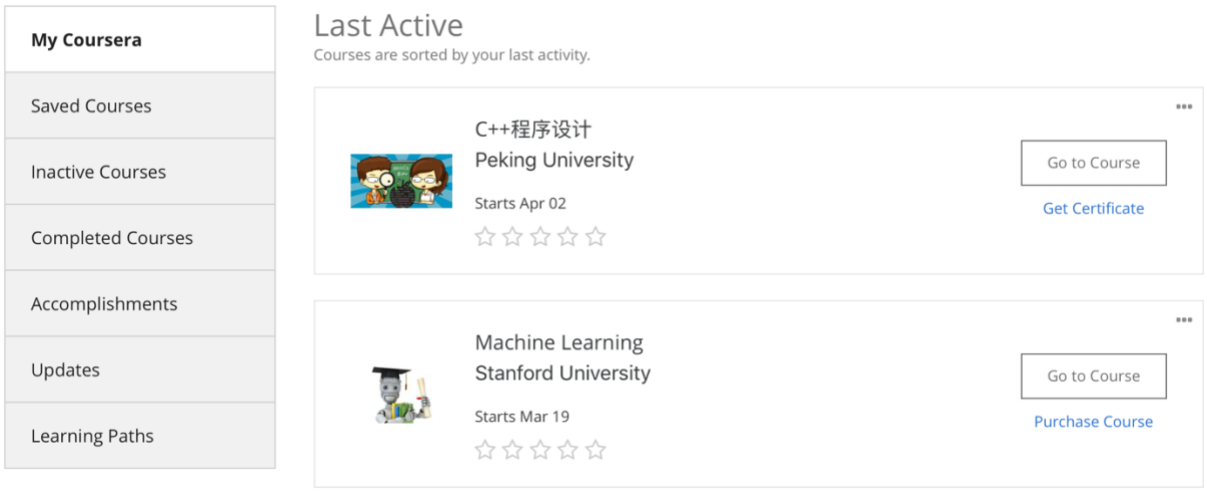

Figure 1-1: Interface of Coursera

b. Udacity

Udacity focuses on providing courses based on skills required by industries and most of the courses are free. Nanodegree programmers offered on this platform are co-created by industry

giants such as Google, Facebook, AT&T, MongoDB, Twitter, NVIDIA, Amazon web services and other (Thakkar, & Joshi, 2015). The personalized dashboard of Udacity is shown in Figure 2.

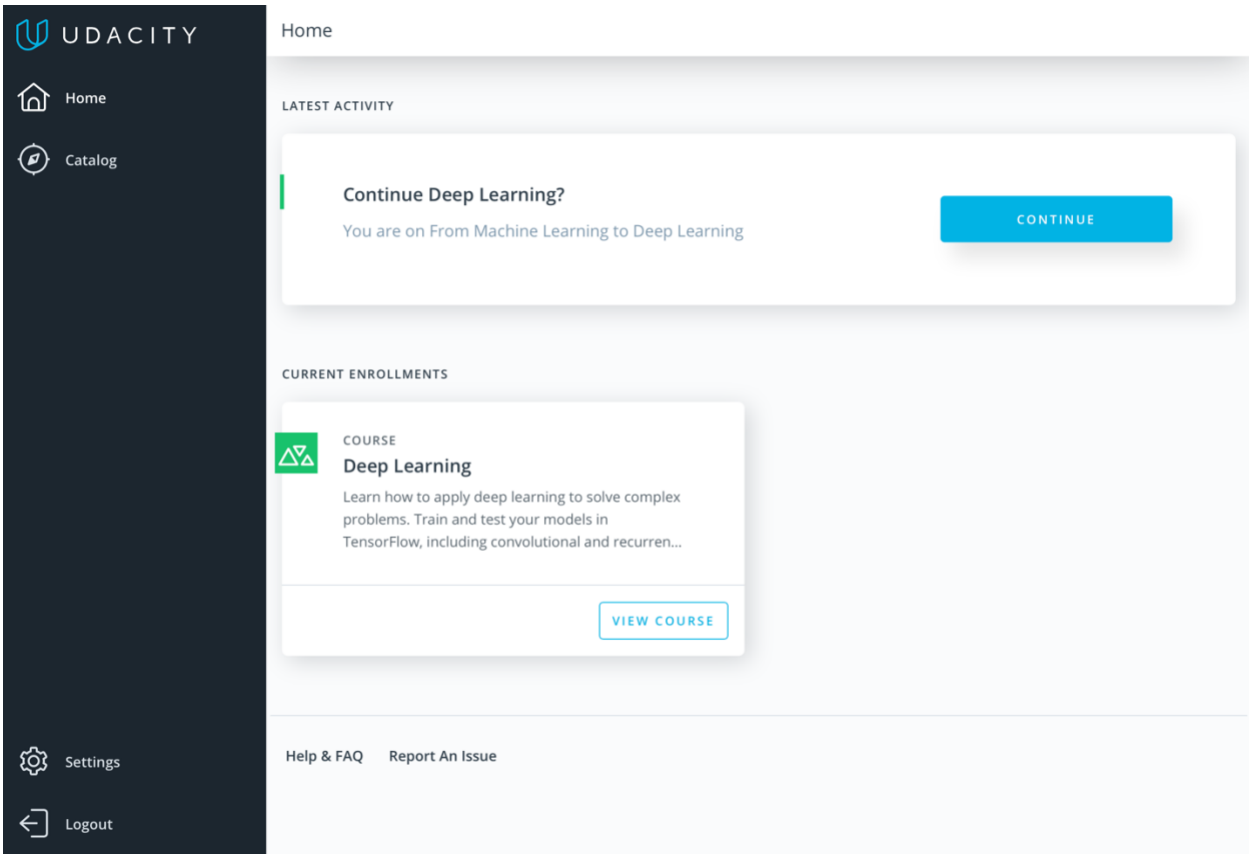

Figure 1-2: Interface of Udacity

Panopticon as an eLearning Support Search Tool

Nicholson et al. (2014) test the performance of Panopticon and argue that Panopticon outperforms YouTube in their two sets of studies. The two studies have the same interface – YouTube and Panopticon, and the same class of video – talk, slides and interactive. The different factor is the time to find all the right points of interest in each video (Nicholson, Huber, Jackson, & Olivier, 2014).

The first study was a Revised Student Study. It had 24 participants, that were from the local population, and had seen the video before and are looking for the answers for the questions posed

by the researcher. This study used 3x2 independent design. Participants are randomly given one lecture type and one video player to finish the study. Once one question was answered correctly, they will move forward the following one. A two-way independent ANOVA was used to analyze the data, and the result was that using Panopticon works faster than using YouTube, and Talk lecture takes longer than Interactive lecture and Slide lecture. No interaction effects (Nicholson, Huber, Jackson, & Olivier, 2014).

The second study was an Independent Learner Study. It had 16 participants, that were also from the local population, but had not seen the video before and are also looking for the answers for the same three questions posed by the researcher. This study used 3x2 mixed design. Participants answered questions, after all three videos, which with order counterbalanced. A two-way mixed ANOVA was used to analyze the data, and the result was the same as the first study (Nicholson, Huber, Jackson, & Olivier, 2014).

DATA VISUALIZATION

Stock Lamp: An Engagement-Versatile Visualization Design

Tanahashi et al. (2015) prompt a new design concept, engagement-versatile design, for visualizations that target users with a variety of engagement styles. They first identify three unique modes of engagement between users and desktop visualizations -- Periphery-Passive mode is the model in which the user does not give too much attention. In this situation, the user was not particularly interested in obtaining specific information; Focus-Passive mode is the model in which the user focused and gives full attention. However, the user was not interacting with the visualization – he/she does not explore the data and are only staring at the visualization. In this situation, the user was interested in obtaining information from the visualization, but he/she had no information on which he/she want to focus; Focus-Active mode is the model in which the user

both gives full attention and he/she had interested to interact with the visualization, and to explore and investigate the data. In this situation, the user was both interested in obtaining information from the visualization and motivated to retrieve information based on specific interests. Then the authors discuss how each mode helps derive design guidelines for constructing a visualization that can serve users with different engagement modes (Tanahashi, & Ma, 2015).

Tanahashi et al. identified the engagement modes for each visual component of the visualization to support. By utilizing the engagement-versatile design concept, the visualization provides a large number of users with valuable information in various situations. With the system which is called Stock Lamp, the authors demonstrate the probability of this concept without losing generality (Tanahashi, & Ma, 2015).

Keeping Multiple Views Consistent: Constraints, Validations, and Exceptions in Visualization Authoring

Qu et al. (2017) presented a Wizard-of-Oz study in which participants were presented with warnings about encoding inconsistencies across views. Their work extends and validates a constraint model describing desirable consistencies in xy and color encodings across views based on the identity of data in those views. Their Wizard-of-Oz study provides the first intimate investigation of visualization authors' perceptions and practices around encoding consistency. Considering how sets of visualizations make data similarities and differences across views immediately recognizable to viewers is an important but often overlooked the aspect of visualization design. Consistency warnings impacted this process by reminding authors of consistency among other design considerations (Qu, & Hullman, 2019).

They identified existing strategies used by authors to achieve forms of consistency, exceptional cases where authors wished to overwrite consistency concerns, and perceived tool

needs, setting the foundation for the future development of encoding consistency principles and tool support. They were pursuing constraint satisfaction approaches to surface consistency warnings, as well as additional development and study of how the authoring process can be supported by human-in-the-loop tools in future work (Qu, & Hullman, 2019).

Applying a Sunburst Visualization to Summarize User Navigation Sequences

In working with site navigation data for YouTube, Rodden (2014) used her knowledge of the data (and her goals in visualizing it) to make appropriate simplifications, producing a more tractable visualization design. First, she categorized the many possible URLs into a small set of page types, after filtering out those that didn't correspond to a user-initiated page transition. Then, she included only those sequences that occurred at the beginning of a user's visit to the site. She used the traditional Web analytics definition of visit: a continuous sequence of activity on the site with a gap of no more than 30 minutes. From a business perspective, it's important to understand how users are arriving at the site and whether they continue to discover new content and remain engaged. After some initial experiments with visualizing the data, she realized that six steps were enough to capture the main patterns at the beginning of a visit. Her final simplification step was to count only direct transitions between two-page types (Rodden, 2014).

The Sunburst Visualization uses a space-filling presentation to explicitly show the proportion of the total value represented by each node, which in this case corresponds to the number of visits. The sunburst was originally designed for hierarchical data. There are three main aspects were helpful. The first was the sunburst visualization itself; the second was the data in the visualization; The third was the user experience design, research, and branding. Following this visualization's success at You-Tube, Rodden created a modified version that was easy to reuse with different data. When the YouTube TV team looked at their sequence visualization, they were

surprised to see a repeated pattern of users doing a search, watching a video, doing another search, watching another video, and so on (Rodden, 2014).

From Rodden's experiences using this visualization at Google, two clear areas for future research have emerged. The first is comparisons, because people can have difficulty drawing conclusions when seeing two sunbursts side-by-side. The second area is a reverse application, since in some cases, it's of interest to understand the sequences leading to the user's end state or a particular goal, rather than the user's behavior at the beginning of the visit (Rodden, 2014).

Tableau

By 2020, the world will generate 50 times the number of data and 75 times the number of sources of information as that in 2011(The premier global market intelligence firm, n.d.). Among these data, there are great opportunities for human progress. People need to grasp the power of data to turn the opportunities into reality. Tableau is a firm that builds software to achieve this goal. Its products are changing the way how people use data to solve problems. They help people understand and utilize the data, which makes it simple, fast, and beautiful to analyze the data. (Tableau: Business Intelligence and Analytics Software, n.d.). The interface of Tableau is shown in Figure 3.

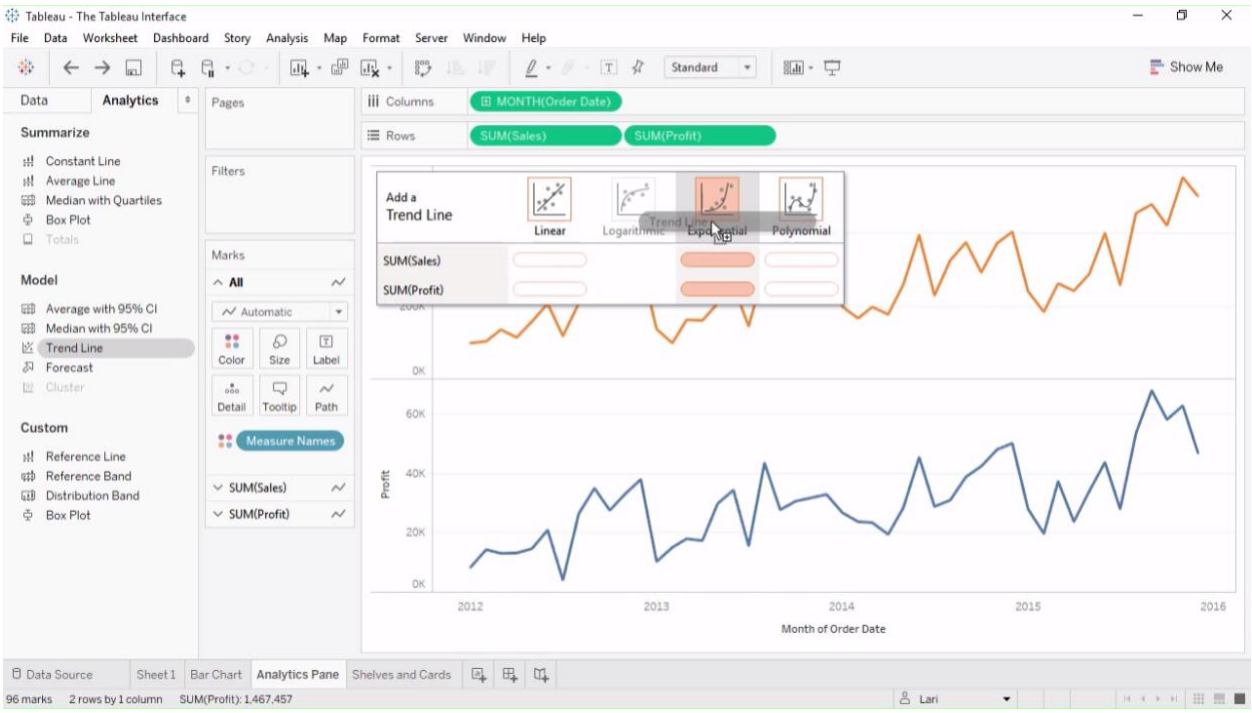

Figure 1-3: Interface of Tableau

Explaining the Gap: Visualizing One's Predictions Improves Recall and Comprehension of Data

Information visualization uses interactivity to implement user-driven visual data queries. However, users' expectations of data and other interactions with their internal representations are also critical to supporting learning visualization. Kim, Y. et al (2017) discussed how the effects differed based on text versus visual presentations of data. They characterized the design space of graphical prediction and feedback techniques and described design recommendations. Their work began by asking, "What if visualizations integrated users' prior knowledge about the dataset?" Informed by prior work in cognitive and educational psychology, they developed multiple novel elicitation techniques for incorporating users' prior knowledge in visualization interaction. They tested the effects of these techniques, including eliciting users' predictions of data, presenting personalized feedback on predictions, and explicitly prompting self-explanations with a

visualization. They observed that providing opportunities for users to interact with their prior knowledge improves recall of data values and is more powerful when used with visualization than with text. Their findings deepened users' understanding of the data and paved the way for new interactive visualization paradigms (Kim, Reinecke, & Hullman, 2017).

DATA ANALYSIS

Multiclass classification

In machine learning, classification is the problem of identifying the new set of observations (or instance) belongs to which of the known observation (or instance) category of the training data set (Please, & Gnanadesikan, 1977). For example, assign a given email to the "spam" or "non-spam" category. Classification is an example of pattern recognition.

Classifying instances into one of two classes is called binary classification, and into one of three or more classes is called multiclass or multinomial classification (Aly, 2005). For multiclass classification, one-vs.-rest is the commonly used strategy, which involves training a single classifier per class, with the samples of that class as positive samples and all other samples as negatives (Bishop, 2016). Another general strategy category is an extension from binary. Strategies in this category are by nature binary algorithms, but can be turned into multinomial classifiers, such as neural networks, extreme learning machines, k-nearest neighbors, naïve Bayes, decision trees, support vector machines, etc.

Another general strategy is hierarchical classification. Hierarchical classification solves the problem of multiclass classification by dividing the output space into trees. Each parent node is divided into multiple child nodes, and this process continues until each child node represents only one class. A few methods have been proposed based on hierarchical classification (Hierarchical classification system, n.d.).

What I've learned working with 12 machine learning startups

Daniel Shenfeld has worked with 12 startups. These companies cover a wide range of fields, including educational technology, healthcare, financial technology, and biotechnology. Daniel has held a variety of positions in different companies, such as entry level employee, data science executive, and strategic advisor. In all his works, he has been working on data science issues and machine learning problems. He concluded 8 lessons about products, data, and people: First, "It is about building products, not about AI" -- the value of machine learning and artificial intelligence is measured by the products that they support; second, "It's about the problem, not about the method" – instead of what method is used, how to solve the product problem is the key point. When focusing on the problem itself, we may find machine learning is not that perfect for solving it; third, "Look for synergies between data and product"; fourth, "Data first, AI later" -- If we want to build a product from the very beginning, we should consider collecting data from the very beginning; fifth, "Invest in effective communication"; sixth, "Quick and dirty is not actually that dirty"; seventh, "When in doubt, show the data" – in the absence of quantitative data, the best solution is to present data to users; eighth is "Build trust" (Shenfeld, 2019).

Edit distance calculation by phonetic rules and word-length normalization

Edit distance algorithm is a well-known approach to do string-to-string comparison. In the work of Bae and et al., (Bae, Kang, & Hwang, 2012) they proposed a new edit distance method by consonant normalization and the normalization factor for the syllable-structured word similarity in the context of the Korean language. Their method was designed to improve the performance of the syllable-based and letter-based metrics for word similarity. They conclude that the performance of edit distance was improved via the phonetic pronunciation rules and word-length normalization.

They reported that the phoneme-based metric provided a better result compared to the approaches of letter-based, syllable-based and hybrid distance.

We began this exploration working with the data in our existing system's database. From the literature we reviewed, we planned to improve problem difficulty classification with a machine learning solution (i.e. multiclass classification) (Aly, 2005). Since our client did not specify clear rules for difficulty; during the participatory design process, we found that there were specific rules to categorize difficulty level in linguistics, with the exploration of the data and the literature we found that once we identified the specific rules for difficulty level, we were able to craft a rules-based classification process to support difficulty classification, which was more suitable for our problem.

Method

Research Problem

In the field of communication disorders faculty do not have the opportunity to get students quick feedback on their transcription's exams. Generally, students are presented with words of disordered speech and transcribe them on paper as the medium to record their response. This may take several weeks for the faculty to get them results related to this topic. In that time the faculty and class has moved on to the next concept. This diminishes the efficacy of the students and the confidence that they have in the process of transcription. This also reduces satisfaction for the teacher as they have to manually grade all of the individual items for all of the students. To improve the teaching experience for the teachers and learning experience for the students, a more automated process will support the computer supported collaborative work of this community of practice.

Current System

The APT-GT is an interactive learning environment connecting students with faculty of the linguistics course. It provides educational and information of lessons in the form of videos of speech and activities to transcribe this speech, which are created by faculty and uploaded as assignments and each assignment will have an exam and practice test related to the video. Faculty can upload and manage lesson files, manage users, and manage exams as well as practice tests (Speights-Atkins, Seals, & Bailey, 2018; Speights-Atkins, Seals, & Bailey, 2019). The lesson files are in the video format and the questions added to the exams and practice tests are of audio format. The teacher will have a user account for himself and will utilize this process to login to the APT-GT, the dataflow is shown below.

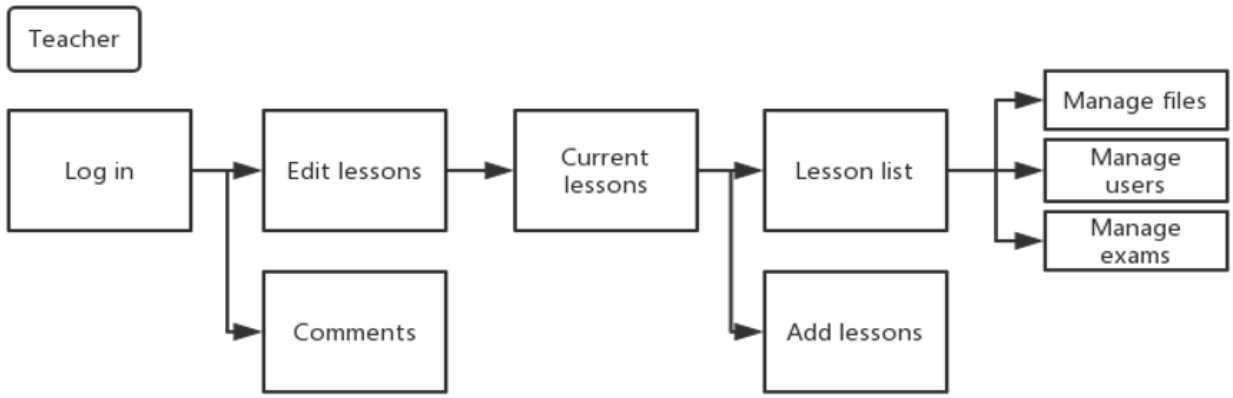

Figure 1-4: Teacher View Dataflow

A student will have to register to the APT-GT to login and access the functionality. The student then registers for a course that he is willing to access. The faculty for the course will approve the student's registration following which the student will be able access the course material, exams or practice tests related to the course. When a student reviews a video for a particular course and takes a practice test and or an exam, he will find the questions in the form

of audio files. The student utilized the International Phonetic Alphabet (IPA) keyboard to transcribe his answers (Speights-Atkins, Seals, & Bailey, 2018; Speights-Atkins, Seals, & Bailey, 2019). The grading tool will compare the student's answers to the professor's answers and offers reliable comparison based upon the saved answers. The tool also offers analysis of results of students both individually and also collectively (as an overview for a particular class) for each exam/ practice test. The dataflow is shown as below.

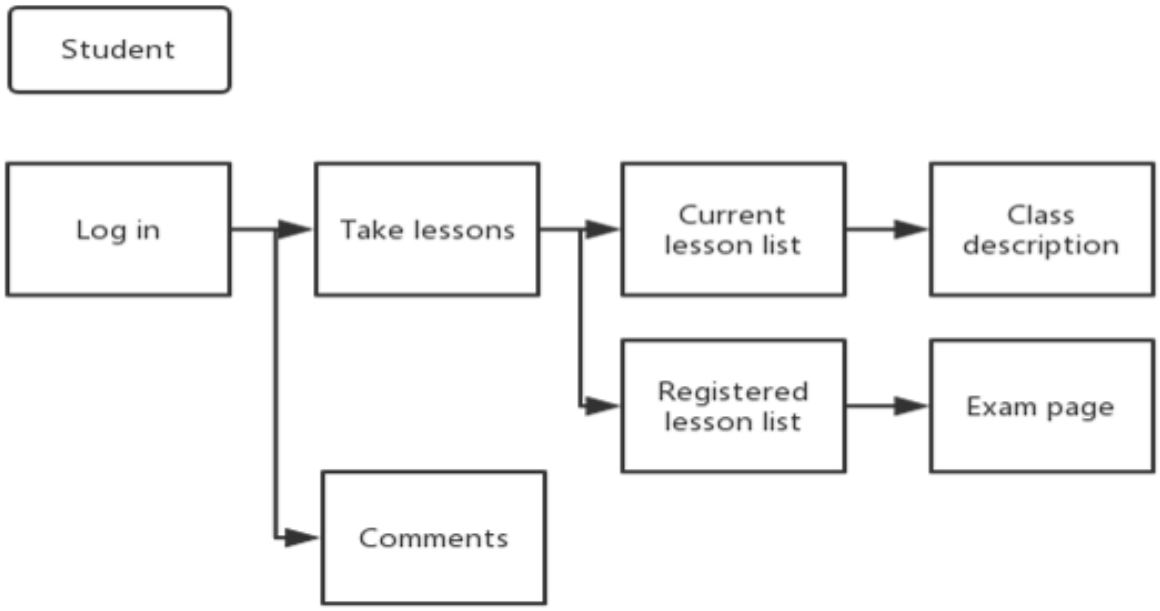

Figure 1-5: Student View Dataflow

The APT-GT v 1.0 has been developed to incorporate all these functionalities. The APT-GT is a web-based application, which enables teachers to create an account, manage lessons, and exams as well as manage students and approve their registration to a particular class. The grading tools enables the teachers to provide course material through an online medium, which facilitates them to make the material available to students at all times. It also enables the teachers to provide tests and exams to students which they can take according to their convenience. The application also enables the teachers to copy or duplicate a particular course into another course along with

the course materials like videos, practice tests and exam and excluding the student data. If teachers plan to offer the course in another semester, they are able to replicate a course in another semester. Once the teacher adds a new course or duplicates an existing course, the course details such as the name, description, start date, semester are editable on a single click, with ease.

The APT-GT enables students to register to the application, login using these credentials and register to a particular course. The students can access the course materials, attempt the practice tests (for which they can access the result immediately) and also the exams (for which they can only access the result after the due date). The students can also see a comparison of their answer to that of the teacher's through a character-wise comparison.

Problem

In the existing Manage Exam module, teachers have to calculate the difficulty of the questions by hand-based calculation, and the system will not record it (i.e. questions and their difficulty level are not stored for future reuse). The next time the teacher needs to reuse a question, they have to recalculate it or they have to remember in advance. In addition, the previously uploaded questions are not reusable. Each time the teacher creates an exam or practice, he or she has to upload every question that will be used in the new exam or practice, shown as Figure 6. This is a very labor-intensive process for the teachers and does not promote good user experience, and this repetition promotes poor server space utilization.

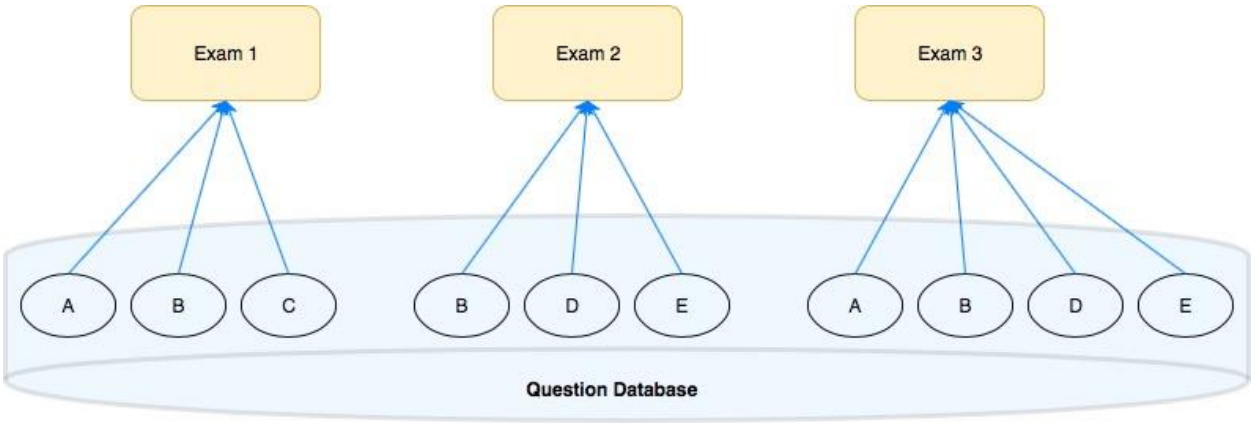

Figure 1-6: Data Storage of Questions

For the examples in Figure 6, “Exam 1”, “Exam 2”, “Exam 3” all have question “B”, which means “B” has to be uploaded three times to generate the three exams; similar to question “A”, “D”, “E” – each of them has to be uploaded twice. This repeated work is not user friendly. What’s worse, the teacher has to waste effort thinking about the question level every time they upload it.

To be a smarter system, the application should be able to automatically calculate the difficulty level of each question when it is uploaded, and the question & question difficulty-level should be saved to allow it to be reused later, saving both teacher’s labor and server storage. The system should also be able to generate exams automatically with the teacher’s requirement.

Proposed Solution

We proposed to redesign the question-upload module, and build a question bank to save all the questions. We call the new part APT-GT UE+. For the new question-upload module, when the question is uploaded, the system should be able to calculate its difficulty level, and it also should be editable that is when its result does not match the teacher’s expectation, he or she could be able to modify it. This module is called difficulty-classification module. The question bank will store all the uploaded questions, and there should be a section to display all the questions to the

teacher. All the questions can be reusable regardless how many times. It will greatly save the teacher's work, the question bank shown as below.

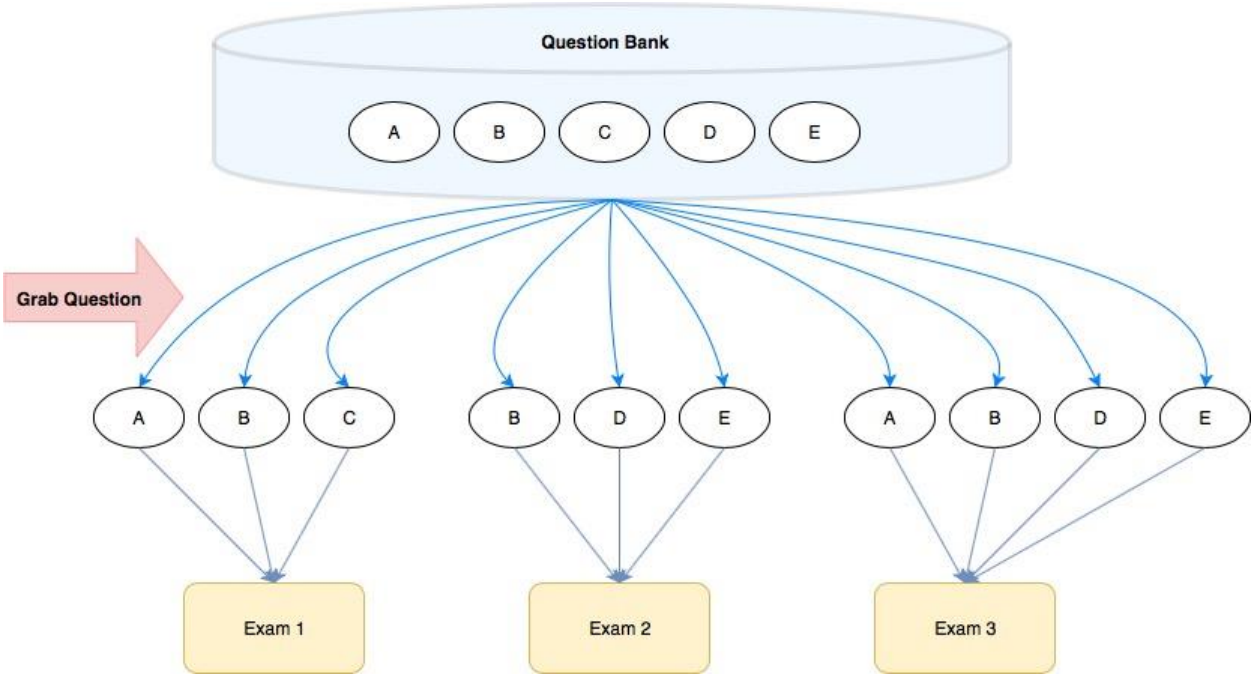

Figure 1-7: Question Bank

For the same case as mentioned in the Problem section, the database only needs to stores each question once, which saves half storage – from ten to five. Also, when the question is uploaded, the difficulty-classification module will calculate its difficulty score and level, saving the teacher's energy of manually calculation.

Another new module of APT-GT UE+ is exam-generation module. In this module, the teacher only needs to input how many questions in each difficulty level he or she wants, and how many points in each level for each question will be set, the system will generate a new exam satisfying the above requirement, together with the automatically calculated total points for that exam.

Hypotheses

The overall usability of the newly designed modules applied to applications will be evaluated based on ease of use, aesthetics, engagement (feedback/design of the user interaction and user interface), and efficiency (code complexity/technologies used). This research is based on the usability questions and research problem in the above section that will be tested at the end of the study. This empirical study will focus on the overall usability of the applications, which will be designed using our proposed guidelines. At the end of the study, the usability analysis of the application by experts and other test participants will be used to test these hypotheses. To evaluate the application, a series of user studies and usability analysis will be conducted (i.e., qualitative and quantitative evaluation and usability analysis are conducted through user surveys). The areas that are assessed are as follows:

Ease of Use:

The overall application design is intended to be perceived as easy to use.

$H1_0$: There is no difference between the experimental and benchmark interfaces on ease of use.

Aesthetically Pleasing:

The layout and design of the application interface is intended to be aesthetically pleasing.

$H2_0$: There is no difference between the experimental and benchmark interfaces on individual appeal and organization of the information.

Engagement feedback:

The application provides feedback to the user via interaction.

$H3_0$: There is no difference between the experimental and benchmark interfaces on time consumed of providing feedback.

Efficient code complexity/technologies used:

The technologies used, or code complexity is the best approach to this application.

$H4_0$: There is no difference between the experimental and benchmark interfaces on code complexity to approach this application.

Satisfaction:

The overall design of the application is intended to satisfy users.

$H5_0$: There is no difference between the experimental and benchmark interface on overall satisfaction.

Features Provided:

The overall satisfaction with provided features meet the user/client's expectation.

$H6_0$: There is no difference between the experimental and benchmark interface on overall satisfaction with provided features meet expectations.

Specification

When defining the specifications of the APT-GT web application, the design team found it useful to determine the conceptual model, and then construct a wire frame.

Conceptual Model

The conceptual model specified the scenarios and functional requirements.

Scenarios

In order to fully understand how APT-GT UE+ needed to function, three scenarios were developed in relation to the prototype. Three persons were created: Ethan, Jason, and Jonathan.

Scenario 1

In the first scenario, “Ethan” visited the APT-GT UE+ website. He uploaded an audio file “elephant” and inputted the phonetic symbol “ɛlɪfɪnt” for it. The traditional rule-based “if-else” algorithm was not suitable for phonetical representations of phonetic symbol words. We applied our own difficulty-categorization algorithm to solve the problem, which will pre-process the input phonetic symbol string. For phonetical representations, the characters may need to be grouped into organic units, as shown in the Appendix 1A, r-colored vowels, diacritics, diphthongs, and double consonants needed to be considered as a single unit instead of several characters. Therefore, after thoughtful consideration, the system treated all the diacritics, diphthongs, and double consonants in a logic way, by dividing the initial inputted phonetic symbols string into array of characters, then combine the corresponding units into one position. As a result, instead of calculating the difficulty score of each character, the system computed the difficulty score of group-based units, then outputted the sum of all of the units as the final difficulty score for the inputted phonetic symbols. The time complexity for the pre-processing was O(n). The preprocessing was done by applying the pre-processing algorithm shown as below and, on the other hand, achieved by restricting the users to use only the IPA keyboard provided by our implementation, for the reason that we only allow users to type legitimate input string. Otherwise, it is very complicated to do the tokenization step, since there are millions of possibilities of input strings.

String pre-processing Algorithm

n: length of input string

result = empty list

The algorithm goes for 0…n:

1. If this character is belonging to a diacritic, a r-colored vowel or consonant, etc. based on the information in Appendix 1A: find the whole group of characters, and add them as a group into the result list
2. Else (not in any of diacritics, r-colored vowels, or double consonants, etc.): add this single character to the result list

Once the system receives the list of strings from the pre-process step, it applies the rules shown in Appendix 1A, checking which categories each string belongs to, and calculates its difficulty score, finally the addition of all single phonetic symbol element string difficulty score was executed to output the input phonetic symbols' difficulty score. The time complexity for this step was also O(n), and n was the length of the inputted string, since it only went through the string once. In this way, the total time complexity of the difficulty-categorization algorithm was O(n) (O(n) + O(n) = O(n)).

In this scenario, the system pre-processed the input string "ɛlɪfɪnt", defined that each phonetic symbol was one element, then by using the rules shown in Appendix 1A, it computed and outputted the difficulty score as 5.5, and it was categorized in the "easy 1" level.

Scenario 2

In the second scenario, "Jason" visited the APT-GT UE+ website. He uploaded an audio file "elephant", which was pronounced by a communication disordered speaker. Jason input the file pronunciation phonetic symbol as "ɛfɪnt". The system calculated the difficulty score to be 4.0 and level to be "easy 1". While, this file had a correct word pronunciation "ɛlɪfɪnt". Jason clicked the add button which was at the same line, and inputted the phonetic symbol. In this case, the difficulty score will be the correct word pronunciation ("ɛlɪfɪnt") difficulty score with the

difference between the file pronunciation (“ɛfɪnt”) and the correct word pronunciation (“ɛlɪfɪnt”), which the system will apply the edit distance algorithm (Bae, Kang, & Hwang, 2012) to calculate.

By definition, edit distance is a way of quantifying how dissimilar two strings (e.g., words) are to one another by counting the minimum spelling correction of operations required to transform one string into the other. One of the simplest sets of operations one can perform is defined by Levenshtein (Levenshtein, 1966) in 1966:

1. Insert a character
2. Delete a character
3. Replace a character

For example, given the words A = “cat” and B = “cars”, edit distance would be 2 since the minimum number of transformations that we need to perform is to replace “t” in A by “r” and then delete the “s” from B. After that, both words would be car. Another solution was also to delete “s” in B first, then replace “r” in B as “t”. That procedure ends up with both words as cat and there are other procedures to produce this resultant word. All the distance in these example cases are the same, which is two.

However, if we defined the length of one inputted string as m, another as n, the time complexity of the brute force solution was $O(3^n)$, where n was the maximum length of the two strings.

With the existing algorithm, we encountered a problem caused by the two strings with similar phonetic representations, through visual inspection we may have 3 characters (e.g. a diacritic) that are represented as 1 sound as produced speech, and we developed a solution to handle this needed translation by preprocessing these strings and providing the necessary values.

The system also runs the pre-processing step as completed in scenario 1. Then using dynamic implementation to save the ongoing result, showing the formula as below:

M[][] is the matrix to store the edit distance

For the list of strings S1 = [S1,0, S1,1, … S1,m]

For the list of strings S2 = [S2,0, S2,1, … S2,n]

M[i][j] = case 0: M[i-1][j-1] + 0 if S1[i-1] == S2[j-1]

case 1: M[i-1][j-1] + replaceCost if replace

case 2: M[i-1][j] + deleteCost if delete

case 3: M[i][j-1] + insertCost if insert

return M[S1.length][S2.length] as the final edit distance

and finally reduced the time complexity to O(m + n) as m and n were also the length of the two inputted phonetic symbols strings.

In this scenario, the system calculates the distance between the two phonetic symbols strings to be 2, and "ɛlɪfɪnt" difficulty score to 5.5, and outputted the difficulty score to be 7.5 and relocated the level in "easy 2" category, which Jason would see.

Scenario 3

In the third scenario, "Jonathan" visited the APT-GT UE+ website. He directed to the exam-generation page, and entered 5 words needed for "easy 1" level, with 5 points for each; 4 words needed for "easy 2" level, with 10 points for each; 2 words for "medium 1" level, with 15 points for each; and 1 word for "adv 1" level, with 20 points for it. Then he inputted "exam 1" as the exam name and clicked the generation button. The system generated the exam with 12 unique questions, for each level, it would call the function in the service layer, shown as below:

```
@Override
public List<Word> getNWordsByDifficultyLevel(int n, String level) {
    List<Word> all = new ArrayList<>(getAllWordsByDifficultyLevel(level));
    int size = all.size();
    Set<Integer> set = new HashSet<>();
    List<Word> result = new ArrayList<>();
    while (set.size() < n) {
        Random rand = new Random();
        int num = rand.nextInt(size);
        set.add(num);
    }
    Iterator<Integer> it = set.iterator();
    while (it.hasNext()) {
        Word word = all.get((int) it.next());
        result.add(word);
    }
    return result;
}
```

Figure 1-8: Logic from Service Layer to generate unique questions

The first while-loop guarantees the uniqueness of questions in each difficulty level. The time complexity of this execution would be O(k * n), with k was the number of levels that this new exam includes, and n was the maximum number of the number of questions at each difficulty level. The system then presents all the questions to Jonathan, and calculated that "exam 1" had a total point as 115 (5*5 + 4 *10 + 2*15 + 1*20).

Functional Requirements

After getting the basic project description from our client, the following items were deemed functional requirements for APT-GT UE+:

1. User should be able to upload a sound file.

2. User should be able to input phonetic symbols.

3. Given the phonetic symbol, the system should be able to calculate the difficulty score.

4. Given the phonetic symbol, the system should be able to calculate the difficulty level.

5. User should be able to input correct word pronunciation phonetic symbols if the speaker is communication disordered.

6. When two pieces of phonetic symbols uploaded, the system should be able to recalculate the difficulty score and difficulty level.

7. The system should be able to present all the questions in the question bank.

8. User should be able to delete question from the question bank.

9. User should be able to determine how many words per difficulty level and how many points per question for each level for a new exam.

10. User should be able to view all the questions generated for the new exam.

11. User should be able to delete the newly generated exam if it does not match his or her expectation.

Wireframe

Figure 8 and Figure 9 show the team's wireframe. The APT-GT UE+ was initially being designed as a web application that a user accesses through his or her web browser as pictured in Figure 8 and 9. After presenting this material to our client, the team decided to add one more button to contain the correct word pronunciation as another dialog was a container for the file pronunciation. Pronunciation classification is further complicated when a speaker exhibits disordered communication and this complication will need to be factored into the difficulty-classification module. The add button is located at the same field with the newly added word under the "New Word" section. When the user uploads a word with the file and the associated file pronunciation, the application calculates the difficulty score and difficulty level for that word, and the correct word pronunciation is set to the same file pronunciation as a regular (i.e. not-disordered) speaker. If this needs to be modified to indicate more distance between the speaker's pronunciation

and regular pronunciation, the user clicks the add button to upload the correct word pronunciation, and the system would recalculate the difficulty score and difficulty level to indicate this distance that needs to be reconciled. Also, these scores and associated levels are editable, if it does not meet the teachers' expectation. This will be discussed in more details in the analysis section as we illustrate the accuracy of the system and provide validation of the accuracy of the difficulty calculation with the support of linguistics professionals. The exam-generation module generates new exams that will utilize questions from the question bank. The user interface requires input from the user of how many words he or she wants from each difficulty level and how many points each question worth for each level, and the input the exam name if he or she would like, the system generates a new exam by randomly picking questions, based on the difficulty level from the question bank, the total score is calculated for the exam automatically. Also, the system guarantees that no repeat questions are generated in the exam.

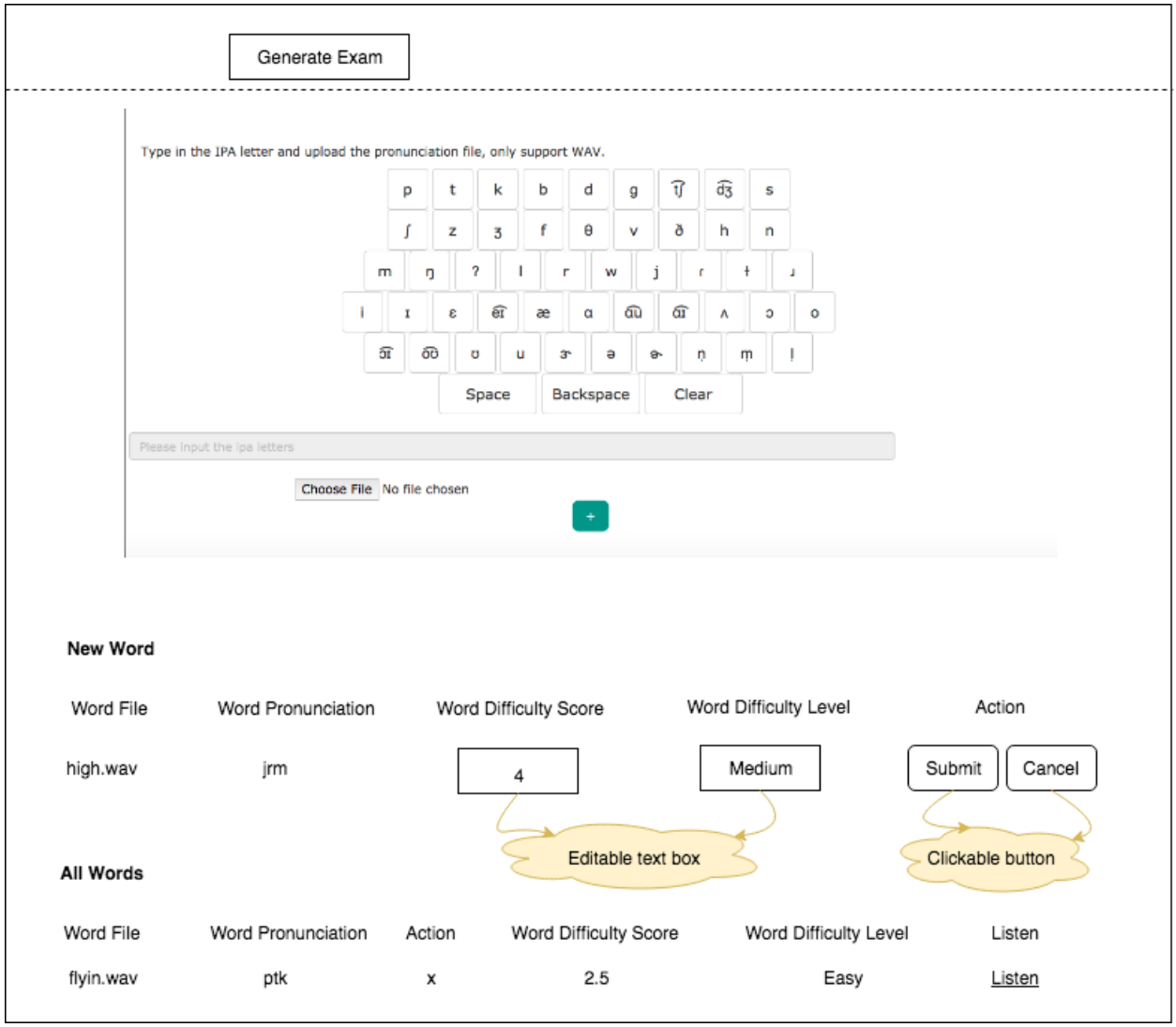

Figure 1-9: Difficulty Classification Module WireFrame

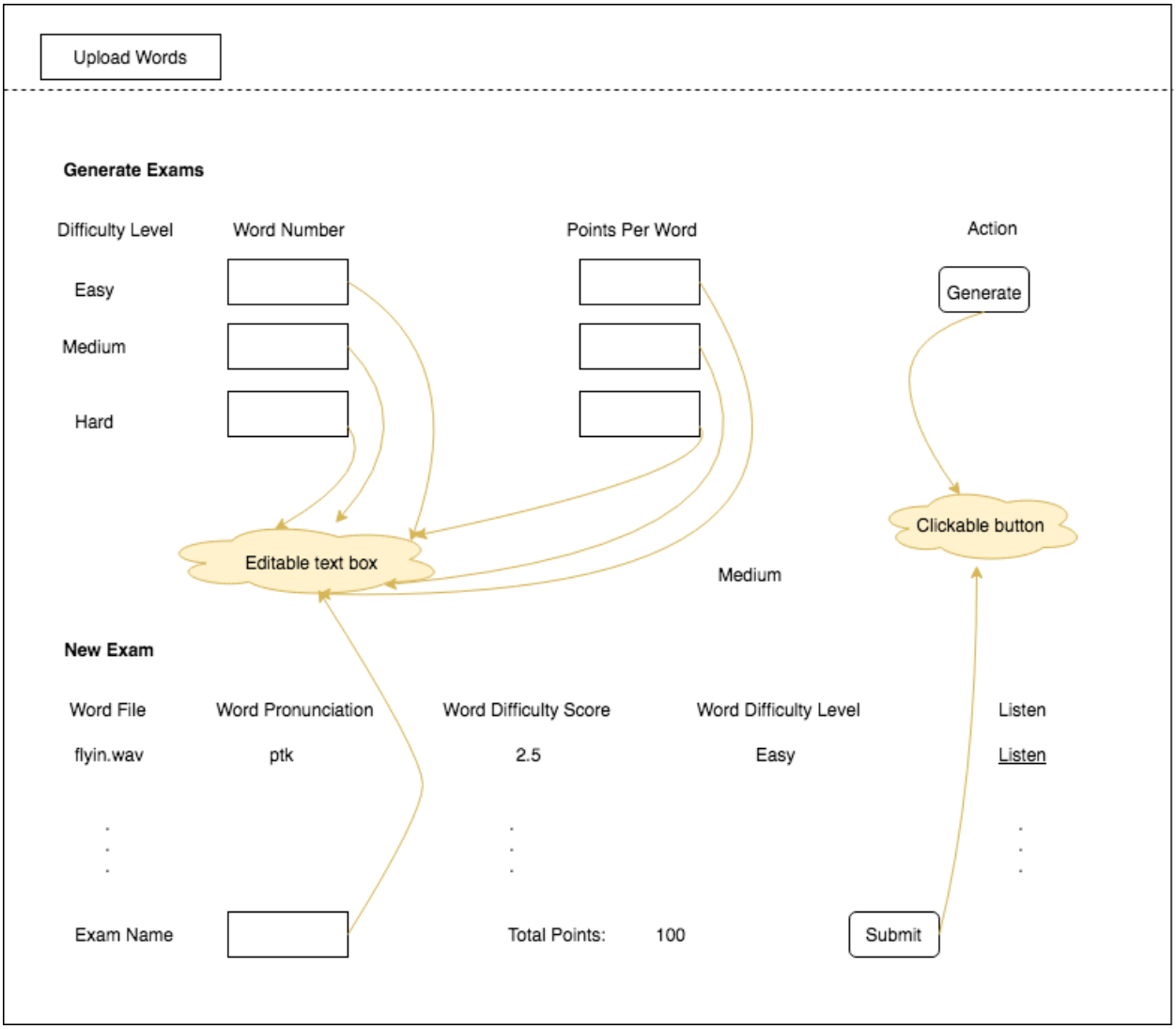

Figure 1-10: Exam Generation Module WireFrame

Software and Hardware Requirement

Given the wireframe above, it was decided the only software requirement for a user to take advantage of APT-GT UE+ will be a modern web browser. As for hardware requirements, the user will require a desktop computer, laptop, or a tablet, smartphone to access the web application and not run into any difficulties, since it is adaptive.

Implementation and Testing

This section describes how APT-GT UE+ was created and tested. Since the software development process was Scrum, the section is divided into sprints. Scrum is an agile software development framework, which is iterative and incremental for managing software development. It is very useful in cases like new software product development, in which there are unclear requirements or emerging requirements. The Scrum process allows developers to adapt to these requirement changes flexibly. It also allows the development of a working prototype as quickly as possible so that the customer can offer their suggestion or additional direction, which is crucial for a new software product development (Schwaber, 2004). After reviewing all the sprints, the implementation details in terms of software languages and tools were discussed.

Sprint 1

Sprint 1 began after the decision was made to improve APT-GT v1.0 application in terms of usability and functionality. The preliminary requirements were collected.

Front-end

After discussing the functions to be developed, our clients, Dr. Speights approved the wireframe, and the user interface design team created a mockup of the prototype, based on the conceptual model. The user utilized the presented IPA virtual keyboard to input phonetic symbols, and choose file button to select the audio file for the difficulty-classification module. Two input textboxes as a pair for each difficulty level to generate a new exam. The default values for all input textboxes are zero.

Back-end

To be consistent with the existing system and ease to integrate later, the team decided to

use JSP, Servlet, MySQL for developing the capabilities necessary for the new modules to function properly. Our client did not specify clear rules for difficulty; therefore, we initially were aiming to resolve this with a machine learning solution (i.e. multiclass classification) (Aly, 2005). Each difficulty level is a class and has its own classifier against all the other difficulty level questions.

Testing

Since the web application had not been fully developed, the testing committee set up the first accuracy test plan.

Sprint 2

At the beginning of Sprint 2, Dr. Speights approved the initial user interface design and more resources for the designers to examine while developing were provided. The team decided to start the development of the web application.

Front-end

During Sprint 2, the interface team started working on the detailed UI design. The requirements for easy navigation, better aesthetic appeal, ease of changing the difficulty score and difficulty level of a newly added question were taken into consideration, and difficulty level score ranges were requested by our client to give an instruction for the update. Figure 11 shows the phonetic symbols and audio upload section, figure 12 shows the difficulty level instruction and update section, which is included in the difficulty-classification module of the user interface design. Figure 13 shows the exam-generation module at the conclusion of Sprint 2.

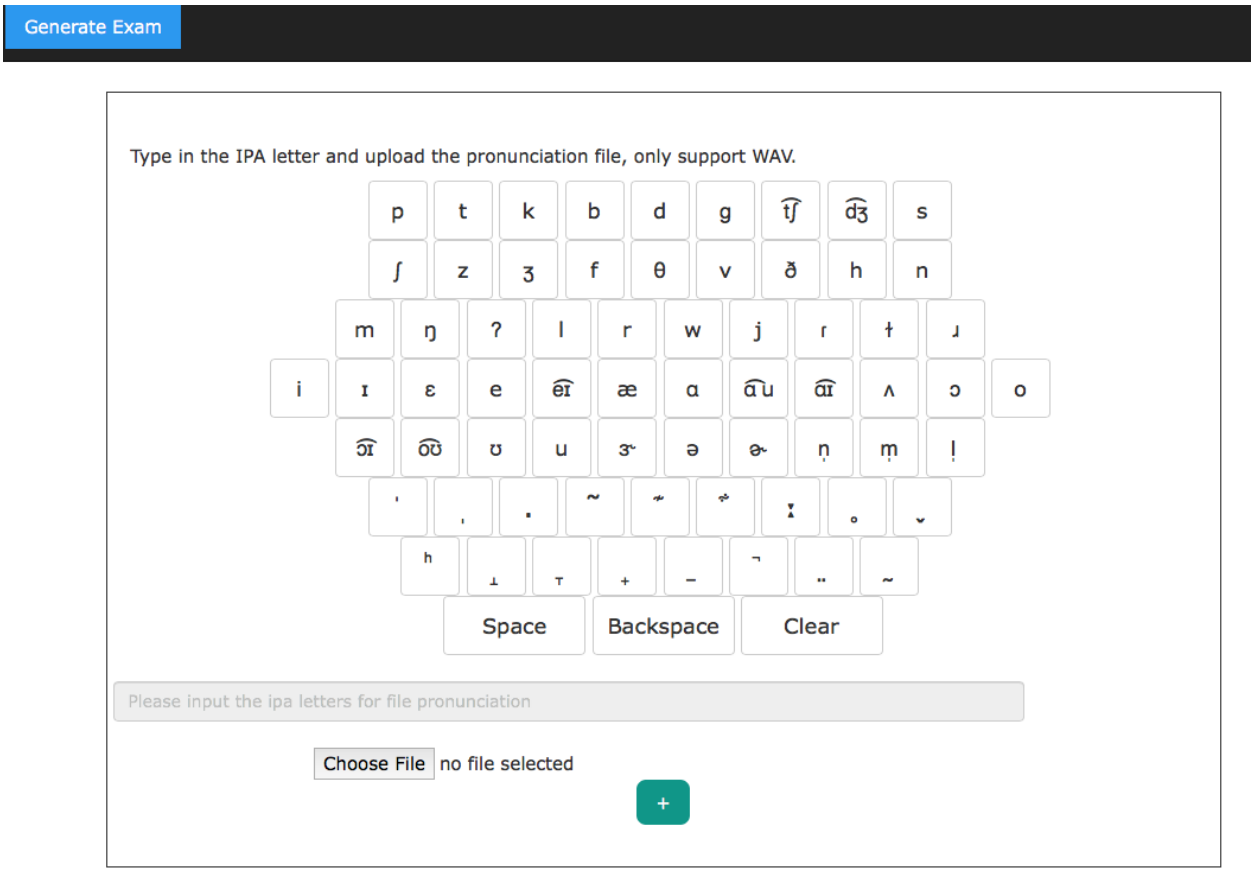

Figure 1-11: Word Upload Section

Points Range for Difficulty Level

Easy 1: 0 ~ 6

Easy 2: 6.5 ~ 13.5

Medium 1: 14 ~ 21.5

Medium 2: 22 ~ 29.5

Adv 1: 30 ~ 40

Adv 2: 40.5+

New Word

Word File	File Pronunciation	Word Difficulty Score	Word Difficulty Level
1559239622254_1437.wav	ŋɛæ.	13.5	easy 2

Update Score To: 13.5

Update Level To: easy 1

update

Figure 1-12: Difficulty Score & Level Update Section

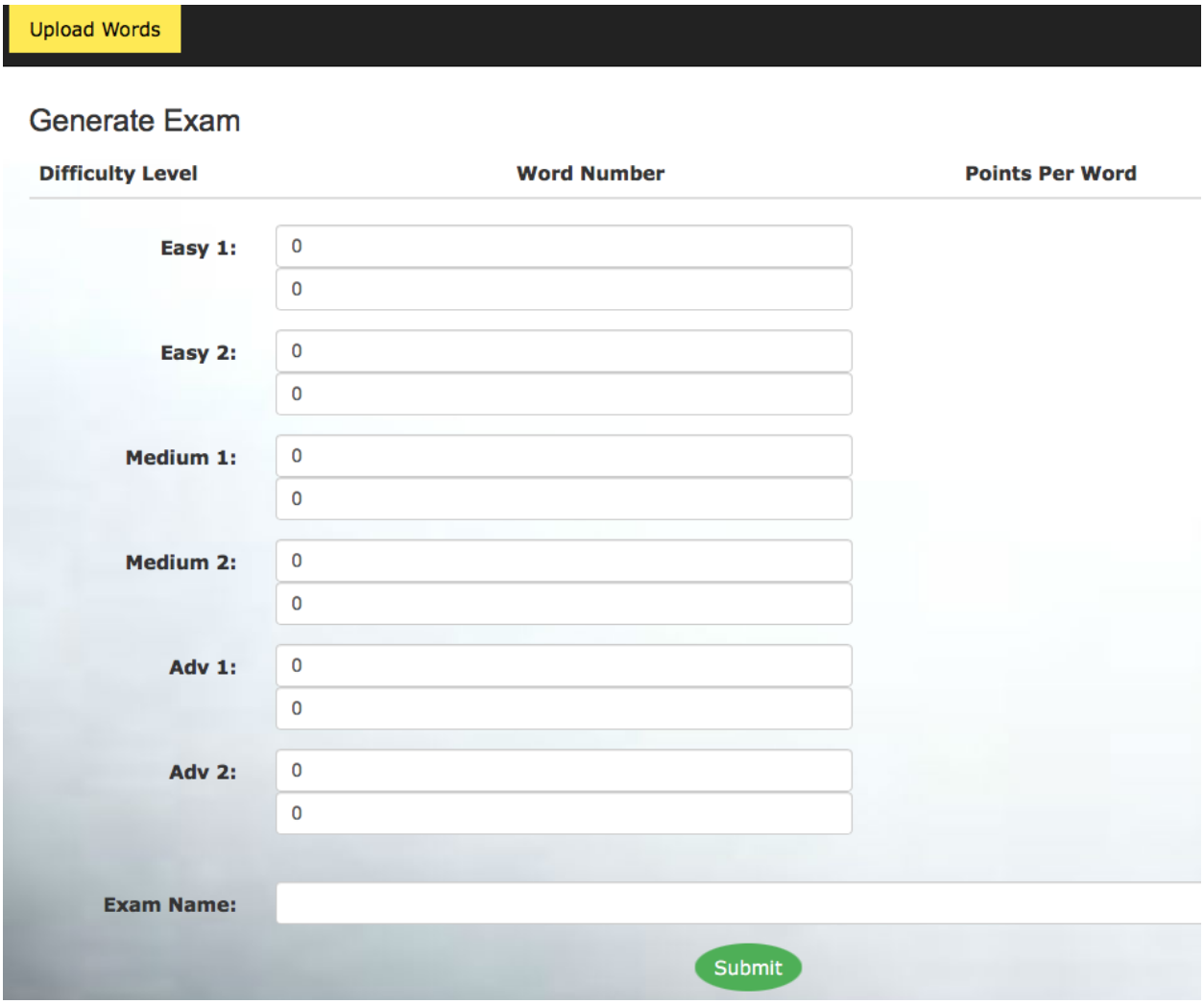

Figure 1-13: New Exam Generation Module

Back-end

While preparing samples for word difficulty level, instead of just giving level to word, our client set up rules for each phonetic symbol. Vowels are divided into the front vowel, back vowel, central vowel, and mid vowel. There are also stressed vs. non-stressed distinction, rhotic vowel, r-colored vowel, diphthong, consonant, diacritics, etc. One phonetic symbol may belong to different categories, and it may also be combined with another phonetic symbol to be an integration. If it is combined, only the integration is considered.

The prepared data is quite different from the data we are supposed to receive. However, we keep in mind that the value of machine learning and AI is measured in the context of the products that they power (Shenfeld, 2019). In the theme of Data First thinking, we cannot begin with a solution and force it to fit our problems. We should think deeply about the problem and then about building products to alleviate the problem or improve the work process. If we are focused on our methods first then we may overlook better solutions. After we found that the rules for difficulty were clearly defined, our team considered that the rule-based difficulty-categorization system may perform better, regardless of the students' response, which should be considered after longitudinal studies of data collection. The detailed information will be discussed in chapter 6.

Testing

The first iteration of the web application was built at this sprint. Our client helped about the accuracy testing, and proposed a new question. The previous design for classification was based on the audio file pronunciation. For a normal speaker, it matched the expectation. For communication disordered speaker, the file pronunciation may be easier than the word correct pronunciation in the phonetic symbol aspect. However, in actuality this transcription will be more difficult with the speaker has disordered speech.

Sprint 3

The focus of Sprint 3 was to ensure all of the customer's requirements were met in APT-GT UE+, and the new modules were tested for all functionality.

By the end of the last sprint, our client was quite satisfied with the exam-generation module, but for the difficulty-classification module, our client proposed a new question. Our rules-based

classifier must also be compounded with the difficulty caused by the added complication of understanding the word that is pronounced poorly. This was the key point for Sprint 3.

Front-end

Consider normal speaker and communication disordered speaker, each audio file should have two phonetic symbols, one is how it is actually pronounced sounded, the other is how the word should be sounded when correctly pronounced. Two columns were added to the "New Word" section, actual word pronunciation and additional correct pronunciation. If the file was recorded by a communication disordered speaker, the Add button can be clicked to add correct word pronunciation, shown as figure 14. The next action is to direct the user to the next dialog, another IPA keyboard for the user to input the correct word pronunciation, figure 15. After the submission, the page returns to the upload word page, and the content of the word pronunciation is also updated, shown as figure 16.

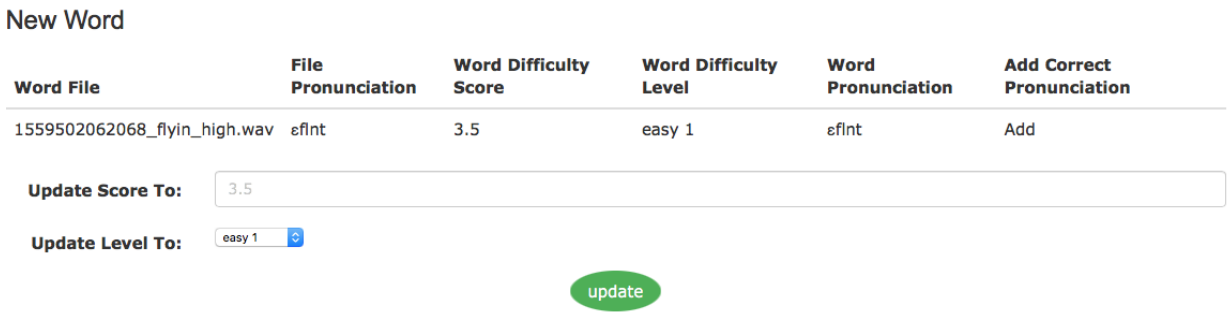

Figure 1-14: Updated New Word Section

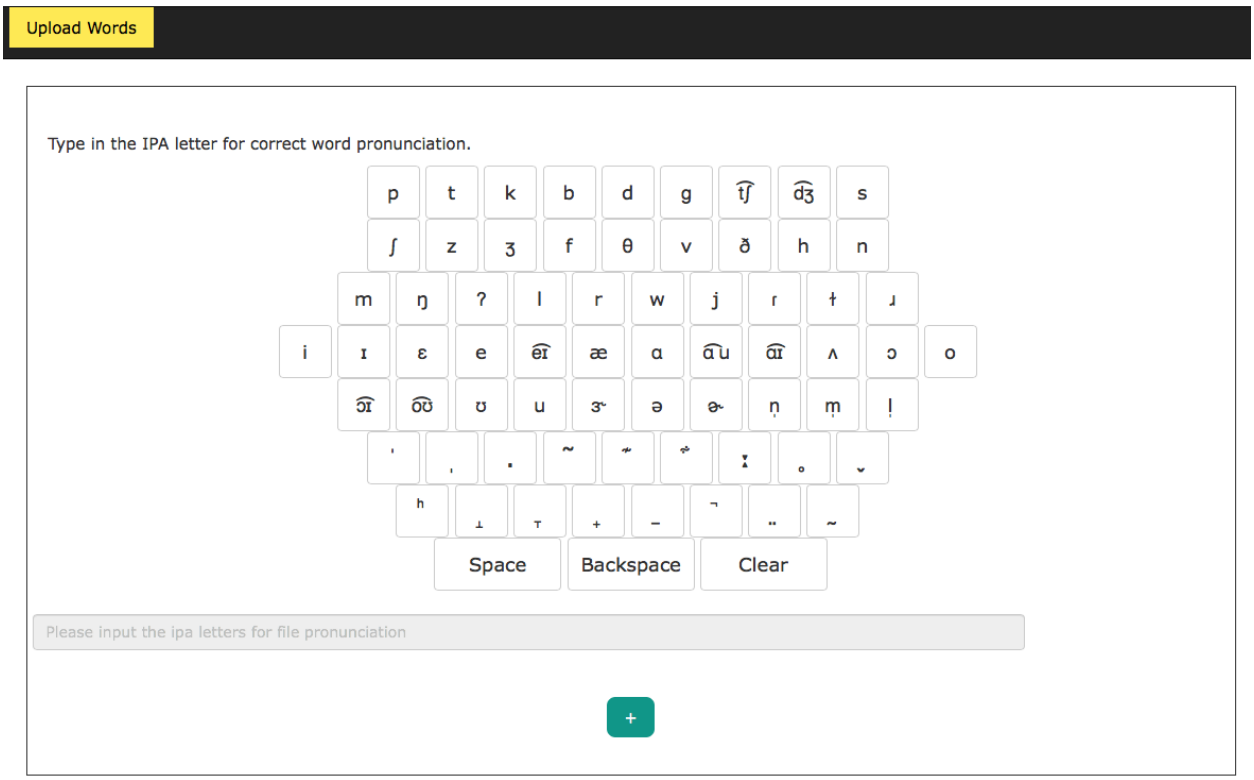

Figure 1-15: IPA Keyboard for Correct Word Pronunciation

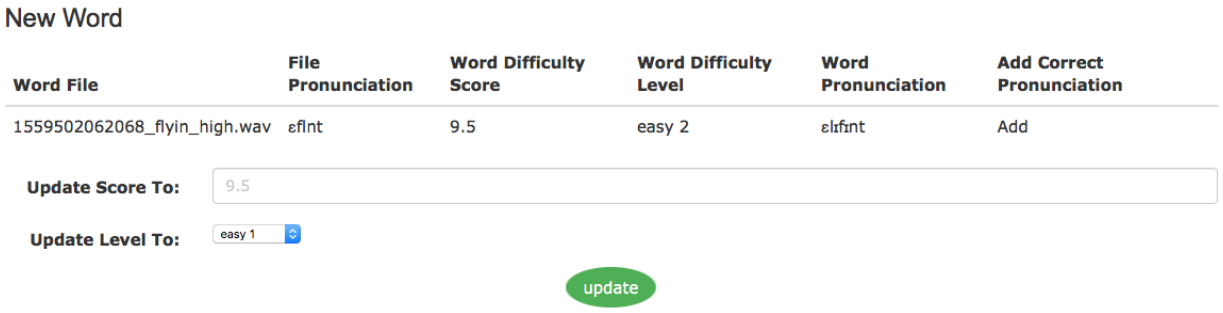

Figure 1-16: Word Score, Level, Pronunciation columns Updated

Back-end

Corresponding to the two phonetic symbol pair, difficulty calculation rules changed. For the disordered speaker file, it must also consider how far the file pronunciation to the word correct pronunciation. To save the user's work, the system as a default, sets the correct word pronunciation to the same value as the audio file pronunciation. If new phonetic pronunciation symbols were

added, the word difficulty score and difficulty level would be recalculated. The Edit distance algorithm was utilized to calculate how far they are from each other (Bae, Kang, & Hwang, 2012). The distance together with the correct word pronunciation difficulty calculates the final difficulty score and level for that audio file.

Testing

By the end of this sprint, a more comprehensive accuracy test was taken by our clients. Twenty-three test cases were uploaded. For the words with less than four phonemes, the results matched the expectation. However, for the words with longer phonemes, if their difficulty scores were at the upper boundary of their difficulty level score range, their difficulty levels were considered underestimated.

Sprint 4

The focus of Sprint 4 was to solve the underestimation of multi-phoneme words.

Front-end

The user interface of APT-GT UE+ remained the same for this sprint since the problem was only caused by back-end logic.

Back-end

The length of a word's phoneme is scaled in either phoneme way or syllabic way. After our clients' discussion, phonemes scale was utilized for this sprint since it also captured syllables.

The pre-process result was utilized again for this step. As it generated phonetic units for each word's phonetic symbols, counting the number of the units resulted in the length of phonemes. We also needed to process an additional value that is attributed to the length of word phonemes

and this is an additional quantity that needs to be added to word difficulty calculations and illustrated in the figure below.

```
if (plen >= 1 && plen <= 3) res += 1;
else if (plen <= 6) res += 2;
else if (plen <= 10) res += 3;
else if (plen > 11) res += 4;
return res;
```

Figure 1-17: Number of Phonemes Affect for Difficulty Score

Testing

By the end of this sprint, the twenty-three test cases were uploaded again as an accuracy test by our clients. One of our clients updated six test cases' difficulty level, for which our algorithm achieved an accuracy rate of 73.9%; another client updated five test cases' difficulty level, for which our algorithm achieved an accuracy rate of 78.3%. Only one test case existed in both the five-updated ones and the six-updated ones. Our clients validated that the accuracy rate of the algorithm was acceptable at this moment.

Implementation Details

Our server was utilizing Tomcat to equip a computer currently. Later it will be integrated into the existing system, which has the APT-GT server. The team used the Dynamic Web Project Module in Eclipse to implement the fully functional prototype. The languages used during development were JSP, HTML, CSS, and JavaScript for front-end; Servlet, Java, and SQL for the back-end. In order to make the web application adaptable to various screen sizes, the developers utilized the Bootstrap libraries.

The finalized new module prototype was accessible to individuals with desktops, laptops, tablets, or smartphones given their devices had a modern web browser, like Google Chrome, Safari, Firefox, or Internet Explorer.

Results and Analysis

With the design and development of Question Bank in APT-GT UE+ web application, this new design saves teachers the effort of re-uploading questions (i.e. once a question is uploaded, they can be reused in the future). The question bank also allowed the server to store unique questions only. This module satisfies our hypothesis of robust Features to meet our user/client's expectation and the hypothesis of client Satisfaction. Our smart difficulty-classification module saves teachers' labor of repeated work – calculating and checking the accuracy of the difficulty score and level for questions when utilizing them, which satisfies the hypothesis of Efficient Code Complexity/technologies with the use of difficulty classification. Also, the exam-generation module allows a new exam to be generated with only the number of questions requested and points-per-question being entered. This also satisfies the hypothesis of Efficient Code Complexity/technologies with automatic exam generation. The APT-GT UE+ has been validated that it improves the user experience significantly.

Conclusion and Future Work

Conclusion

We have created a resource for Communications Disorders faculty by providing a learning system to support automatic transcription of language transcription, that currently does not exist. There are many popular Learning Management Systems, such as Moodle, Canvas, Blackboard, and they do not presently have applications to support this challenge of specific phonetic symbol transcription and automatic grading. This paper presents the motivation, method, and implementation of the APT-GT UE+ website. We noted all the changes to be made to APT-GT v1.0 requirements and provided solutions to develop the system. We designed and implemented Question Bank in the system, to save teachers from re-uploading questions that have been uploaded

before. This also avoids duplicate storage of questions in the server. Secondly, our smart difficulty-classification module saves the teacher from thinking and calculating difficulty score and level for questions when utilizing them. Thirdly, the exam-generation module allows a new exam to be generated with only the number of questions desired and points-per-question being entered. These developments significantly improve the user experience, which was affirmed by our clients and also verified our hypotheses.

Future Work

Future work can be divided into two parts. The first one is the accuracy and efficiency of the APT-GT UE+. Currently, we are utilizing rule-based difficulty categorization algorithm and edit-distance algorithm to do the difficulty classification. We don't have an exhaustive set of test cases but have cases that have been validated by Specialists in this content area. To have a more powerful and conclusive result, we'd like to collect more questions, probably keep track of the database for a longitudinal study. Calculate the difficulty score and level using our algorithms, and compare them with the database-saved data, which are verified by teachers. If the difference (i.e. non-accurate and need to be manually updated) rate is high, we may re-consider to utilization of the multiclass classification model as a logic module, and then compare their performance. In addition, our current tests are only from the professionals' aspect. In further study, we may also take the students' aspect into consideration to improve the study efficiency of our system and user experience for the students, that is if teachers agree that one question should be considered as easy, however quite a few students get wrong on that question, the difficulty level of that question should be reconsidered. This could be added as a feature if we utilize the machine learning model.

The other part of the future work is that the whole APT-GT system should also be available as a mobile application in both iOS and Android platforms, since smartphones are more and more popular, and mobile learning has taken an exceedingly important position in the CSCL market.

Appendix 1A. Difficulty Score Rules for Phonetic Symbols

Rule		score
Front Vowel	i, ɪ, e, ɛ, æ	1
Back vowels	u, ʊ, o, ɔ, ɑ	1.5
Central vowel	ɝ, ʌ, ɚ, ə	2
Mid vowel	e, ɛ, ɝ, ʌ, ɚ ɔ , ə, o	.5
Stress vs. non-stressed distinction	e, eɪ, oʊ, o, ʌ, ə, ɝ, ɚ	3
Rhotic vowel	ɝ, ɚ	2.5
r-colored vowel	ɪɹ , ɛɹ, ɑɹ, ɔɹ, ʊɹ, oɹ	2.5
Diphthong	eɪ, aʊ, oʊ, ɔɪ, aɪ	2
Consonant that doesn't match roman alphabetic symbol	d͡ʒ, ɹ, t͡ʃ, θ, ð, ʒ, ʃ	1
Affricates	d͡ʒ, t͡ʃ	2
Allophone	ɾ, ʔ	2
Diacritics	ː ‖ ˺ ʰ ˜ ˇ ˣ ˚ ˖ ˗ ˔ ˕ ʷ ˒ ˽ ˾ ɫ	5
When the orthographic spelling contains a letter that is identical to an IPA symbol for a phoneme that is not in the word	j	1

Or when the grapheme and phoneme are the same but represent different sounds (ex. “j” jar and /j/ yellow)		
When one grapheme is represented by two phonemes ex. mjuzık	mj, kw, ks	2
Low back vowels	ɔ, ɑ	4
All other consonant		0.5

Essay 2: Refactoring Design: IWANT2KNOW an improved User Interface to support an Online eLearning Network

Introduction

With the development of Internet technology, individuals can access huge resources and information, including news, advertisements, and other market products. Some new technologies may be inconspicuous to the average consumer, but development teams utilize them to constantly create new educational resources. Online educational resources and tools are gaining in popularity, but are not as popular as some more lucrative markets (e.g. gaming industry) (Genota, 2018). However, educational resources play a vital role in human development, because they have a huge impact on the new generation (Igel, & Urquhart, 2012). Generation z and young adults are the groups in the stage that will decide what they will do in the future. How can we make the generation z have a tremendous future? We need to prepare for them an appropriate environment and facilities with solid knowledge to achieve this goal. We must recognize that the future technology workforce will not be the same as in past years (Colbert, Yee, & George, 2016). Limited education and skills make it difficult to get jobs in a job market redefined by technology. This situation makes generation z lose their interest and fear the future. We want to motivate young adults and attract them in their interested fields and make it easy for teachers to express their thoughts and feedback quickly. Therefore, the use of online educational resources is critical, and for us, this research is valuable.

The popularity of mobile devices such as smartphones and portable tablets has made it possible for anyone to access the Internet anytime and anywhere. Mobile Learning marks the beginning of a new era of learning (Dye, Solstad, & K'Odingo, 2003). Mobile learning is learning that can be done anytime and anywhere with the help of mobile computing devices. In this research,

we have been tasked to create educational software to improve access to educational articles. From our review of the literature, we have found that it is expensive to find good educational software, and for economic reasons, institutions/organizations are hesitant to invest in them. This situation greatly requires a low-cost mobile learning system that provides an effective learning system for students. The purpose of mobile learning is to allow users to access information when they need it. Mobile devices can be easily brought to different locations, and users can access learning materials as long as they have access to the Internet. Due to the limited screen size of mobile devices, User Interface (UI) design for mobile learning requires simple and easy navigation. These characteristics make mobile learning a better learning strategy for young people to explore their interest (Understanding The Difference Between eLearning and mLearning, n.d.).

The For Youth, For Life Learning Network consists of STEM topics related to science, health, living responsibility, etc. Based on the knowledge of extension.org, they have made great efforts to provide young people with content in various subject areas (Seals, Zhang, & Cook, 2016). However, extension.org has a general design for all populations, in other words, it is not specifically designed and attractive for the new generation. It is common to build systems to support learning and work for general groups, but rarely is the focus on specific user characteristics such as age, race and ethnicity, or specific populations. It has been presented that specific age groups have different software and interface preferences and they require design considerations that target their needs and abilities (Darejeh, 2013). To fill this gap, we propose to design and develop an application specifically for our targeted group.

In this study, we designed and implemented a new Android version of the IWant2Know application. IWant2Know is an application providing introductory information on various subject areas to generation z. Our system will collect data from specific organizations, which have

educational articles, such as extension.org. Also, we have collected requirements, designed and developed a user-friendly Android application for young adults (i.e., based on user feedback) and students can utilize this app to access exciting topics (e.g., youth science). We aim to improve user experience in the area of STEM content access.

We collected the specific resources from the Internet, displayed them to the individual users and provided recommendations. We will discuss special requirements and design principles for the developing software to improve user experience, and discuss the development team's software process. In Section 3, the methodology, we discuss the existing problem and proposed solution. The next section covers the detailed implementation of the application and section 5 discusses the system evaluation and corresponding results. We will complete this work with conclusions of the study and proposed future work.

Literature Review

The plan for the next improved version of IWant2Know application is still an Android application. We will study the ideas of Mobile Learning, especially Mobile Learning for generation z. The innovative idea for application design and mobile application design is another aspect we will dig into. In addition, we are designing and developing an application to give introductory, in other words, our audiences are novices in the introduced areas, thus we need to pay attention to software design principles for novices. The following part will discuss those areas.

Mobile Learning

Mobile learning is defined as "any sort of learning that happens when the learner is not in a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies" (O'Malley, Vavoula, Glew, Taylor, Sharples, Lefrere, ... & Waycott, 2005). Just as desktops and laptops are primarily used for

electrical learning or e-learning, devices like cell phones and personal digital assistants (PDAs) are used for m-learning. Thanks to the features of mobile devices, in the mobile learning model, students can use the mobile device at any place and access the learning materials at anytime and anyplace. Students learn as if they are in a real classroom while they are outside of school. Students communicate and exchange data with each other and even with their instructors anytime they are equipped with a mobile device. Students also decide their own learning path since they will select from a menu of courses based on their preference. Moreover, students can gather data unique to their current environment and time, including both real and simulated data (Vrana, 2015).

Mobile Learning Environment System (MLES): The Case of Android-based Learning Application on Undergraduates' Learning

Fahri and Samsudin measured undergraduates' perception of mobile learning used throughout a semester. They divide fifty-six students into two different groups. The first group uses the e-learning of the university and the second group uses their mobile phones, running to gain access to learning contents. The questionnaires are prepared in Google doc form, which includes four sections: respondents' demographic, android learning environment system, e-Learning environment provided by the university and the effectiveness of the android learning system. The results revealed that students using mobile learning systems were more receptive of their learning experience. The authors concluded that mobile learning systems were cost efficient and were quite easy to implement. The participants of the study reported that the application was fun, interactive and intuitive, based upon their use of this mobile learning system, which supported self-paced student learning (Fahri, & Samsudin, 2012).

A study of the interface usability issues of mobile learning applications for smartphones from the users' perspective

A great M-learning application should be attractive, easy to understand and easy to use. Enjoyable experience and meeting the usability needs for users is critical for this kind of app. There are few instructions or methods to assess the usability of an M- learning applications. Alrasheedi and his colleague developed a conceptual framework to achieve this goal. Also, a prototype application for smartphones was developed by using Java and the Android SDK as a guideline of their framework. They used questionnaires to analyze the collected data and concluded that their framework provided guidelines to support the design and develop M-learning applications (Ali, Alrasheedi, Ouda, & Capretz, 2014).

User Experience Design

Sidebar vs. No Sidebar: The Pros & Cons For Different Layouts

The sidebar of websites dates back to the mid-1990s. The early sites were simple, but usable, and since then the web development community has made many great advances in web design over the past 20 years. But as responsive design grows as a strategy, it is questionable whether the sidebar is still useful. For mobile phones since there is little space on the smaller screen, there are several responsive design strategies. Strategies are as follows: sidebar has been replaced with a bottom menu bar to allow for the viewing of more screen real estate; side bar that is hidden or to have a hamburger menu that can expand; and the most noteworthy option is to completely forget the sidebar (i.e. have no side bar at all) (Rocheleau, 2017).

This design does not provide extra content for mobile users. The width of the site can be reduced without the sidebar, and it is easier to rearrange the layout. Of course, it's unfair to remove

the sidebars of all sites. It all comes down to what information is conveyed with the sidebar and the value of that content (Rocheleau, 2017).

A framework for technology design for emerging markets

As millions of new people from emerging markets are coming to the Internet in recent years, Sambasivan et al. (2017) proposed a framework for technology design especially for emerging markets. They shared the framework creation process and discussed the framework. First, they designed and implemented the framework wireframe, then they created the guidelines and defined specifications. Then corresponding metrics were developed. Finally, they commoditized the framework into tech talks, posters, etc. for the general public. Visual aids and examples were helpful to apply the framework to the design process. They provided a 9-dimensional (6C's and 3S's) methodology for product and research design. The framework format made information adhesive and continuous, making it easier to connect with different product teams. 6C's were: connectivity -- since in some of the emerging markets' the Internet services were slow, unreliable, often offline, then design should take the lack of connectivity into account; compatibility -- since a significant portion of users in emerging markets could only afford low-cost devices, which means the hardware and software were low-level, the design should be compatible with those low-end devices; cost -- data costs could still be a large portion of monthly expenses in emerging markets, the online applications' design should really care about data consumption throughout the whole app lifecycle; culture -- the existing social, cultural, political and religious norms may affect the acceptance and likability of the application design; commerce -- once the design involved payment, local economics, local relevant payment methods and local business models all mattered; content -- in addition to a useful design, expectation fitness should be considered. 3S's were: social -- in some emerging markets, a sense of belonging to social units were quite important, which yearned

for social currency creation in the design to make users perform well and look good in the groups; sensorial -- different cultures have different aesthetics, emerging markets have vivid characteristics like vibrant, busy, densely populated, which the design should fit; surprising -- provided something extra occasionally to ease users' pain point, such as infrastructural constraint, would be appreciable (Sambasivan, Jain, Checkley, Baki, & Herr, 2017).

Semantic UI: Automated Creation of Semantically Personalized User Interface

Oleksiy (2015) presents a framework for user-centric personalized UI of applications and services. Based on configurable UI elements (able to adapt accordingly to user preferences), this framework applies "one-design-fits-all" approach for UI development. This approach might help to relieve competitive efforts regarding system user interface development and direct them towards product business logic improvement. Additionally, this framework incorporates a personal semantic user-profile management architecture distributed among applications and services. This distributed nature of the architecture allows users to make changes to their own profile immediately from a place where and when such need appears, increase willingness of a user to do this, rather than make it through central Profile Management system in isolation from a particular context. Along with UI personalization, this paper tackled a challenge of semantic API visualization. The authors presented an approach towards on-the-fly UI creation based on machine-readable semantic descriptions (e.g. semantic service API) facilitates a process of human integration into machine-oriented infrastructure and allows the human to become an integral part of the IoT environment (Khriyenko, 2015).

This approach was implemented in two projects funded by the government and driven by a consortium of local companies. The projects are concerned with end-user supportive tools in IoT and challenges of customer feedback gathering process with its automated processing. Today most

companies are looking for new strategies and techniques to engage a customer in the collaboration process making the process more attractive for them. The involvement of customers into a collaborative product review and feedback provisioning process provides a deeper understanding of their needs and increase the likelihood that the new products will meet customer's needs. Therefore, this paper summarizes the role of semantic personalization of feedback supportive tools as crucial for fruitful customer involvement in the process (Khriyenko, 2015).

Software and Tools for Novices/Youth

Design principle for youth/novices

Youth today are growing up in a world filled with newly evolved technologies, such as the computer and smartphone. Since many applications intended for use by youth are developed, many scientists are investigating the relationship between youth and software. As science has shown, youth are different from adults in cognitive development and physical development. Therefore, software designed for adults cannot be directly applied to youth. Special design principles should be identified for youth. Sonia Chiasson and Carl Gutwin have reviewed a variety of studies concerning design principles for youth and made several conclusions (Chiasson, & Gutwin, 2005). Listed here are some of these conclusions:

a. Interface should avoid using text-based instruction since youth don't like to read instructions, and they cannot fully understand them. Instead of text instructions, visual or audio cues are a more effective way of displaying information for youth (Chiasson, & Gutwin, 2005).

b. Software should provide some audio or visual feedback immediately after youth have made some action because youth are impatient. If they do not get feedback for their action, they will repeat the action until they get some feedback. Sometimes, this may lead to a system crash (Chiasson, & Gutwin, 2005).

c. Mouse interactions should be made as simple as possible. One-click is better than dragging or double-clicking (Druin, Bederson, Hourcade, Sherman, Revelle, Planter, & Weng, 2003). Touch screen is youth-friendly, and tangible interfaces are extremely welcomed by youth.

d. Colors can evoke powerful emotions and memories. When bright colors are used and put in contrast with each other, youth can see the difference between them, and this creates a more vivid world to explore (Chiasson, & Gutwin, 2005).

e. Icons should be visually meaningful to youth (Hanna, Risden, Czerwinski, & Alexander, 1998), and buttons should be large enough for youth to hit.

Based on these design principles, many applications are developed for youth and make some effectiveness improvements with respect to learning. Zhen Liu illustrated a method of developing youth's e-learning software with three examples written in Web3D. These three examples simulated the virtual image of the sun, a forest park, and an aquarium. In these examples, youth can click on some of the components and receive feedback from the image that allows them to interact with the scene (Liu, 2008). Researchers at Beijing Normal University created a learning software program to improve youth's interest in learning English. This software displays a virtual picture, meaning, and pronunciation of the word when using a mobile camera to identify an English word on a card. Two groups with 20 young students in each participated in the experiment. One used the traditional learning method, the other used mobile learning. The control group received a score of 23.750 in pre-test and 26.250 in post-test on average, which was a small improvement in their results. While, the experimental group made remarkable progress, their mean score changed from 23.125 in pre-test to 73.125 in post-test. Therefore, they concluded that AR learning software for mobile devices was very helpful for students to learn non-native vocabulary (He, Ren, Zhu, Cai, & Chen, 2014).

Scratch Community Blocks: Supporting Children as Data Scientists

Widespread use of social media and digital learning platforms by youth has led to the creation of massive sets of observational data that describe the ways that young people interact, socialize, and learn (Mining, 2012). In this process, youth are the object of analysis; their role is to generate data by using the system. Dasgupta et al. (2017) imagined a different approach to data science and education in which young people use data to ask and answer their own questions. They presented a system called Scratch Community Blocks that was designed to give the 15 million users of the Scratch online community the ability to programmatically analyze data from the community itself—an ability that has previously been the exclusive domain of data scientists and engineers. The system enables community members to create and share their own visualizations and analytics tools (Dasgupta, & Hill, 2017).

Dasgupta et al. demonstrated, through a series of examples and case studies, how *Scratch Community Blocks* both engages youth in visualizing, representing, and answering questions with data in new ways and also supports self-reflection on learning and social participation. As a system designed to support a constructionist approach to data science, Scratch Community Blocks enables learners to learn by designing and building projects that help them answer questions they are interested in and to represent and make use of data in ways that speak to their styles and identities. Learners can also share their work with their peers. These shared creations are not only viewable by others, but can also be used by peers to reflect on their experiences and learning (Dasgupta, & Hill, 2017).

From the literature we reviewed, we planned to design a new user interface applying a bottom menu bar to replace the sidebar to allow for viewing of more screen real estate. With the idea of user-centered, we designed and developed “For You” tab, “Bookmark” tab, and “Setting”

tab beyond the previous introduction tabs to make our application personalized. We also utilized the software design principles for novices to improve the visual look of our new IWant2Know application (Dasgupta, & Hill, 2017).

Method

Research Problem

There is no particular software or application designed for specific groups to gather information from extension.org so far. eXtension is an interactive learning environment connecting knowledge consumers with knowledge providers. This web platform gathers educational and information resources on a variety of topics from the best land-grant university minds across America and provides this knowledge to online learners. It offers reliable answers based upon sound research and creative solutions to today's complex challenges. The For Youth For Life Learning Network is a community initiated in 2007. eXtension is a network of learners interested in a variety of subjects related to science, health, living responsibly, and service to others. It strives to explore ways to engage youth with technology through online learning environments and recognizing learning achievements in a digital form and to produce youth-oriented content in wide-ranging scientific topics for the knowledge base of extension.org. The target users of eXtension.org are researchers, clinicians, professors, and the general public. It is not specifically designed for different age groups, as a result, the UI design is not user-friendly for different groups, especially youth to use. It only has three words linking to the youth section that is located at the bottom end of the home page of extension.org, which is hard to find and navigate. To improve the user experience for younger generations, a more youth-centric designed UI will support this community of practice.

Previous Versions and Problems

This Android application is the extended version of the previous three Android releases.

Comparison with the 1st Versions

Kalyan Bobbili and our lab research team designed the first version based on Android system. Figure 1 shows the homepage and the sidebar. He divided the category based on 4-H (i.e., 4-H, 'Science', 'Health', 'Responsibility' and 'Serve') into four categories, which were science, health, responsibility and serve. By using a sidebar, the user navigated each type. And there was a search bar to search the content from the website. This version implemented most of the requirements with some features to be improved: the article detail page did not provide a way for users to return to the previous page. We analyzed the implementation details and found that though it used the WebView as a container to display the web page, it did not provide a friendly method for end users to return to the previous page; another problem was that the result page of search results had a toolbar overlapped by the phone's status bar, which complicated navigation for the users and they had a difficult time in efforts return to the previous page.

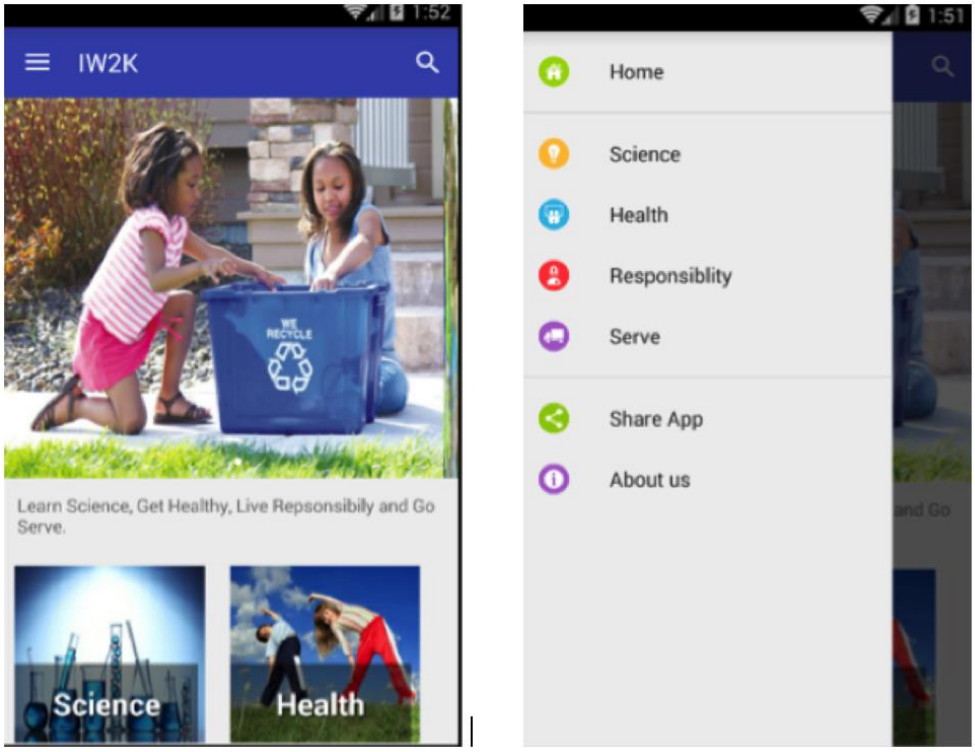

Figure 2-1: Home Page and Sidebar for version 1

Comparison with the 2nd Versions

Version 2 was created as an alternative view as a class project in Human-Computer Interaction by Guorui Li and his teammates. Figure 2 shows the homepage and hamburger menu, which was a mainstream design for a mobile application at that time point. Well-designed software supported users in a user-friendly method to access materials to learn happily and efficiently. He designed this app with UI based on the cartoon style since young people might prefer it. For each category, he created a cartoon-style icon instead of a real-life icon to represent the content. He used a hamburger-style menu to navigate the main page. The whole design was more user-friendly and more appealing to particular users like young people. However, it had several defects in the application: the application did not respond appropriately for the search function. We analyzed the URL when search function was executed and found some URLs were not accessing the proper

resource, which caused the blank page; another problem was when users visited the article detail page and wanted to go back from the details, the back button did not respond (i.e. does not properly support undo). We hypothesized that they did not set the click listener when they implemented the function.

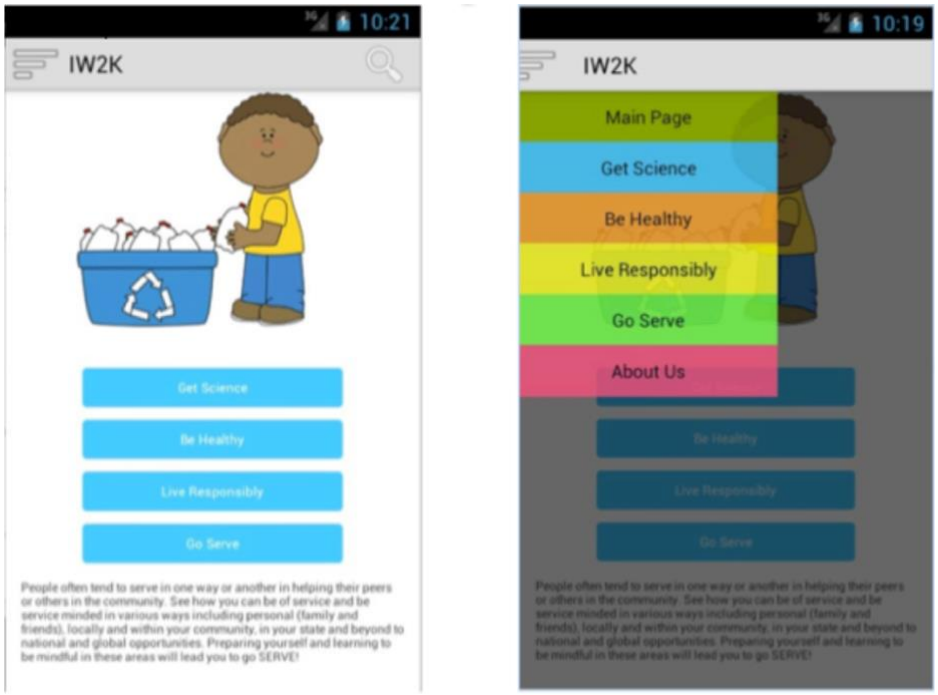

Figure 2-2: Home Page and Menu for version 2

Comparison with the 3rd Versions

Based on the previous two Android versions, the client revised the requirements to create a version that supported both styles. Qian (Seals, Zhang, & Cook, 2016), also from our lab, developed the third version, which had a modal setting button to change the theme of the application. She integrated two themes of the two versions into the third android application, which handled the situation that not all young people prefer cartoon style. Figure 3 shows the real-life style and cartoon style. This version was only an integration, and there was not a significant improvement on functionality, but it satisfied the user's requirement.

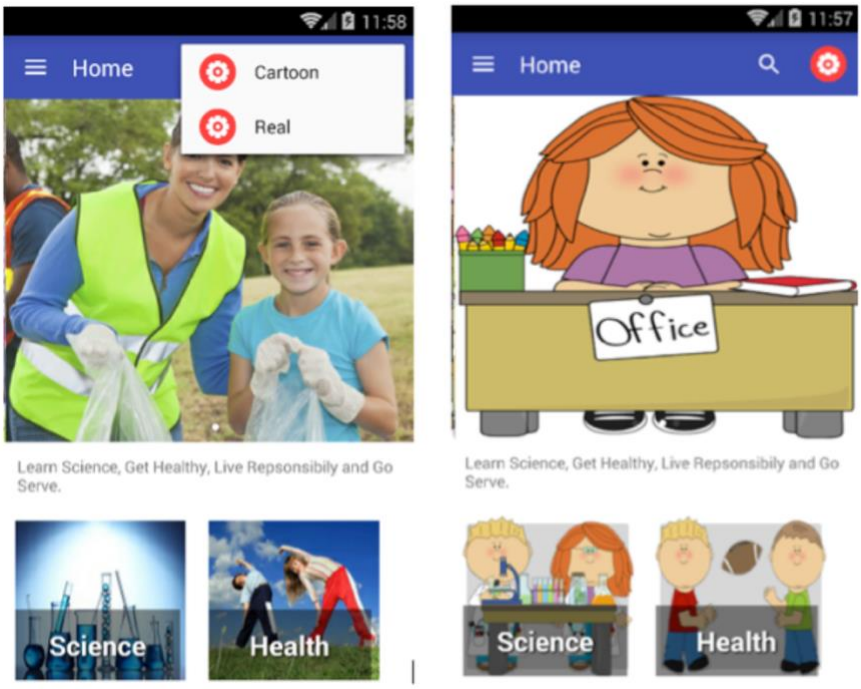

Figure 2-3: Real-life style and Cartoon style for version 3

The three previous versions all separated the articles into four categories. There were also several subcategories in each category list with articles for users learning and reading. All the versions implemented a search icon, which provided a search function for items from the extension.org website. Sidebar style design had been analyzed as inefficient for mobile applications now, and we utilized another layout to catch up with mobile design trend.

Proposed Solution

In order to solve the above problems of making scientific information more attractive and increasing accessibility, we proposed to redesign and develop a non-sidebar and personalized mobile application for generation z. Since it was for novices, the application was designed to support good ease of use and simple navigation to release anxiety. The app contained four broad categories (i.e. 4-H) and their subcategories, which were connected to the category articles. We designed to flatten all the categories, in other words, had all 11 categories listed at the same level.

With this strategy, if our user did not get enough knowledge to figure out his interest in high level (4-H), he could still get the information in specific areas without click into the main categories.

With the user-centered approach, we designed a personalized application. Different from the previous versions' general view, our application asked the user to register and the system saved the user's information into the database for further use. An interest-inquiry page added to ask user's interests about categories. "For You" tab was designed and developed to recommend articles to users. "Bookmark" tab saved user's interesting and/or to-read articles. "Setting" tab included login or logout, and user's action log collection controller from a user's privacy aspect.

The database was another newly added component for our version. The previous versions had all the article contents stored in the application, which made the application take a lot of memory on the phones, and searching function still required the Internet connection. As we considered the connectivity for the software (Sambasivan, Jain, Checkley, Baki, & Herr, 2017) had been significantly improved, and searching function required a connection, we proposed to design and implement a server for the application, to store all the article contents and users' information. This saved quite a lot of spaces for the phones and users' information would be utilized for further development.

Hypotheses

We will evaluate our new application with six aspects which are ease of use, aesthetically pleasing, engagement feedback, efficiency, satisfaction, and feature provided. We will compare our new design version as an experimental group with the previous versions as a benchmark at the end of this research study. Usability questionnaires will be utilized to evaluate.

Ease of Use:

The overall application design is intended to be perceived as easy to use.

$H1_0$: There is no difference between the experimental and benchmark interfaces on ease of use.

Aesthetically Pleasing:

The layout and design of the application interface is intended to be aesthetically pleasing.

$H2_0$: There is no difference between the experimental and benchmark interfaces on individual appeal and organization of the information.

Engagement feedback:

The application provides feedback to the user via interaction.

$H3_0$: There is no difference between the experimental and benchmark interfaces on time consumed of providing feedback.

Efficient code complexity/technologies used:

The technologies used, or code complexity is the best approach to this application.

$H4_0$: There is no difference between the experimental and benchmark interfaces on code complexity to approach this application.

Satisfaction:

The overall design of the application is intended to satisfy users.

$H5_0$: There is no difference between the experimental and benchmark interface on overall satisfaction.

Features Provided:

The overall satisfaction with provided features meet the user/client's expectation.

$H6_0$: There is no difference between the experimental and benchmark interface on overall satisfaction with provided features meet expectations.

System Design and Development

Flow Diagram

The application flow of the diagram is designed to be ease of use and simple navigation. It begins with interest inquiry page, then register/login requested, which is the start step. The main page presents five tabs to users, which are for you, favorites, search, bookmark, and setting. For you, favorites, and bookmark present articles to users, and users read details of the article by clicking it. The Search tab allows users to input text for searching, which returns a list of articles as the result page. This flow is depicted in the figure below.

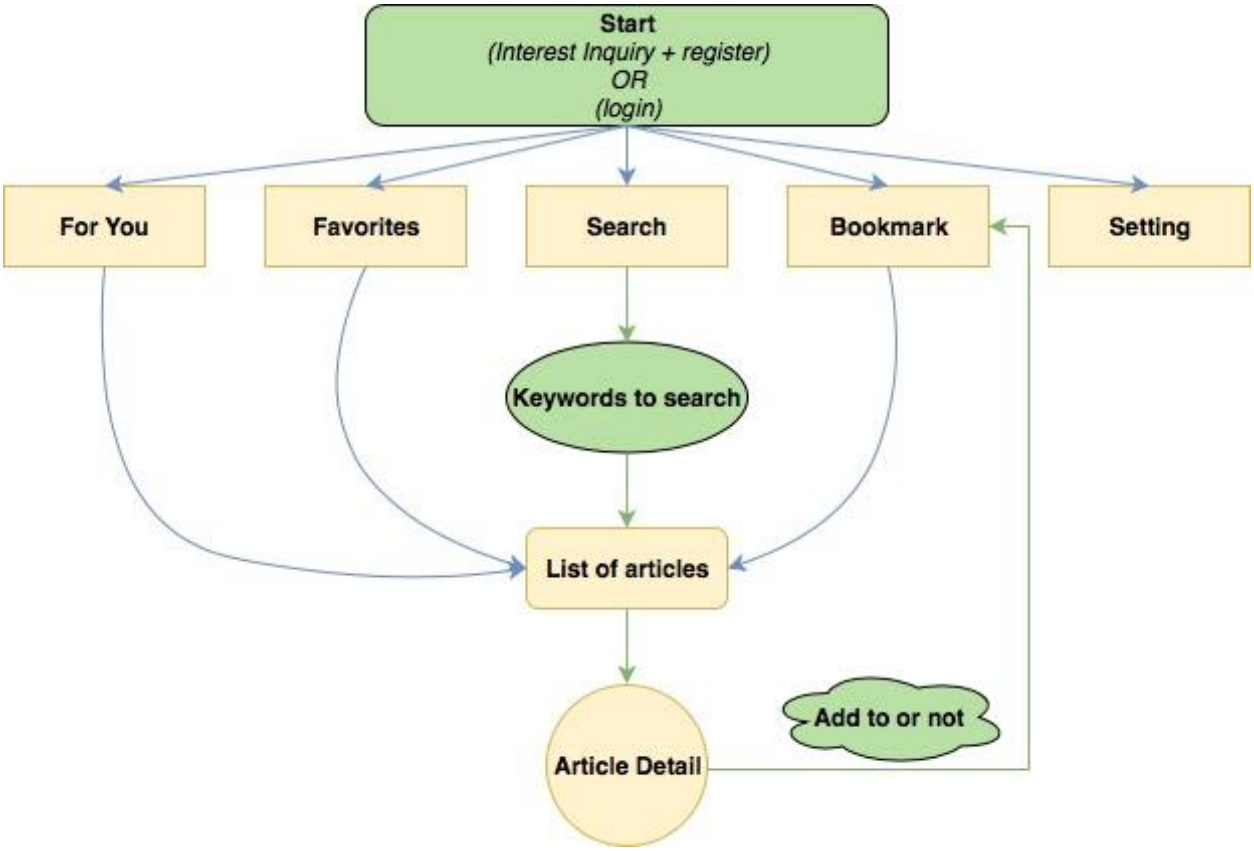

Figure 2-4: IWant2Know Flow Diagram

Tools and Technologies

Android is a mobile operating system (OS) currently developed by Google (Google's Android, 2011). It is based on the Linux kernel and designed primarily for touchscreen mobile devices. Android's app store is Google Play, which has more than one million Android applications ("apps") published. As the figure below shows, which comes from the official site of an android document, most Android devices run above the 5.0 Lollipop platform. The percentage is nearly 82.3%. This data indicates that if we develop the application based on Android 5.0, it supports most kinds of mobile devices with the android system. At the same time, we are available to use the new features of the latest version of APIs. Therefore, we implemented our application based on Android SDK 5.0.

Version	Codename	API	Distribution
2.3.3 - 2.3.7	Gingerbread	10	0.3%
4.0.3 - 4.0.4	Ice Cream Sandwich	15	0.4%
4.1.x	Jelly Bean	16	1.7%
4.2.x		17	2.6%
4.3		18	0.7%
4.4	KitKat	19	12.0%
5.0	Lollipop	21	5.4%
5.1		22	19.2%
6.0	Marshmallow	23	28.1%
7.0	Nougat	24	22.3%
7.1		25	6.2%
8.0	Oreo	26	0.8%
8.1		27	0.3%

Data collected during a 7-day period ending on February 5, 2018.
Any versions with less than 0.1% distribution are not shown.

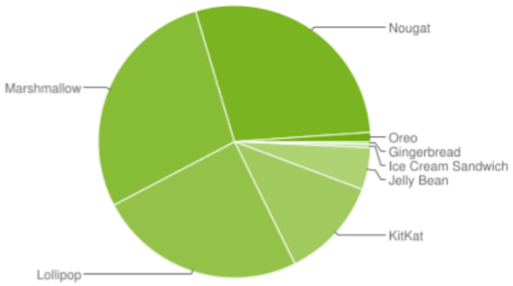

Figure 2-5: Android platform distribution

Application Implementation

As we learned from mobile design study (Rocheleau, 2017), we implemented the application with a bottom menu navigation bar at the bottom of the main page instead of a sidebar. The new menu bar consists of five "tabs" -- "For you," "Favorites," "Search," "Saved" and "Setting" as described in the flow diagram. This was based on the personalized user-centric design for the users since they were able to reach each function directly and conveniently by using only one-touch action, and were provided personalized recommendations.

Start Step

For the start step, we designed and developed interest inquiry page and registration page for users that newly install this application. If the user is a returning user (i.e., not a new user), the login page appears when he clicks the app. We followed the standard flat design specification of Android 5.0, which supports the most current standard of aesthetically pleasing visual effects. The figure below demonstrates the user interface of the two pages.

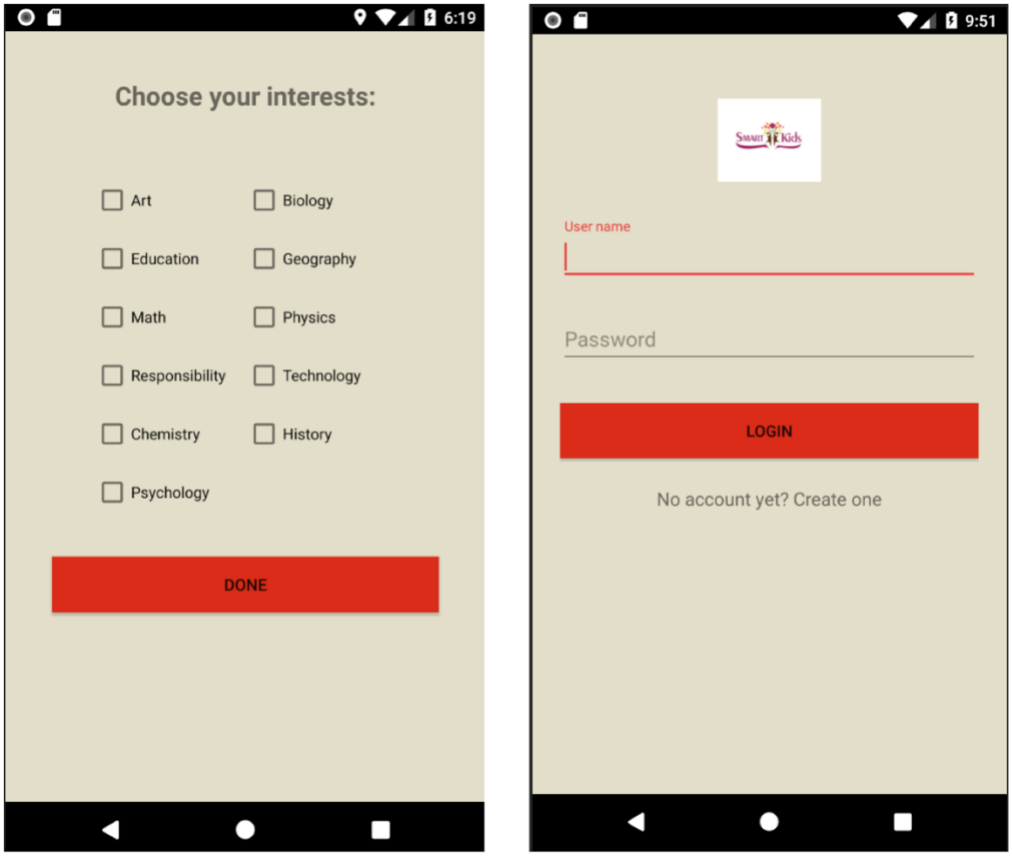

Figure 2-6: Interest Inquiry and Login page for new version

Interest Inquiry page had eleven checkboxes, which represented the eleven basic categories of the article from extension.org, that were art, biology, education, geography, math, physics, responsibility technology, chemistry, history, and psychology. These kinds of topics covered most subjects of both natural science and humanities. Users selected from one to eleven categories for their initial potential interests. Based on that, the recommended articles would be selected and presented in the "For you" tab for users. Each user gets his own recommendation to implement the personalization. With which we want to implement the user-centric idea (Khriyenko, 2015) to improve user experience. If the user is utilizing the application for the first time, they will create a new account and the system will query the users to submit their chosen interests. The application will save this interest information to help the system prepare appropriate views for that user based

on their sentiment. If the user is returning to the application (i.e. not an initial visit), the user will log in, the system will retrieve their profile, and then the application will render a dashboard that is specialized to their sentiment information based on their preferences and show them appropriate views.

Main Pages

In the main page, there were five navigation tabs at the bottom menu, which were for you, favorites, search, bookmark, and setting. All the core functions and interactions presented in these five tabs, which shown as the figure below.

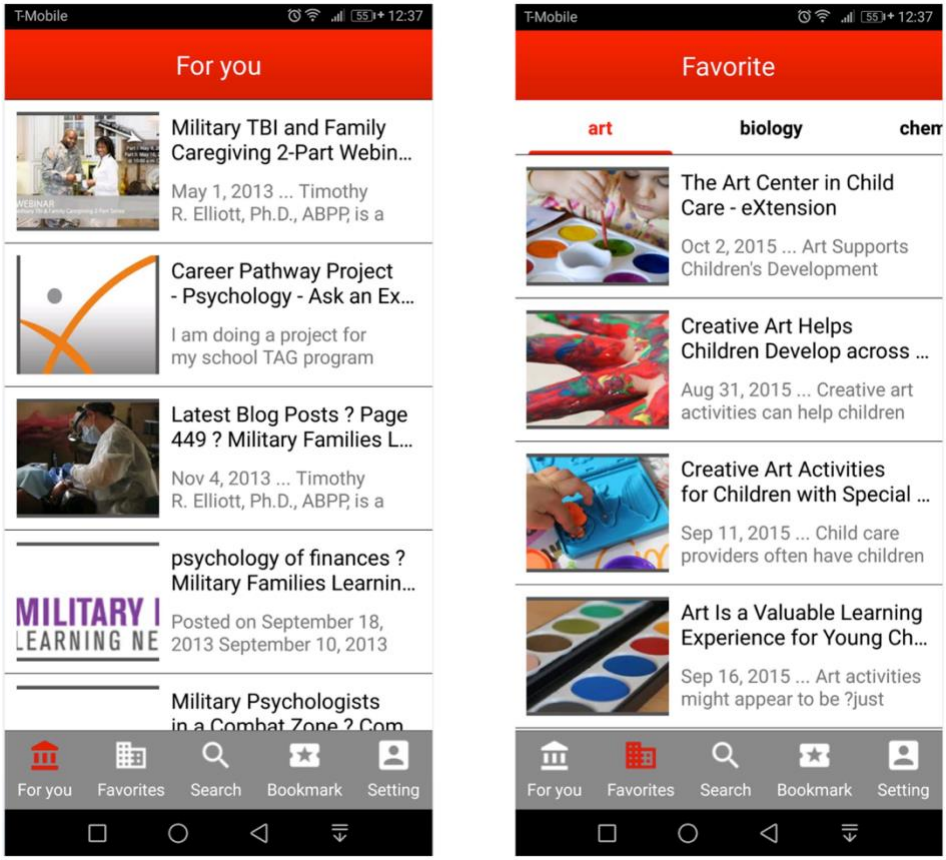

Figure 2-7: For you tab and Favorites tab for new version

Login successfully directed to “For you” tab, which was the default page. It requested data from the server and displayed the recommended articles on the list. The data shown in this page is an example of data from the database. We implemented a pagination function for all the article-list pages with a shown list. On initial display, the server received the request and pulled twenty articles from the database to list in the page. When the user reached the bottom by scrolling the view, the application sent another request to the server to load the next twenty articles.

On the “Favorites” tab, the eleven categories were listed in the middle, which resulted from flattened four main categories and their subcategories. The list-view showed the corresponding data for each group. The user either click each category to view different categories of articles or he scrolled left or right to switch categories. Once he had selected a category to view, the user scrolled up or down to select articles. We also implemented the pagination function for each view-list.

The third tab was “Search” function. In this page, there was an editable text area for the user to type in keywords to search the topics he was interested in. After the search button was clicked, the request was sent to the database and resend a list of data back to the application, which listed on the result page. The result page had a pagination function as well and looked similar to the “For You” page with contents differed. If the user clicks on one article, the application showed the details of the article on the article details page.

All the clicking article actions opened the details page. The “Article Details” page was shown as the figure below. At the top of the page, there was a back button on the left and a star button on the right. If the user clicked the back button, the application returned to the article list page of the tab which directed here. If the user clicked the star button, the star changed to red color, which represented that the user would like to save this article. The user could have the motivation

of being interested in this article to save it or to would like to read it later. This action added the current article to the user's bookmark. The star was designed to allow the user to click again to cancel saving this article, which removed the article from the bookmark. Below the navigation bar, the content of the article was listed, which included the title, the time posted and the article body. The content might be text-format, or a video combined with text and images. They were original HTML pages. We utilized the "WebView" component in the Android system to display the pages. The "WebView" supported all these formats. We implemented a zoom in and zoom out function for this page, which was located at the right bottom of the page. This function was implemented to give the user a choice for font size of personal-fitted reading.

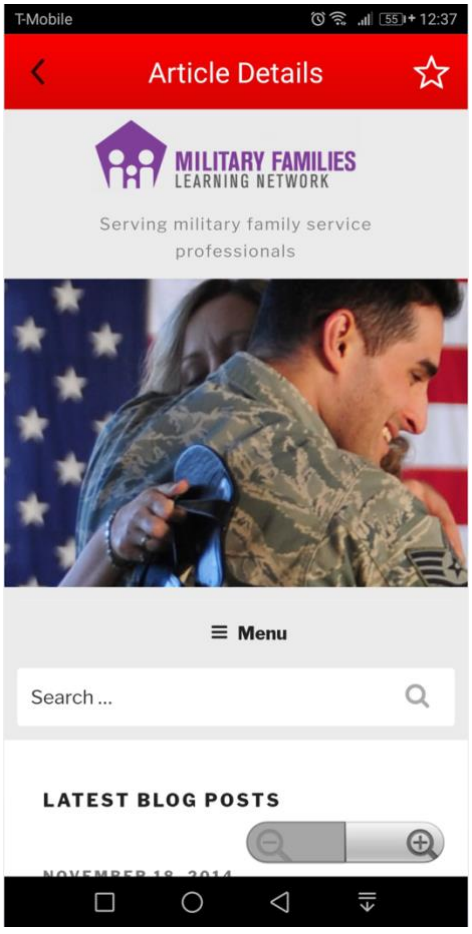

Figure 2-8: Article details page for new version

The “Bookmark” tab was a place to list all the articles the user saved. The add to and remove from actions were introduced in the article details part. We utilized the “GridView” component, which was different from the previous pages with “ListView” component to display the article list. “GridView” let the articles have multiple display format. In this tab, each row had two articles, from where the user reviewed his own saving articles.

The “Setting” tab was mainly to handle the user account – login and logout, to switch account. The tab also contained a log collection controller from the user’s privacy right aspect. If the user closed it, the user actions data did not send to the server.

Testing

To increase system quality and performance, we analyzed the possible weakness of the software application and tested our Android app by using Automated Monkey test.

Automated test (Monkey)

We analyzed the mobile applications in the Google store and app store and summarized a bunch of standard defects. They were connection timeout, crash, UI lag, force close, low-performance of user interaction. We wrote monkey instructions to test our final Android application. The Monkey is a piece of code which runs on the emulator or the mobile device which generates pseudo-random streams of user events, such as click, touch, and gesture. There are four option categories which include basic configuration options, operational constraints, event types and frequencies, and debugging options.

The basic syntax is written like the following instruction.

$ adb shell monkey [options] <event-count>

There are three stop conditions which are listed below.

If we have constrained the Monkey to run in one or more specific packages, it watches for attempts to navigate to any other packages and blocks them.

If the application crashes or receives any sort of unhandled exception, the Monkey program will stop and report the error.

If the application generates an ANR (application not responding) error, the Monkey program will stop and report the error.

For example:

$ adb shell monkey -p edu.auburn.smart -v 500

We use the instruction above to generates 500 random events to operate on our application, such as ACTION_UP, ACTION_DOWN, and ACTION_MOVE. Our application runs well and satisfies the monkey test.

Usability testing

We utilized questionnaires to conduct usability testing. The results were presented in the next chapter together with the analysis and verification of our hypotheses.

Results and Analysis

We conducted a usability test to assess the performance of IWant2Know application. This study identified how generation z would like to use the app and their overall experiences with the app. We designed an experiment, pre-survey and post-survey to evaluate the performance.

To test the usability of IWant2Know application with our targeted group, generation z, we tested it with undergraduate and graduate student from Auburn University. They were asked to take a pre-survey questionnaire, which asked about their general information, such as age, the operating system of their mobile phone, and whether they had previous online learning experience or not, etc. After the pre-survey, the participants were presented task lists of the functionality and

usability of the different android version of the application. on. The task lists for different versions were presented separately and in a random order to ensure there was no carry-over effect of learning and reduced potential experimental bias. The task lists were guides to help users through usability testing and they covered all the functions of the application. As we did not have enough Android mobile devices on hand, we used an emulator for the test, which was embedded on Android Studio 2.2. The mobile device was Huawei Mate SE. After our participants completed the whole lists of tasks, we asked them to finish the post-survey. The primary purpose of the post-survey was to investigate and evaluate the performance and usability of the application.

Pre-Survey

The pre-survey includes 18 questions, and 22 participants tested this application. They were all undergraduate and graduate students from Auburn University. Ten of the participants were females and 12 were male. Two of them are high school students, 8 are undergraduate students, and 12 are the graduate students.

The evaluators asked the question "What do you normally use mobile for?", which was a multiple-choice question, 90.91% of the participants selected email, 68.18% of them selected the Internet, 45.45% of them chose the homework, 13.64% selected blog, 36.36% selected social network and 13.64% selected work.

When the participants answered the question "What type of mobile phone do you primarily use?": 9.09% of them chose the regular cell/mobile phone (not a smartphone), 50% of them preferred the Android, 40.91% of them liked the iPhone. None of our participants used blackberry or windows mobile phone, shown as the figure below.

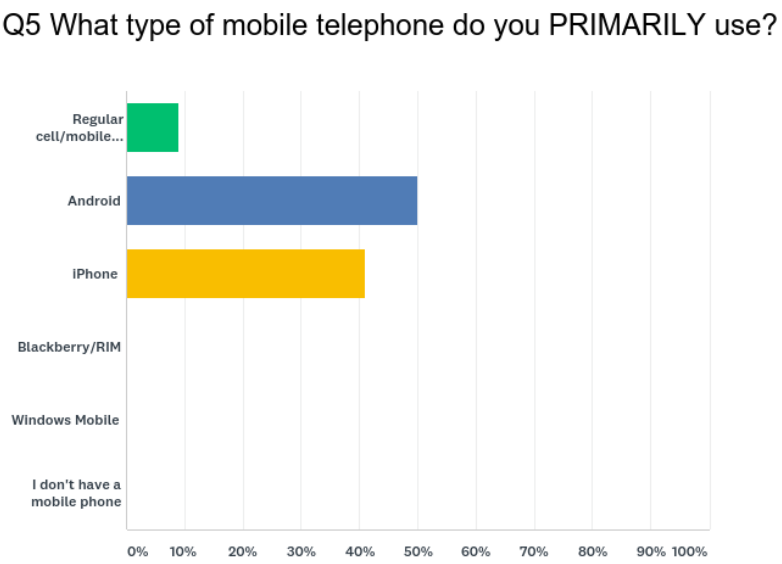

Figure 2-9: Pre-survey Phone operating system distribution result

The majority of our participants preferred to access a product directly through the application with 81.82% preferring application access. The remaining participants preferred browser access through a mobile device (as shown in Figure below), which verified our research motivation that an educational mobile application was valuable.

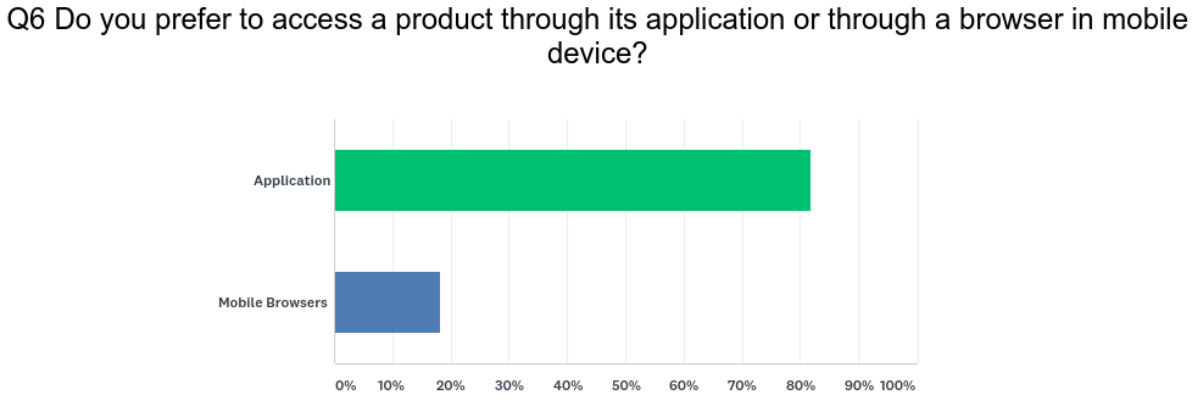

Figure 2-10: Pre-survey Application or browser preference result

A large number of our users, 54.55% have had the experience of taking the course on the Internet. The rest did not have this kind of experience. All users expressed they liked to share fascinating articles with others.

When asked the question “Select the social media connection you have.”, which was also a multiple choice. 42.86% selected Twitter, 85.71% select Facebook, 4.76% selected Pinterest, 33.33% selected Google Plus, 28.57% selected Snapchat, 9.52% selected Tumblr and 38.10% selected LinkedIn.

For the most frequently used educational application or website on mobile phones, we collected answers as Udemy, Canvas, Coursera, Lynda and Google Translate. 86.36% of users expressed they preferred the Internet products to provide them with advice based on their interest. When they answered the question “Do you accept the suggestions of the recommendation system?” 4.55% selected “I do not accept,” 13.64% selected “I do not care,” 4.55% selected “accept,” 27.27% selected “accept a little,” 50% selected “accept strongly.”

Post-Survey

The results of the post-survey presented the participants’ perception of the application from the usability perspective. The average response to all the usability questions indicated a positive reaction to the app from the usability point of view. Data were collected on a scale of the 1-5 scale, ‘strongly disagree’ being the lowest and ‘strongly agree’ being the highest, or ‘very low’ being the lowest and ‘very high’ being the highest. The average rating for each question in the survey was nearly 4.5, shown as the two figures below.

	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE	TOTAL	WEIGHTED AVERAGE
The application is attractive	90.91% 20	4.55% 1	4.55% 1	0.00% 0	0.00% 0	22	4.86
The application is easy to use	77.27% 17	18.18% 4	4.55% 1	0.00% 0	0.00% 0	22	4.73
Fun	45.45% 10	54.55% 12	0.00% 0	0.00% 0	0.00% 0	22	4.45
Interesting	59.09% 13	40.91% 9	0.00% 0	0.00% 0	0.00% 0	22	4.59
The application is simple to navigate	77.27% 17	22.73% 5	0.00% 0	0.00% 0	0.00% 0	22	4.77
Helps me to get to key information quickly	72.73% 16	22.73% 5	4.55% 1	0.00% 0	0.00% 0	22	4.68
Based on this experience, I will use this application again	86.36% 19	13.64% 3	0.00% 0	0.00% 0	0.00% 0	22	4.86

Figure 2-11: Post-survey Overall reaction to the new IWant2Know result

	VERY HIGH	HIGH	MODERATE	LOW	VERY LOW	TOTAL	WEIGHTED AVERAGE
Flexibility	72.73% 16	27.27% 6	0.00% 0	0.00% 0	0.00% 0	22	4.73
User Experience	63.64% 14	27.27% 6	9.09% 2	0.00% 0	0.00% 0	22	4.55
Learnability	45.45% 10	54.55% 12	0.00% 0	0.00% 0	0.00% 0	22	4.45
Visual look of the system	63.64% 14	27.27% 6	9.09% 2	0.00% 0	0.00% 0	22	4.55
Interactive feel of the system	63.64% 14	31.82% 7	4.55% 1	0.00% 0	0.00% 0	22	4.59

Figure 2-12: Post-survey Specific usability aspects feedback results

Our null hypotheses stated that our experimental version made no difference between the experimental version and the benchmark version in the aspects of "Aesthetically pleasing," "Ease of use", "Engagement feedback" and "Satisfaction". We were able to reject the null hypothesis

based on the survey results of our participants, as the majority expressed that the experimental application had a higher level of usability in the aspects of attractiveness, good visual look, fun, easy to use, good interactive feel, and quick retrieval of critical information. From this experiment we concluded in more detail that our new version made significant improvement with the respect to aesthetically pleasing (attractive, fun, exciting, satisfying visual look), increased ease of use (easy to use, simple to navigate, high flexibility), higher engagement feedback (get key information quickly, good user experience and learnability), and higher user satisfaction (use the application again, great feel of interaction).

95.45% of our participants expressed that they considered the navigation was clear and smooth, shown as the figure below, which also rejected the hypothesis in the "Aesthetically pleasing" aspect that there was no difference between the experimental and benchmark interfaces on individual appeal and organization of the information, but participants verified that the new version application had a new clean layout and framework which gave the users a feeling that the system was aesthetically pleasing.

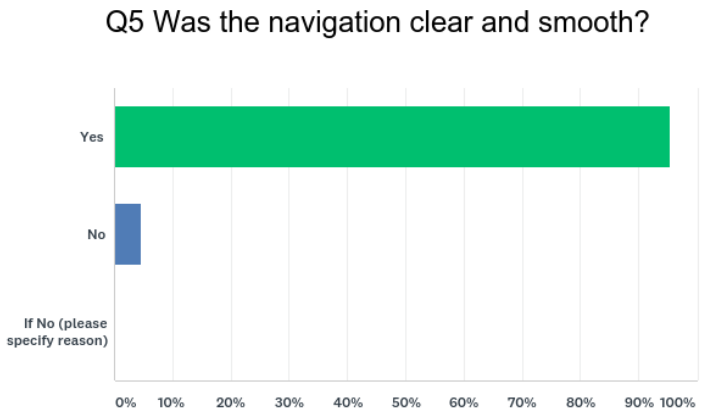

Figure 2-13: Post-survey Navigation clearness and smoothness results

95.45% of the participants expressed that they would like to recommend the new version application to others, shown as the figure below, which explicated their satisfaction of the experimental application, and rejected the hypothesis that there was no difference between the experimental and benchmark interface on overall satisfaction in the “Satisfaction” aspect.

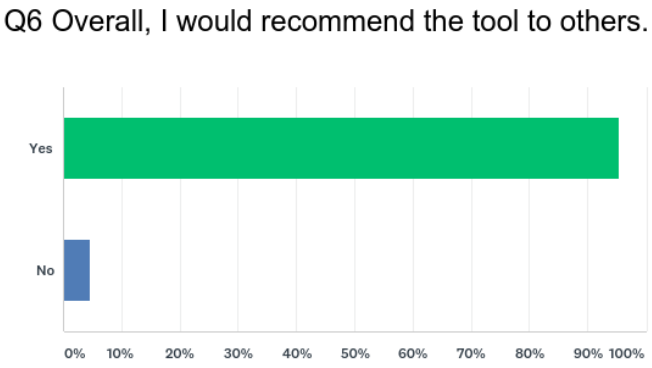

Figure 2-14: Post-survey Willingness to recommend the application results

When our participants answered the question “Do you like the ‘For you’ column to provide you with the potential interesting articles?” 95.45% of them selected “yes”, and 4.55% selected “no”, shown as the figure below.

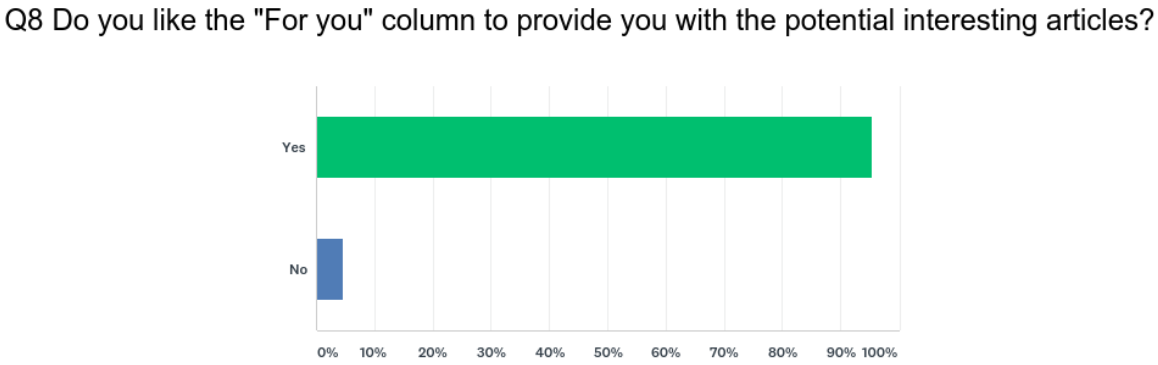

Figure 2-15: Post-survey likeness of "For You" tab result

The hypothesis that there was no difference between the experimental and benchmark interface on overall satisfaction with provided features meet expectations in the “Feature provided” aspect was rejected, since most of our participants were fond of our newly added tab.

Most of the end users preferred to receive the recommended articles than general provided articles. They confirmed that the new version helped them to get more interesting articles. When they answered the question “You will learn more knowledge from reading the recommended articles.” 59.09% of them selected strongly agree, 31.82% selected agree and 9.09% selected neither agree nor disagree. Most of the participants agreed or strongly agreed that the recommend articles helped them to learn more useful knowledge and their attitudes about the recommendation system were positive. We asked the participants to list the positive aspects of the new IWant2Know application that they observed. The results were as follows: Seven of the users expressed a preference for the "Bookmark" tab; Four users preferred the "For you" tab; and with this result, we rejected the “Feature provided” hypothesis mentioned above.

Conclusions and Future Work

Conclusions

In this research, we implemented a new Android version iWant2Know app as an educational application for providing learning opportunities to the new generation. The content was already provided by eXtension.org, but the website was not user-centric. Our app flattened the original organization with categories to allow easy access to the content and also allow users using a text search to find articles of their interest. Also, at the very beginning, we asked users about their potential interest, and provided articles in the “For you” tab to help them verify that. When the users found an interesting article, they saved it to their own bookmarks.

We asked 22 participants to take the pre-survey and then asked them to complete task lists in a random order to process the usability and functional test. After that, they finished the post-survey based on the user experience of the different versions of the application.

Based on the result of the survey, more than 95% of users agreed or strongly agreed the application was fun and interesting. They believed it was easy to use and it helped them receive the key information quickly. More than 90% of users gave a high or very high value to the flexibility and user experience of the application. All of the users confirmed they obtained the information quickly by using the new IWant2Know. According to the result of the post-survey, more than 95% of users expressed that they liked the "for you" column to provide the potential interesting articles and showed the interests in the recommended articles.

Future Work

The future work of this study could support discovery and discuss more technical aspects related to software development of this application. We plan to develop a web crawler system to refresh our article database to obtain more useful and attractive articles. Also, as the participants have a positive attitude about the recommendation system, we need to implement the recommendation system based on the users' data and article resource and integrate it into the whole study.

To support greater accessibility, we need to deploy the Android application to the Google Store. In addition, since nearly half of the participants are using iPhone devices, we need to design and implement the IOS version and deploy IWant2Know to the App Store.

Essay 3: IWant2Know: An Online Educational application utilizing user sentiment to improve User experience of an eLearning Network

Introduction

With the development of information technology and the popularity of the Internet, people have gradually become accustomed to the prevalence and ease of access to information and in some cases are suffering from information overload (Bawden, & Robinson, 2008). This information overload, also known as information anxiety (Wurman, 2012) or information explosion (Bucklan, 2017), means that what you really need or what you are really interested in, is submerged in the ocean of similar products and the results that you need to find are obscured and the user spends a lot of time and effort, in order to find what you are actually searching for (Yang, Chen, & Kong, 2003). In this era, both information consumers and information producers have encountered great challenges: as an information consumer, how to find the information that is of interest from a large amount of information is very difficult; as an information producer, how to make the information produced by them stand out and be regarded by the users is also a very difficult thing.

A huge amount of information is being published on the Internet every day, and it is increasingly difficult for users to accurately find content or products that they are interested in (Bawden, & Robinson, 2008). Assuming that the user's goal is clear, he can simply search for it (in fact, search is also a keyword recommendation), but in many cases, the user is not clear about what he is looking for and cannot search for it directly, or does not even know of the existence of the items that meet his requirements or interests. At this point, if the product can effectively match the user's preferences or interests, user experience and user loyalty or stickiness can be enhanced, in which way the information can better achieve the purpose of publishing.

In order to solve the information overload problem, people have experienced three stages until now: classified table of content, search engine, and recommendation system. The recommendation system is a significantly important tool to resolve information overload now (Crespo, Martínez, Lovelle, García-Bustelo, Gayo, & Pablos, 2011). The task of the recommendation system is to build connections between users and information (Bauman, & Tuzhilin, 2014), which is, on one hand, to help users find information that is valuable to them, and on the other hand to enable information to be presented to users who are interested in it, thereby achieving a win-win situation for information consumers and information producers. The recommendation system tries to recommend products or services to people (Bauman, & Tuzhilin, 2014). They are almost everywhere and a foundational component to many companies (Leavitt, 2006), such as Amazon, Netflix, Facebook, and LinkedIn. Companies like YouTube and Netflix rely on recommender systems to help users discover new content. In our daily lives, based on the data of millions of customers, Amazon determines which items are usually purchased together and uses ratings, purchase behavior, and historical browsing history as a basis for recommendations; LinkedIn advises us on possible work based on our past experiences, current job titles, and endorsements; When we set our preferences rate a movie on Netflix, it utilizes the data and similar data from other users to recommend us movies and shows; Social Networks like Facebook recommends connections instead of products based on recommender systems; Other platforms like Spotify, YouTube, Internet Movie Database (IMDB), Trip Advisor, Google News, etc. are constantly providing us with recommendations and suggestions to satisfy our needs and demand. Similarly, we can apply the recommendation system characteristics to the M-Learning field to utilize best practices from this field to support the design of systems that support the creation of more enjoyable systems that are enhanced by potential interests of the users (Fahri, & Samsudin,

2012; Bauman, & Tuzhilin, 2014). The Internet provides the enormous educational resource, smart mobile devices provide efficient mobility, and big data provides the technical solution, it is an exciting era to build new educational platforms, which provide enjoyment and efficiency in the learning process and develop the greatest practical utilization of potential interests of our users.

In this study, we utilize the crawler system to populate our database content, and the recommendation system to provide user-centered data to our users. We will discuss the crawler system, a few machine learning models for recommendation, and other data analysis methods for developing software to improve user experience. In the next section, we will discuss the existing problem and proposed solution. Implementation details will be covered next, and discuss the system evaluation and corresponding results. We will finish this work with conclusions.

Literature Review

In the previous work, we have identified that people are fond of the contents which are personally designed. And as the information is exploded out, we have the desire to keep our provided contents periodically refreshed. Therefore, we will learn about the crawler system and its commonly-used methods. Then instead of the randomly recommend contents, we will study several recommendation engines and utilize the ones that fit our situation. Other interesting data analysis methods will also be discussed in the following section.

Web Crawler

Web crawlers, also known as web spiders, network ants, network robots, etc., can automatically browse the information in the network. A web crawler starts with visiting a list of URLs, and identifies all the hyperlinks in the pages, then adds them to the URL list for visiting (Masanš, 2006). Of course, it follows the rules established by developers when browsing information. There are two common reasons why we study and utilize web crawlers: the first one

is with learning crawlers, you can customize a private search engine, and you can understand the working principle of search engine data collection. The crawler can automatically collect the information from the Internet, collect it and then store or process it accordingly. When it is necessary to retrieve some information, it only needs to search in the collected information, that is, implement a private search engine; the other one is that in the era of big data, to analyze data, we must first have a data source, and learning crawlers allows us to obtain more data sources, and these data sources can be collected for our purposes, eliminating a lot of irrelevant data. When performing big data analysis or data mining, data sources can be obtained from some websites that provide data statistics, or from some documents or internal materials, but this way to obtain data is sometimes difficult to meet our needs. The need for data, and manually looking for this data from the Internet, is too labor-intensive and costly a process. At this point, the crawler technology can be used to automatically retrieve data that we are interested in from the Internet, and crawl the data (i.e. catalog and return the content back as our data source) for deeper data analysis and more valuable information (What is a web crawler, why..., n.d.).

The method of determining the order in which the URLs are to be crawled is called a crawling strategy. There are four common crawling strategies (Olston, & Najork, 2010):

1. Depth-first traversal strategy. The depth-first traversal strategy means that the web crawler will start the page, and links in this page will be tracked after it. And keep tracking the links in the linked page, etc. After finish processing the line, it will transfer to the next start page and continue to track the link (Olston, & Najork, 2010).

2. Width-first traversal strategy. The basic idea of the width-first traversal strategy is to insert the link found in the newly downloaded webpage directly into the end of the queue to be crawled. That is, the web crawler will first crawl all the links in the starting webpage. Then select

one of the linked pages to continue crawling all the pages linked to the page (Olston, & Najork, 2010).

3. Backlink number policy. The number of backlinks refers to the number of pages that are pointed to by other webpage links. The number of backlinks indicates the extent to which the content of a web page is recommended by others. Therefore, the search engine's crawling system usually uses this metric to evaluate the importance of the page and determine the order in which different pages are crawled (Olston, & Najork, 2010).

4. The big station priority policy. For all the web pages in the queue to be crawled, according to the website to which it belongs; for the website with a large number of pages to be downloaded, the download is preferred. This strategy is therefore called the big station priority strategy (Olston, & Najork, 2010).

Recommendation System

The recommendation system is arguably the most common application in big data, and it improves the personal user experience by recommending content to your website. The recommendation system is part of an information filtering system and artificial intelligence designed to predict user preferences. The most common area to use a recommendation system is product recommendation field filtering and applying the knowledge of learning through user preferences to others.

There are five different types of AI recommendation systems (Apostolopoulos, 2019):

1. Content-based Recommender System: Identify similar products based on the attributes of similar products (i.e., the characteristics of each product). Each product has its own attributes (for example, the attributes of the laptop are screen size, price, memory, storage, etc.), and the

recommendation system tries to find the most similar attributes. In this way, the system recommends similar laptops to customers who prefer specific attributes (Apostolopoulos, 2019).

2. Collaborative Filtering Recommender System: Identify similar customers' preferences, and bases on the notion that people with similar behaviors have similar interests. In this kind of systems, customers are represented by their interactions with products, and the system predicts the probability that the customer will be interested in every product, i.e., the likelihood that the customer really appreciates the product recommended to them. Therefore, the system can approach new customers by recommending products for the most similar ones (Apostolopoulos, 2019).

3. Hybrid System: Combine content-based recommender systems with collaborative filtering recommender systems. Each given product in both models is scored and each result is weighted; the final recommendation results from a linear combination of the two scores (Apostolopoulos, 2019).

4. Association Rules or Market Basket Analysis Recommender System: Slightly different from the previous systems. With a large number of interactive datasets, the system can find patterns for items that are often purchased together as a sequence; for example, someone adds coffee to the shopping cart, but without coffee mate, the system will recommend coffee mate to him/her (Apostolopoulos, 2019).

5. Repeat Purchase Recommender System: Predict the precise time or approximate time that a customer purchases a particular product sporadically. This algorithm uses product period, purchase history, and date statistics to predict future purchase dates. For example, if somebody buys a bag of coffee monthly, the system will suggest a similar product each thirty days if he forgets to shop for it. In this way, customers are encouraged to continue shopping in this store (Apostolopoulos, 2019).

The recommendation systems are mainly used to solve two problems: Prediction version and Ranking version. Prediction version is utilized to predict the rating of a user-item combination. In this case, ratings provided by the user are used as the training data. The goal is to use this data to predict the ratings of things that the user does not interact with; Ranking version is utilized to list a restricted size list that provides the right folks the best things to present to them. In addition, customers do not want to see the ability of the system to predict their rating of an item, they just want to see what they might like. The success of the recommendation system depends on its ability to find the top recommendations for people, so its significance is to find things that people might like, not things that may be annoying (Pandey, 2019).

Charu C. Aggarwal (2018) mentions in his book that the desired goals of the recommendation system include the following four points: Relevance, Novelty, Serendipity, and Diversity. Relevance means that the recommended things only make sense if they are relevant to the user. Users are more likely to purchase or consume items that are interesting to them; Novelty means that if the recommended items are new (not viewed or consumed before) by the user, the recommendation will also make more sense. Novelty is another important factor along with relevance; Serendipity is different from novelty, but it also states to recommend some unexpected items to promote sales. In the author's words: "if a new Indian restaurant opens in a neighborhood, then the recommendation of that restaurant to a user who normally eats Indian food is novel but not necessarily serendipitous. On the other hand, when the same user is recommended Ethiopian food, and it was unknown to the user that such food might appeal to her, then the recommendation is serendipitous"; Diversity is equally important in recommendations. Simply recommending a similar item is not that very useful, increasing diversity is a more sophisticated recommendation strategy (Aggarwal, 2018).

Topic Modeling

In natural language understanding (NLU) tasks, we can extract meanings from words to sentences, to paragraphs, to documents. At the document level, one of the most effective ways to understand text is to analyze its topics. The process of learning, identifying, and extracting topics through a collection of documents is called topic modeling (Xu, 2018). Topic modeling is a commonly used text mining tool for discovering hidden semantic structures in text bodies. A topic model is a statistical model used to discover abstract "topics" that in a collection of documents (Blei, 2011). The topic model is built around the following idea: the semantics of a document is handled by hidden or "latent" variables that we ignore. All topic models are based on two same basic assumptions: one is each document contains multiple topics; the other is each topic contains multiple words. Therefore, the goal of topic modeling is to reveal these latent variables “topics”, which establish the meaning of our documents and corpus (Blei, 2011).

There are four most popular topic modeling techniques today: Latent Semantic Analysis (LSA), Probabilistic Latent Semantic Analysis (pLSA), Latent Dirichlet Allocation (LDA), and lda2ver.

Latent Semantic Analysis (LSA)

LSA is one of the fundamental technologies in topic modeling. The core idea is to decompose the document-term matrix which we have into separate document-topic matrix and topic-term matrix. The LSA model typically replaces the raw counts in the document-topic matrix with the tf-idf score (i.e., the term frequency-inverse document frequency index). With document vectors and term vectors, evaluation such as cosine similarity can be utilized: similarity of different words; similarity of different documents; similarity between the term (or "queries") and the documents.

LSA is fast and efficient, but it also has some primary shortcomings, such as less efficient representation, need of a lot of files and vocabulary to get accurate results, lack of interpretable embedding (the components of topics may be positive or negative, and this is arbitrary) (Dumais, 2005).

Probabilistic Latent Semantic Analysis (pLSA)

pLSA takes a probabilistic approach instead of singular value decomposition (SVD) to solve the problem. The core idea is to find a probabilistic model of latent topics that can generate the data observed in the document-term matrix. A model P(d, w) is needed so that for any document d and the word w, P(d, w) can correspond to that entry in the document-term matrix.

Although pLSA seems to be very different from the LSA, and the way to deal with the problem is completely different, pLSA only adds the probabilistic treatment of the topics and vocabulary based on the LSA. pLSA is a more flexible model, but there are still some shortcomings, such as it may overfitting as the number of parameters for pLSA grows with the number of documents, and to assign a probability to a new document is not doable if don't have parameters to model P(D) (Hofmann, 1999).

pLSA is rarely used on its own. Usually when people are solving a problem with topic models that beyond LSA benchmark performance, they will switch to the LDA model. LDA is the most common, popular, and effective topic model, which is extended on the basis of pLSA to solve these problems (Xu, 2018).

Latent Dirichlet allocation (LDA)

LDA is a Bayesian version of pLSA. It is a generalization of the pLSA model, which is equivalent to LDA under a uniform Dirichlet prior distribution (Girolami, & Kabán, 2003). It achieves higher generalization by utilizing Dirichlet prior to handling document-topic and word-

topic distributions. Dirichlet might be thought-about as “distribution over distributions” (Xu, 2018).

In general, LDA performs better than pLSA since it can be easily generalized into new documents. In pLSA, if a document is not seen, that information (data point) cannot be obtained, since the document probability is a fixed point in the dataset. However, in LDA, even if a file is not seen, it can still easily sample from the Dirichlet distribution and move forward since the dataset is used as training data for the Dirichlet distribution of the document-topic distributions (Xu, 2018).

K-Nearest Neighbors (KNN)

In pattern recognition, the k-nearest neighbors algorithm (KNN) is a non-parametric methodology used for classification and regression (Altman, 1992). From the name of the KNN algorithm, we can intuitively see its principle: find the nearest K samples from all the training samples, and assign the most occurrences of the k samples to the unknown sample. KNN has several features: (1) KNN is a type of instance-based learning, or lazy-learning, which opposites to eager learning. KNN has no explicit learning process. That is to say, there is no training stage. The data set has classification and eigenvalues in advance, and new samples will be processed directly after receiving; (2) KNN has high computational time complexity. The new sample needs to be calculated from all data in the dataset. The computational complexity is proportional to the number n of data in the dataset. That is, the time complexity of KNN is O(n). Therefore, KNN is generally applicable to data sets with a small number of samples; (3) When k takes different values, the classification results may be significantly different (Peterson, 2009).

DATA ANALYSIS

Analyza: Exploring Data with Conversation

Dhamdhere et al. (2017) published their data-explore system "Analyza", along side a annual user feedback analysis. A common thread between these is that it is a repeated cycle of dependent phases, including discovery, inquiry, exploration, refinement, summarization and visualization, collaboration, and inference. The goal of this paper was to explain how a natural language interface that may be integrated into a multimodal tool for information exploration, in such the way that users are protected against loss of exactness and may freely transition between totally different modes of interaction. There are at least two reasons that the authors cannot have faith in ML. The authors reported they failed to have an ample quantity of high-quality training data to begin with, which is required by most ML systems. Second, ML systems tend to not be very robust, and may not be ready to deliver the goods the desired level of precision for a data system. Since SQL is the industry standard for information analysis, they aspired to support all SQL features via natural language: Semantics and types, Using default values, Domains or entity scopes, Grammar, and Portability (Dhamdhere, Mccurley, Nahmias, Sundararajan, & Yan, 2017).

Curation Process -- Next, they describe the method of populating the Metadata store described previously. The Metadata store holds two kinds of metadata that require curation. The first is schema data (i.e. dimensions, dates), the second kind of metadata is a knowledge base about entities within the information (i.e. lexicon for this entity, data column). Other examples of the curation process are as follows: inferring semantics from structured information, Manual curation, Ongoing curation, Inferring Semantics from Knowledge Graph and Approximate matches (Dhamdhere, Mccurley, Nahmias, Sundararajan, & Yan, 2017).

Analyza is a system that uses natural language processing to allow users without coding

skills to explore and interact with this information effectively. It combines the ease-of-use of a natural language interface with the exactness of a structured interface, sanctionative users to explore information effectively, without resorting to a programming language (Dhamdhere, Mccurley, Nahmias, Sundararajan, & Yan, 2017).

A Cost–Benefit Study of Text Entry Suggestion Interaction

Mobile keyboards typically present error corrections and word completions (suggestions) as candidates for anticipated user input. However, these suggestions are not cognitively free: they need users to attend, evaluate, and act upon them. To understand this trade-off between suggestion savings and interaction costs, Quinn et al. conducted a text transcription experiment that controlled interface assertiveness: the tendency for an interface to present itself (Quinn, & Zhai, 2016).

Presented an empirical analysis of the interaction with text input suggestions, they specialized in how eager interfaces ought to point out word completions (their assertiveness). A moderately assertive (ambivert) interface that guarded completions with a confidence threshold afforded quicker performance than a more assertive (extraverted) interface that keeps providing the most effective three. While both types of the interface were slower than never presenting completions at all (introverted), the suggestions were utilized to avoid wasting faucets and were subjectively most popular – indicating benefits not measured by time (Quinn, & Zhai, 2016).

Profile CBC: Using Conjoint Analysis for Consumer Profiles

Traditionally, technology research has often relied upon qualitative personas approaches that are difficult to assess quantitatively. Chapman, C. et al. (2015) investigated the usage of choice based conjoint analysis (CBC) for sizing consumer profiles for a technology product area. They demonstrated that Profile CBC was able to find consumer profiles from tradeoffs of attributes derived from qualitative research, and yields replicable, specifically sized groups that are well

differentiated on both intra method and extra method variables. After data was collected, they identified profiles using aggregate latent class analysis of the conjoint utilities, conducted with Sawtooth Software CBC Latent Class (CBC Latent Class Technical Paper, 2004). Then Chapman et al. implemented the six design principles they suggested: Be careful to omit "must-have" attributes; Tasks should consist of 2 or 3 concepts; Concepts should present a partial profile limited to 3 attributes; Tasks should not use a "none" option (especially single response "none"); Tasks should not use allocation CBC; Careful investigation is needed before using ACBC. The Profile CBC method outlined demonstrates that choice based conjoint analysis may be useful in situations where analysts seek to find and size clusters of respondents who identify with profile-like descriptions. Because Profile CBC allows incorporation of qualitative self-descriptions as attributes, finds classes with a replicable procedure, and determines class size, it overcomes key limitations of purely qualitative personas (Chapman, Krontiris, & Webb, 2015).

We began this exploration based on the highly-voted “For You” tab from our previous work. From the literature reviewed, we plan to utilize the width-first traversal strategy crawler system (Olston, & Najork, 2010) to keep our database refreshed periodically. LDA model was applied to recommendation articles for users based on their current readings. For the contents in the “For You” tab and results from searching, KNN was utilized to support the rank of the articles.

Method

Motivation/Problem

From our previous work, we gathered the information that users were fond of through personalized design, which was reflected in the following figure:

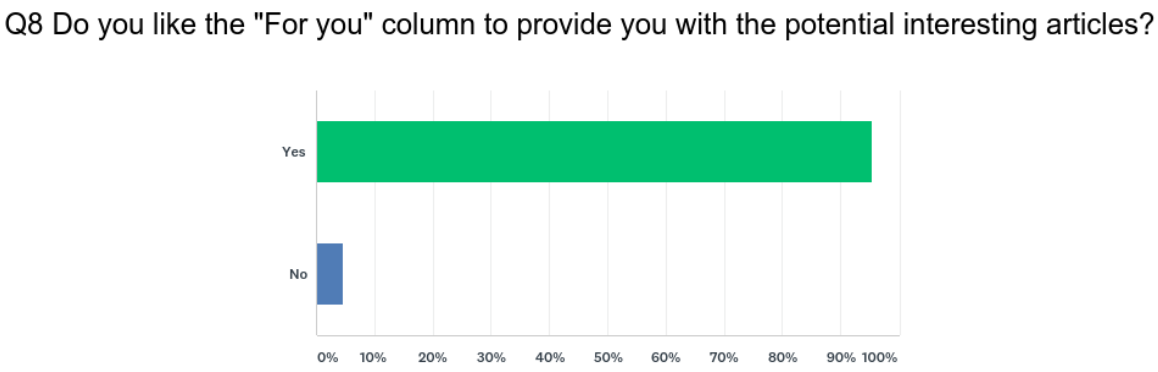

Figure 3-1: Likeness of "For You" tab from previous work

In the previous work, we implemented the “For You” from user interface level, but not really from technical level. In other words, we pulled random articles from the server to recommend to users.

With the literature we reviewed, we proposed the question that can a framework created to support the learning for generation z students provide better user engagement and user experience. We aimed to understand the extent that the usability improvement of a machine learning based user sentimental analysis framework (experimental) contributed to a learning application, showing overall satisfaction with its ease of use, engagement, and efficiency, compared to a traditional learning application (benchmark). Based on that we proposed specific questions:

a. To refresh contents in the database, how to collect the original educational resource?

Though there were lots of available resource from the Internet, it was a difficult task to handle the thousands of websites because the different websites had their own organized structures. Where could we find a more relevant useful original educational resource and how to use them?

b. How to display the processed data to users?

If we have collected the particular data, how could we display them to our users? We had chosen a mobile app to deliver information, how could we design to adjust to users' preference and which was the most useful and efficient way to display the data to users?

c. How to collect users' data, analysis and response to users?

Based on the data, how to design and implement a particular recommendation system to adjust to our system? For there were many different experimental methods, such as offline experiment, user study and online experiment, which one should we choose to integrate into our system?

Proposed Solution

To solve problems listed in the above section, we designed the whole framework for our system, which included a crawler layer, a recommendation layer, a server layer, and a front-end user layer. The crawler layer was responsible for collecting and processing data from different kinds of websites which could provide useful articles. The recommendation layer was responsible for recommending articles to users based on users' reading, users' interest preference, and ranking the searching results based on users' preference. The sever layer had three primary purposes. Firstly, it stored the data we collected from the crawler layer; the data was formatted in the form of the Restful API. Secondly, the server layer played a role as a receiver, to receive the log data from front-end users which included the users' basic information and users' interactions with the applications. We called these data as users' data. Thirdly, based on the users' data we also had a recommendation system in the server to analyze users' data and calculated the result which provided special users with special articles, and a suggested ranking for the articles. The front-end layer was responsible for displaying processed data, and recording and sending users' data to the server layer. The figure below represents the roles of the four layers.

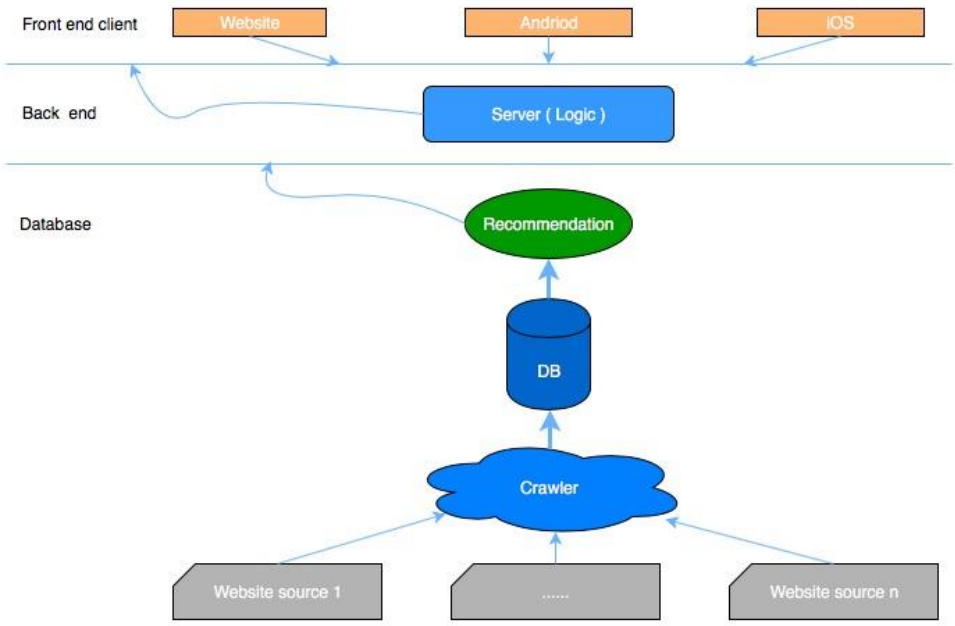

Figure 3-2: System Layer Framework

Functional Requirements

With analysis of the problem, the functional requirements were separated into two parts based on our proposed solution:

Requirements of Crawler system

1. The crawler system should have the ability to collect useful data from specific websites. Currently, we only need to collect valuable articles from extension.org.

2. This crawler system should have the function to divide the essential data into specific categories. In this research, we define eleven types which include art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology.

3. The crawler system should have the function to store the divided data into the database according to the category.

Requirements of Recommendation system

1. The recommendation system should have the ability to select validate articles collected by the crawler system.

2. The recommendation system should have the ability to train a machine learning model to do context-based recommendation based on user's current reading

3. The recommendation system should be able to provide the user ranked result lists based on the people's preferences who has similar property.

Research Hypotheses

The overall usability of the ML framework applied to the application will be evaluated based on ease of use, engagement (feedback/design of the user interaction and user interface), and efficiency (code complexity/technologies used). This research is based on the research questions in the above section that will be tested at the end of the study. This empirical study will focus on the overall usability of the applications, which will be designed using our proposed guidelines. At the end of the study, the usability analysis of the applications will be used to test the hypothesis. To evaluate the applications, a series of user studies and usability analysis will be conducted (i.e., qualitative and quantitative evaluation and usability analysis are conducted through user surveys). The areas that are assessed are as follows:

Engagement feedback:

The application provides feedback to the user via interaction.

$H1_0$: There is no difference between the experimental and benchmark interfaces on time consumed of providing feedback.

Satisfaction:

The overall design of the application is intended to satisfy users.

$H2_0$: There is no difference between the experimental and benchmark interface on overall satisfaction.

Features Provided:

The overall satisfaction with provided features meets the user/client's expectation.

$H3_0$: There is no difference between the experimental and benchmark interface on overall satisfaction with provided features meet expectations.

Implementation

Crawler system

CasperJS, Java, and Jsoup were utilized to implement our crawler system. By utilizing CasperJs, we collected the introductory education data from the targeted website such as extension.org. The figure below showed the principal function.

```
function collect() {
    var casper = require("casper").create({
        waitTimeout : 10000,
        stepTimeout : 10000,
        verbose : true,
        pageSettings : {
            webSecurityEnabled : false
        },
        onWaitTimeout : function() {
            this.echo('** Wait-TimeOut **');
        },
        onStepTimeout : function() {
            this.echo('** Step-TimeOut **');
        }
    });

    casper.start();
    casper.open(casper.cli.args[0]);
    casper.then(function() {
        fs.write(casper.cli.args[1], this.getPageContent(), 'w');
        console.log("Completed: ".concat(casper.cli.args[1]));
    });

    casper.run();
}
```

Figure 3-3: Crawler function

By using the third-party JS library, we also simulated the actions such as click the button (i.e. selecting the dialog) to advance to the next page and enter information into the Text-Field in the HTML web pages and then log into the website.

We wrote a java application to create a bash file to run the CasperJs script file, shown as the figure below.

```
24    /**
25     * Create the bash file according to the keyword,
26     * create a file named 'keyword.sh' in the sh_file directory.
27     *
28     * @param keyword
29     */
30    public static void createBashFile(String keyword) {
31        File file = null;
32        FileWriter fw = null;
33        file = new File(PATH, keyword + ".sh");
34        if (!file.exists()) {
35            file.getParentFile().mkdirs();
36            try {
37                file.createNewFile();
38                fw = new FileWriter(file);
39                for (int i = 1; i < COUNT; i++) {
40                    StringBuilder sb = new StringBuilder();
41                    sb.append("casperjs load.js ").append(getUrlByKeyWord(keyword)).append(URL_POST).append(i)
42                            .append("\"").append(" ").append(keyword).append(i).append(".html")
43                            .append(System.getProperty("line.separator"));
44                    System.out.println(sb.toString());
45                    fw.write(sb.toString());
46                }
47                fw.flush();
48            } catch (IOException e) {
49                e.printStackTrace();
50            } finally {
51                try {
52                    fw.close();
53                } catch (IOException e) {
54                    e.printStackTrace();
55                }
56            }
57        }
58    }
```

Figure 3-4: Bash file generator

After web pages were collected, the system parsed these HTML files to extract the particular data that we needed. We utilized Jsoup to achieve this goal, with achieving the content in specific div, parsing title, image, content, and other information, then saved them in our article database.

Recommendation system

We applied two types of recommender systems in our application: LDA model to implement content-based recommendation and KNN to implement collaborative-filtering recommendation.

Content-based recommendation

Considering the Relevance as the one of the design goals of recommendation system, we assumed that if the user read through an entire article and scrolled down to the bottom of the page, he expressed his interest in this article, and he would also be interested in the articles that had the similar topics with the current reading article. Based on this assumption, we added one section to the bottom of the article content to recommend articles (i.e. "you may like") to users. In our previous IWant2Know version 4.0, we set the "you may like" articles to be the ones randomly selected from the database as a benchmark. For our new version, from our literature, we designed and utilized Latent Dirichlet Allocation model to do content-based recommendation.

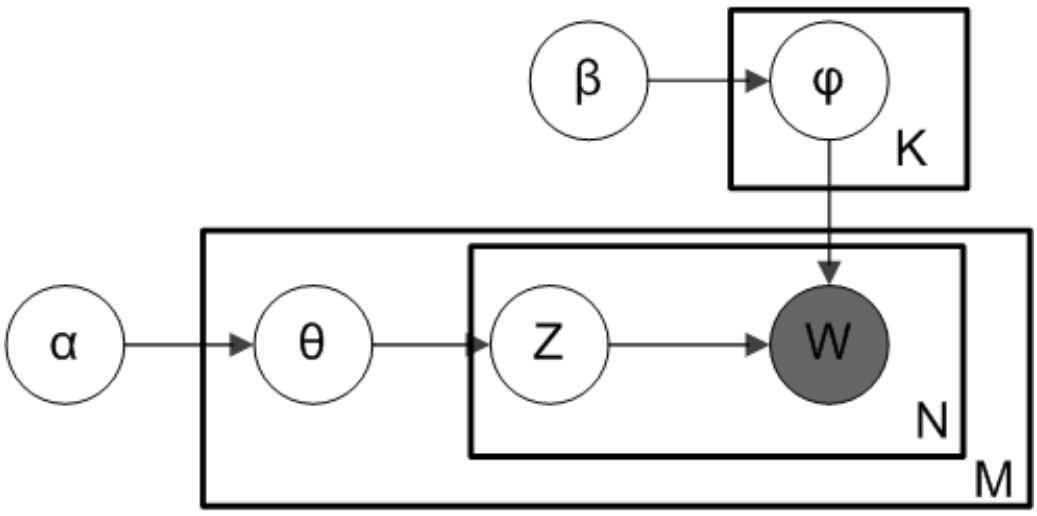

Figure 3-5: LDA Topic Modeling (Doll, 2018)

Above is what is known as a plate diagram of an LDA model where:

α is the per-document topic distributions,

β is the per-topic word distribution,

θ is the topic distribution for document m,

φ is the word distribution for topic k,

z is the topic for the n-th word in document m,

w is the specific word.

For the software development, we utilized the canonical LDA model imported from genism package. Gensim is a free python library that automatically extracts semantic topics from documents. The algorithms in gensim include: LSA (Latent Semantic Analysis), LDA (Latent Dirichlet Allocation), RP (Random Projections), which can be used to explore the semantic structure of documents by examining the lexical statistics joint appearance pattern in a training document corpus. Algorithms mentioned above are unsupervised training and able to handle unstructured plain text. To handle stop words, we imported the stop_words library. The main functional code was shown as below:

```
57  # turn our tokenized documents into a id <-> term dictionary
58  dictionary = corpora.Dictionary(texts)
59  path_model = '/Users/Yang/Documents/model/'
60  dictionary.save(path_model + "all.dic")
61  # convert tokenized documents into a document-term matrix
62  corpus = [dictionary.doc2bow(text) for text in texts]
```

Figure 3-6: Corpus utilization

```
# generate LDA model
model = models.LdaModel(corpus, id2word=dictionary, num_topics=10,passes=20)
print (model.print_topics(num_topics=10, num_words=4))
model.save(path_model + "allLDA50Topic.mdl")

corpus_lda = model[corpus]
indexLDA = similarities.MatrixSimilarity(corpus_lda)
indexLDA.save(path_model + "allLDA50Topic.idx")
```

Figure 3-7: LDA model generation

Collaborative filtering recommendation

Besides the relevance of articles, we also considered articles relevance to our users. From the theory of collaborative filtering recommendation, we assumed that the users who had similar interest areas would express similar like and/or dislike categories. To collect information about users' sentiment, we designed and applied for approval from the Auburn University Institutional Review Board (IRB). The consent form and all other materials were reviewed by the Auburn IRB and stamped with approval dates and protocol number. All of these documents are attached as Appendix 3A. As our targeted group was generation z, we recruited undergraduate students from the College of Engineering and College of Liberal Arts to participate in the information design phase. A participant was given a paper-based document, including a Recruitment Script (Appendix 3A), which described the details of the study and the requirements to participate in the study. The script also informed the participant of his/her rights. The rest of the document was questions that captured the participant's information and attitude towards unknown-category articles. The information collected was contributed to K-nearest neighbors (KNN) algorithm to rank the article lists presented to users.

From the literature, KNN was known as in the condition that the data and tags in the training set are known, input the test data, the features of the test data are compared with the features corresponding to the training set, and the top K data which are most similar to the training

set are found, and the test data can be classified into the category that has the most occurrences of K data. KNN algorithm is described as the following steps

1) Calculate the distance between the test data and each training data;

2) Sort according to the increasing relationship of distances;

3) Select the K points with the smallest distance;

4) Determine the frequency of occurrence of the category of the first K points;

5) Return to the category with the highest frequency among the top K points as the predicted classification of the test data.

To support our case, we utilized the core idea of KNN and made modifications to assist the article list ranking. The categories that a participant selected as his/her interest were presented as "1" in the matrix, the other categories were marked as "0". The participant's attitude towards the articles with their corresponding categories was recorded as rated.

The most common method to calculate the distance for KNN was Euclidean metric, shown as the following formula:

$$dist(X,Y) = \sqrt{\sum_{i=1}^{n}(x_i - y_i)^2}$$

Figure 3-8: Euclidean distance

For our case, since all the inputs were either "1" or "0", it was the same to apply Manhattan distance but with multiple dimensions.

$$d_{ab} = |x_1 - x_2| + |y_1 - y_2|$$

Figure 3-9: Manhattan distance

When finding K sets of data from the training data (in the current case, we set k = 5) that had smallest distance of a user, we accumulated their preferences, ranked in descending order and retrieved the top categories to help rank the article lists presented to the user. KNN was applied both in the "For You" article list and search result article list.

Results and Analysis

We conducted a usability test to assess the performance of the IWant2Know application. This study performed an information design study to identify user's sentiment and preference for STEM articles. We accessed the participants' preferences of various STEM contents; we utilize these preferences to refine our design requirements to improve the IWant2Know app for generation z. We designed an experiment, pre-survey and post-survey to evaluate differences performance between the baseline and experimental versions. All the surveys received approval from the Auburn IRB see Appendix 3A).

We tested the usability of IWant2Know application with generation z students (i.e. for this study the population were undergraduate and graduate student from Auburn University). Participants were asked to take a pre-survey questionnaire, which asked about their general information, such as age, the operating system of their mobile phone, and whether they had previous online learning experience or not, etc. After the pre-survey, the participants were presented with task lists of the functionality and usability of the different Android versions of the application. The task lists for alternative versions were presented separately and in a random order to ensure there was no carry-over effect of learning and reduced potential experimental bias. The

task lists were guides to help users through usability testing. The participants were guided to review all the functions of the application. During our experiment, one of the limitations was the limited number of Android mobile devices on hand, and based on this limitation, we used an emulator for system testing (i.e. emulator with Android Studio 2.2). After our participants completed the whole lists of tasks, we asked them to finish the post-survey. The primary purpose of the post-survey was to investigate and evaluate the performance and usability of the application.

Pre-survey

The pre-survey includes 17 questions, and 17 participants tested this application. They were all undergraduate and graduate students from Auburn University. Eight of the participants were females and nine were male. Eight are undergraduate students, and eight are the graduate students.

More than half of the participants (i.e. 52.94%) primarily used Android phones, the rest (i.e. 47.06%) used iPhone. None of them used regular cell, nor Blackberry, nor Windows Mobile. When the participants answered the question "What do you normally use a mobile for?", which was a multiple-choice question, 88.24% of the participants selected email, 58.82% selected surfing the Internet, 52.94% selected homework, 23.53% selected blogging, 70.59% selected maintaining social network, 29.41% selected work, 58.82% selected entertainment, 29.41% selected online learning. More than half (i.e. 52.94%) of our participants indicated they had taken courses over the Internet previously.

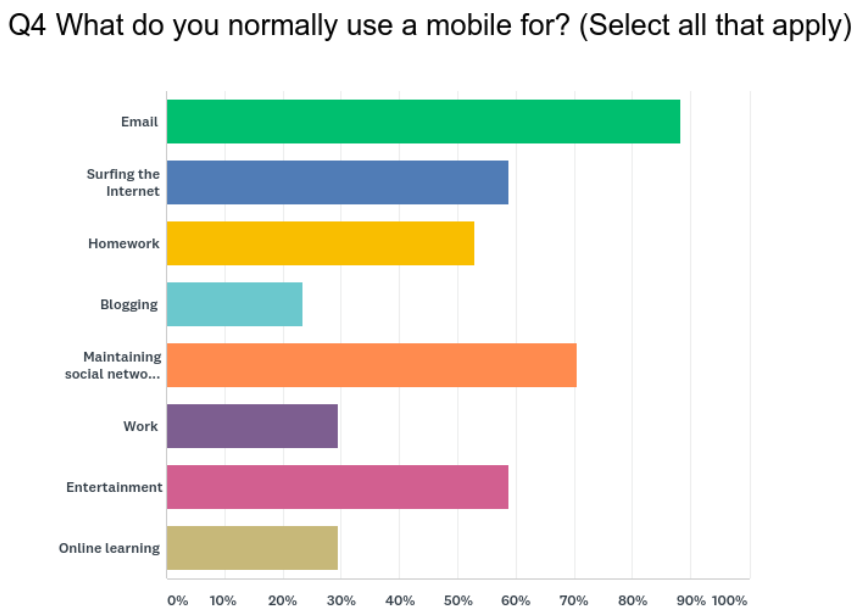

Figure 3-10: Pre-survey Smartphone usage distribution

The majority of the users spent more than one hour daily on their phones, with 52.94% spent 1-3 hours per day, 23.53% spent 3 - 7 hours per day, and 5.88% spent more than 8 hours per day. And 88.24% of them preferred application to mobile browsers when accessing a product.

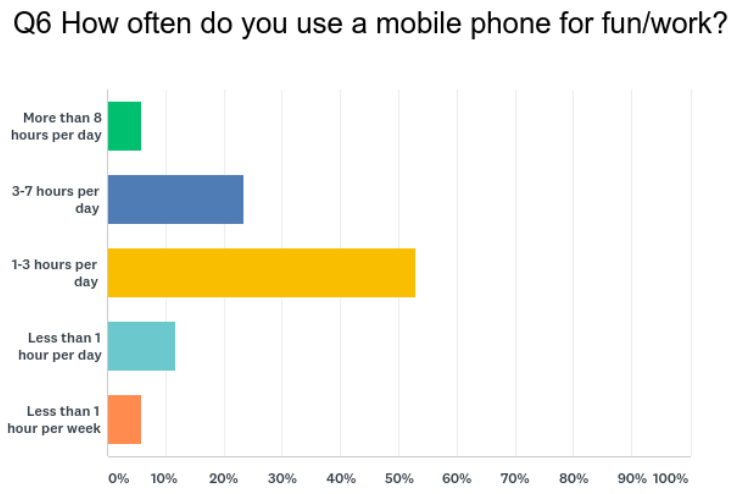

Figure 3-11: Pre-survey Average hour spent on phone distribution

Most of the participants (i.e. 94.12%) expressed their willingness to share the interesting readings to others, and 82.35% of them expressed their likeness of user-centric recommendation by the Internet. The average score on a 1-5 scale of accepting suggestions from recommendation system received 4.41. All the above three answers verified our motivation of this research.

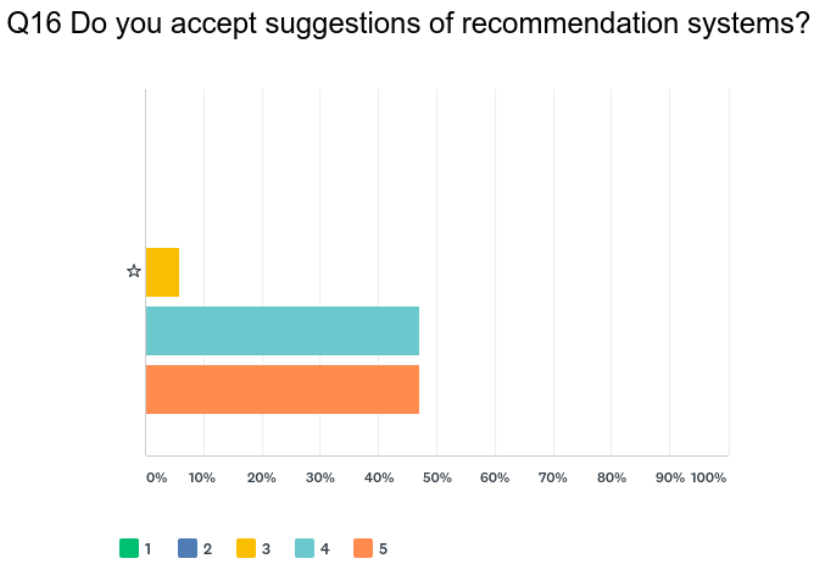

Figure 3-12: Pre-survey Acceptance of recommendation system

Our participants had a high utilization of social media. 70.59% of them maintained a Twitter account, 64.71% of them used Instagram, 58.82% of them had a Facebook account, and the rest of the users indicated that they may also use LinkedIn, Snapchat, What's App and Pinterest.

Post-survey

In order to get a comprehensive evaluation, we provided four versions from technical aspects to compare. The previous 4.0 version had randomly provided articles in "For You" tab, and search-result article list was in random order. Articles in "you may like" for 4.0 version were also randomly pulled from the database. Version 4.1 utilized categories that the participant chose

on the interest inquiry page as his/her preference. Articles in "For You" tab matched the categories that the participant initially chose. The search-result article list had articles which had the same categories that the participant preferred ranked higher than the others. Version 4.2 was similar to version 4.1. The difference was that instead of directly utilizing categories, version 4.2 mapped the participant's preference to the data we collected from the information design phase, ranked and recommended articles based on his/her K nearest neighbors' preference. Version 4.1 and 4.2 did not take participate in the "you may like" section comparison. Version 4.3 utilized LDA model for "you may like" section to give recommendations based on the participant's current readings. The "For You" tab and search-result article list had a combination of technologies used in version 4.1 and version 4.2.

The results of the post-survey presented the participants' perception of applications from the usability perspective. Sixteen participants submitted their responses to the post-survey. The overall satisfaction was quite high, as all of the participants expressed, they'd like to recommend the newest version of IWant2Know to others.

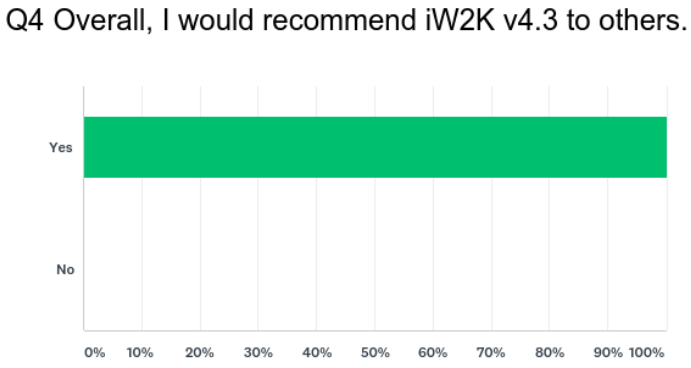

Figure 3-13: Post-survey Overall satisfaction result

For "For You" tab and search-result article list, we compared all the four versions, and achieved the following result:

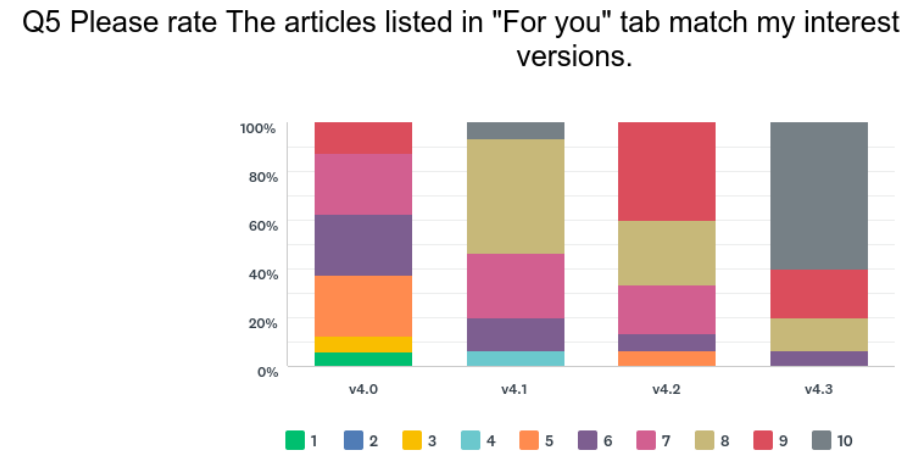

Figure 3-14: Post-survey "For You" tab result

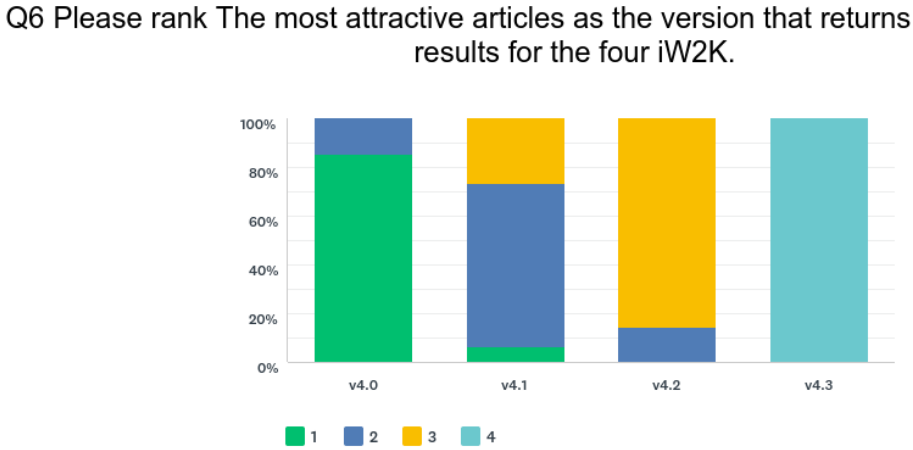

Figure 3-15: Post-survey Search-result list result

The newest version v4.3 was far beyond the benchmark version v4.0 based on participants' ratings. Our null hypotheses stated that our experimental version made no difference between the experimental version and the benchmark version in the aspects of "Engagement feedback", "Satisfaction", and "Feature provided", which we were able to reject based on the above results provided by our participants.

We required our participants to compare the two “you may like” sections from version 4.0 and version 4.3, and they expressed their preference of the experimental version, as shown in the figure below.

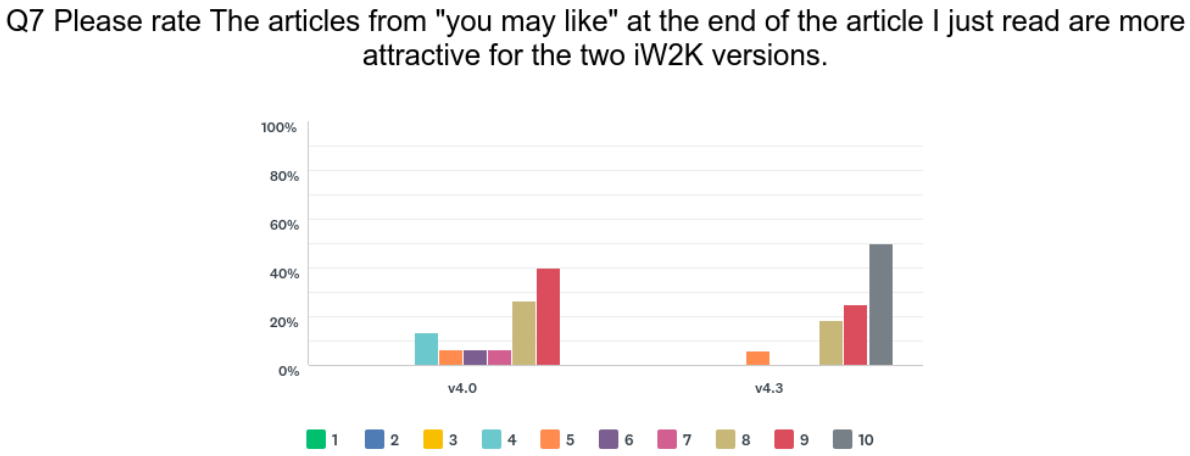

Figure 3-16: Post-survey "you may like" section result

From the above results, we were also able to reject the null hypotheses related to “Satisfaction” and “Feature provided” aspects, as the participants expressed, they liked and were satisfied with the feature provided by the experimental version more than the benchmark version.

Although the new version had more analysis and computation than the benchmark version, we did not expect the experimental one to have poor performance that affected user experience. Therefore, we asked the participants whether they felt v4.3 ran slower than v4.0. If they felt it ran slower, we hoped they would point out which steps for further improvement. 81.25% of the participants considered the two versions had similar performance, however, we did not collect any comments from the other participants who thought the new version performed poorer.

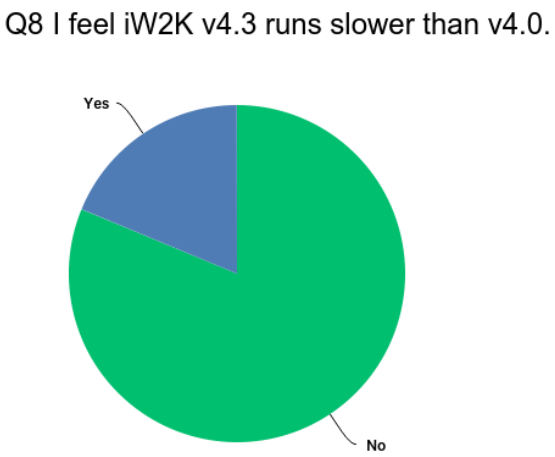

Figure 3-17: Post-survey Performance comparison result

Conclusion and Future Work

In this research, we implemented multiple strategies as a mechanism to assess user sentiment and preference to improve the user experience for an Android version IWant2Know app. From the previous work, we gathered the information that users preferred user-centric design. Our new app utilized the Latent Dirichlet Allocation Model to recommend articles to users based on their current readings. The app also ranked top articles and recommended the articles that matched the user's preference and/or preferences of other users who had similar interest to their own interests.

We conducted a comparative evaluation of the new tech version and the original version that only had a user-centric interface. The evaluation of the two versions validated our expectations on all of the usability factors. In all the three sections we tested, the new version got quite higher average ranking than the benchmark version received. Our participants preferred more the experimental version to the benchmark version in the "For You" tab, the "you may like" section, and the article list returned from the search function.

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Appendix 3A. Auburn IRB Approval Form

Memo

Protocol title and number: #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults"

Thank you very much for your time reviewing our IRB application. We appreciate your comments, and have outlined the changes made in italics below.

IRB comments:"1. The information included in the modification form is not clear.

a. What additional questionnaires were used? "

Please see attached. We have already integrated the new questions (Pre-survey & Post-survey) and you can view those in the attached document.

IRB comments:" b. Were the questionnaires completed during the time the study was open to enrollment? If no, are you requesting the study again contact participants so the additional questionnaires can be completed?"

The previously submitted and approved questions were used for InformationDesign Study1. The InformationDesign Study1 was purposed to gather information to refine the final Usability Evaluation (UE) Study2 and final UE Study2 questions.

These additional questions will be used for actual study.

IRB comments:" c. Has the IRB previously reviewed and approved the additional questionnaires? "

No, these questions are newly added based on information gathered in Information Design Phase Study1.

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD
REQUEST for MODIFICATION

For Information or help completing this form, contact: **THE OFFICE OF RESEARCH COMPLIANCE (ORC)**
Phone: 334-844-5966 **E-Mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research /vpr/ohs

In MS Word, click in the white boxes and type your text; double-click checkboxes to check/uncheck.

- **Federal regulations require IRB approval before implementing proposed changes.**
- **Change means any change, in content or form, to the protocol, consent form, or any supportive materials (such as the Investigator's Brochure, questionnaires, surveys, advertisements, etc.). See Item 4 for more examples.**
- **Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.**

1. Today's Date	05/22/2019

2. Principal Investigator (PI)

Principal Inves. (title):	Yang Cao	**Faculty PI (if PI is a student):**	Cheryl D. Seals
Department:	CSSE	**Department:**	CSSE
Phone:	3343323678	**Phone:**	3348446319
AU E-mail:	yangcao@auburn.edu	**AU E-mail:**	sealscd@auburn.edu
Contact person who should receive copies of IRB correspondence (Optional)			
Name:		**Department Head:**	Hari Narayanan
Phone:			
AU E-mail:			

3. AU IRB Protocol Identification

3.a. Protocol Number	19-048 EX 1902
3.b. Protocol Title	Framework for user sentiment analysis to improve usability of applications for generation z and young adults

3.c. Current Status of Protocol—For active studies, check ONE box at left; provide numbers and dates where applicable

☐ **Study has not yet begun; no data has been entered collected**

☐ **In progress If YES, number entered**
Adverse events since last review

☒ **Data analysis only**

Approval Dates: From03/05/2019 To

☐ **Funding Agency and Grant Number:** **AU Funding Information:**

☐ **List any other institutions and/or IRBs associated with this project:**

4. Types of Change

Mark all that apply, and describe the changes in item 5

☐ **Change Key Personnel**
Attach CITI forms for new personnel.

☐ **Additional Sites or Change in Sites, including AU classrooms, etc.**
Attach permission forms for new sites.

☐ **Change in methods for data storage/protection or location of data/consent documents**

☐ **Change in project purpose or project questions**

☐ **Change in population or recruitment**
Attach new or revised recruitment materials as needed; both highlighted version & clean copy for IRB approval stamp

The Auburn University Institutional Review Board has approved this Document for use from 05/28/2019 to ----------
Protocol # 19-048 EX1902

☐ **Change in study procedures**
Attach new or revised consent documents as needed; both highlighted version & clean copy for IRB approval stamp

☒ **Change in data collection instruments/forms (surveys, data collection forms)**
Attach new forms as needed; both highlighted version & clean copy for IRB approval stamp

☐ **Other**
(BUAs, DUAs, etc.) Indicate the type of change in the space below, and provide details in Item 5.c. or 5.d. as applicable. Include a copy of all affected documents, with revisions highlighted as applicable.

▶

5. Description and Rationale

5.a. For each item marked in Question #4 describe the requested changes to your research protocol, with an explanation and/or rationale for each.
Additional pages may be attached if needed to provide a complete response.

▶ Additional questionnaires added for Usability Evaluation Phase

5.b. Briefly list (numbered or bulleted) **the activities that have occurred up to this point, particularly those that involved participants.**

☐ Information design phase finished (hands out 120 pieces of survey, each contains interesting query & five articles) – by participants.
☐ Mobile application designed and implemented by PI.

5.c. Does the change affect participants, such as procedures, risks, costs, benefits, etc.

▶ N/A

5.d. Identify any changes in the safeguards or precautions that will be used to minimize described risks.

▶ N/A

5.e. Attach a copy of all "stamped" IRB-approved documents currently used. (information letters, consents, flyers, etc.

▶

5.f. Attach a copy of all revised documents (high-lighted revised version and clean revised version for the IRB approval stamp).

▶

6. Signatures
Principal Investigator Yang Cao

Faculty Advisor PI, if applicable Chris D. Seals

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

REQUEST for MODIFICATION

For help, contact: **THE OFFICE OF RESEARCH COMPLIANCE (ORC)**, 115 Ramsay Hall, Auburn University
Phone: 334-844-5966 **e-mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs

Revised 2.1.2014 **Submit completed form to IRBsubmit@auburn.edu or 115 Ramsay Hall, Auburn University 36849.**

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

1. **Protocol Number:** 19-048 EX 1902
2. **Current IRB Approval Dates: From:** 02/19/2019 **To:** ----------
3. **Project Title:** Framework for user sentiment analysis to improve usability of applications for generation z and young adults

4.

Yang Cao	PhD Candidat	CSSE	3343323678	yangcao@auburn.edu
Principal Investigator	**Title**	**Department**	**Phone**	**AU E-Mail** (primary)
Yang Cao	2306 Shelby Center, Auburn AL			
PI Signature	**Mailing Address**			**Alternate E-Mail**
Cheryl D. Seals	Cheryl Seals	CSSE	3348446319	sealscd@auburn.edu
Faculty Advisor	**FA Signature**	**Department**	**Phone**	**AU E-Mail**

Name of Current Department Head: Hari Narayanan **AU E-Mail:** naraynh@auburn.edu

5. **Current External Funding Agency and Grant number:** N/A

6. **a. List any contractors, sub-contractors, other entities associated with this project:**

N/A

b. List any other IRBs associated with this project: N/A

7. **Nature of change in protocol: (Mark all that apply)**

- ☐ **Change in Key Personnel** (attach CITI forms for new personnel)
- ☐ **Change in Sites** (attach permission forms for new sites)
- ☐ **Change in methods for data storage/protection or location of data/consent documents**
- ☐ **Change in project purpose or questions**
- ☐ **Change in population or recruitment** (attach new or revised recruitment materials as needed)
- ☐ **Change in consent procedures** (attach new or revised consent documents as needed)
- ☐ **Change in data collection methods or procedures** (attach new data collection forms as needed)
- ☑ **Other (explain):** All 100 articles that will be used for information design are attached (compared to the approved 5-article-sample)

FOR ORC OFFICE USE ONLY

DATE RECEIVED IN ORC: _____ by _____
DATE OF IRB REVIEW: _____ by _____
DATE OF IRB APPROVAL: _____ by _____

MODIFICATION # _____
PROTOCOL APPROVAL CATEGORY: _____
MODIFICATION APPROVAL CATEGORY: _____
INTERVAL FOR CONTINUING REVIEW: _____

The Auburn University Institutional Review Board has approved this Document for use from 03/05/2019 to ---------- Protocol # 19-048 EX 1902

COMMENTS:

8. **Briefly list** *(numbered or bulleted)* **the activities that have occurred up to this point, particularly those that involved participants.**

The study hasn't started yet.

9. **For each item marked in Question #7, describe the requested changes to your research protocol, with an explanation and/or rationale for each.** (*Additional pages may be attached if needed to provide a complete response.)*

N/A

10. **Identify any changes in the anticipated risks and / or benefits to the participants.**

N/A

11. **Identify any changes in the safeguards or precautions that will be used to address anticipated risks.**

N/A

12. Attach a copy of all "stamped" IRB-approved documents you are currently using. *(information letters, consents, flyers, etc.)*

Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **The OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to irbsubmit@auburn.edu.

1. PROJECT IDENTIFICATION

Date 01/30/2019

a. Project Title Framework for user sentiment analysis to improve usability of applications for generation z and young adults

b. Principal Investigator Yang Cao Degree(s) PhD

Rank/Title PhD Candidate Department/School CSSE

Phone Number 3343323678 AU Email yangcao@auburn.edu

Faculty Principal Investigator (required if PI is a student) Cheryl D. Seals

Title Associate Professor Department/School CSSE

Phone Number 3348446319 AU Email sealscd@auburn.edu

Dept Head Hari Narayanan Department/School CSSE

Phone Number 3348446312 AU Email naraynh@auburn.edu

c. Project Personnel (other than PI) - Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting). Attach a table if needed for additional personnel.

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

d. Training - Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? ■ YES ☐ NO

e. Funding Source- Is this project funded by the investigator(s)? ☐ YES ■ NO
Is this project funded by AU? ☐ YES ■ NO If YES, identify source _____
Is this project funded by an external sponsor? ☐ YES ■ NO If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for the award.
Name _____ Type _____ Grant # _____

f. List other IRBs associated with this research and submit a copy of their approval and/or protocol.

2. Mark the category or categories below that describe the proposed research:

■ 1**.** Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

■ (i) Recorded information cannot readily identify the participant (directly or indirectly/linked); **OR**

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include children when investigators do not participate in activities being observed.

■ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3**.** Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions) **Mark the applicable sub-category below (I, ii, or iii).** 104(d)(3)(i)

☐ (A) Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ (B) Any disclosure of responses outside of the research would not reasonably place subject at risk; **OR**

☐ (C) Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by the IRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one of the following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information and must be publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directly or indirectly/linked; investigator does not contact subjects and will not re-identify the subjects; **OR**

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); **OR**

☐ (iv) Research information collected by or on behalf of federal government using government generated or collected information obtained for non-research activities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. **(**Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

***Limited IRB review* – the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

****Category 3 – Benign Behavioral Interventions (BBI)* must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark all applicable)

Minors (under 19)	☐ YES ■ NO
Pregnant women, fetuses, or any products of conception	☐ YES ■ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ■ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ■ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ■ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ■ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ■ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ■ NO
Deception of participants	☐ YES ■ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this research is to create a web crawling system that will be enhanced through machine learning strategies. The study participants will provide us with data that will help us to learn their preferences to model in the proposed system. This study is to investigate the effect that our proposed framework has on software usability with a system enhanced with this method. The main objective is to create framework that can be used to design usable applications and the proposed framework will be evaluated through empirical experiments.

The participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. Informed consent will be granted using the recruitment script (see attached script). Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

Phase one -- Information Design
Participants will be asked about their interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology. Then 5 - 10 articles from extension.org will be provided to participants to ask which category do they think each article belongs to, and participants' interest level (ranges 1 - 10) in this article.
Those users' preference data and articles themselves will be used to train a machine learning model, which will be applied to our experimental application.
Phase two -- Usability evaluation
Participants will be provided two Andriod applications (one benchmark, one experimental) to read articles. To collect unbiased data, the order of the application review will be assigned to survey participants in random order. Usability and satisfaction data will be collected with the Usability Evaluation Questionnaire.

The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

5. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

Participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. For this experiment, we invite participates of all genders. We will also utilize opportunistic sampling to choose participants. It will be advertised in classes to seek volunteers and we will use personal recruitment and email recruitment based on recruitment script.

6. **Does the research involve deception? ☐ YES ■ NO If YES, please provide the rationale for deception and describe the debriefing process.**

7. **Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the person would experience in daily life.**

   Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

   No this experiment will not cause any harm to the participants and they will be given the opportunity to withdraw at any time.

8. **Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.**

   Hard copy paper documents will be stored in a locked file cabinet after being entered into an Excel Spreadsheet or SQLite Database. Confidential data will not be coded in the database. Only Yang Cao (PI) and Dr. Cheryl Seals (FA) have access to participants' data.

9. **Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).**

   Data will be collected without a link of participant s data to any identifying information, recorded and analyzed as "anonymous . Participants' name won't be published.

10. Will the research involve interacting (communication or direct involvement) with participants? ☐ YES ■ NO **If YES, describe the consent process and information to be presented to subjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.**

During Phase I, the informant design, the experiment facilitators will give the participants the informed consent. There are two options to the experiment. The user can complete the survey remotely and in this case we will have no contact with the participant.

In case two, we will consent the participants and situate them in a study area were they will complete the survey. We will also perform the experiment and collect the experimental data from the experiment.

We will also use this same procedure for the Phase II systems experiment.

11. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Appendix A Recruitment Script
Yang Cao Citi training
Cheryl Seals Citi training
Phase One information design survey sample

Principal Investigator's Signature Yang Cao **Date** 01/30/2019

If PI is a student,
Faculty Principal Investigator's Signature Cheryl Seals **Date** 01/31/2019

Department Head's Signature N. Hari Narayanan **Date** 01/31/2019

The Auburn University Institutional Review Board has approved this document for use from 01/29/2019 to 01/28/2020. Protocol #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults

RECRUITMENT SCRIPT (verbal, in person)

You are invited to participate in a research study because you are generation z students and aged above 18. The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering. Only individuals who are at least 18 years old may participate in this study.

As a participant, you will be asked to choose your interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology, and provide opinions about articles in those categories. Your time commitment will be approximately half an hour.

There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. You will not directly benefit from being in this study. There are no costs associated with participating.

If you would like to participate in this research study, email me at yangcao@auburn.edu. If you have questions, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** History and Ethical Principles - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720860
- **Completion Date:** 06/06/2016
- **Expiration Date:** 06/06/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
History and Ethical Principles - SBE (ID: 490)	06/06/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** History and Ethical Principles - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720860
- **Report Date:** 06/06/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
History and Ethical Principles - SBE (ID: 490)	06/06/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COURSEWORK REQUIREMENTS REPORT*

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- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 19720852
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/06/2020
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
CITI Conflict of Interest Course - Introduction (COI-Basic) (ID: 15177)	06/06/16	No Quiz
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	06/06/16	5/5 (100%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	06/07/16	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	06/07/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 19720852
- **Report Date:** 06/07/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
CITI Conflict of Interest Course - Introduction (COI-Basic) (ID: 15177)	06/06/16	No Quiz
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	06/06/16	5/5 (100%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	06/07/16	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	06/07/16	5/5 (100%)

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

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- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research with Children - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720850
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/07/2019
- **Minimum Passing:** 80
- **Reported Score*:** 80

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Research with Children - SBE (ID: 507)	06/07/16	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

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- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research with Children - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720850
- **Report Date:** 06/07/2016
- **Current Score**:** 80

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research with Children - SBE (ID: 507)	06/07/16	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research in Public Elementary and Secondary Schools - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720849
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/07/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	06/07/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research in Public Elementary and Secondary Schools - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720849
- **Report Date:** 06/07/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	06/07/16	5/5 (100%)

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COURSEWORK REQUIREMENTS REPORT*

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- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Cultural Competence in Research
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720859
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Cultural Competence in Research (ID: 15166)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Cultural Competence in Research
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720859
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Cultural Competence in Research (ID: 15166)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720858
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
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- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720858
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

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- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher
- **Course Learner Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Key Personnel (including AU Faculty, Staff and Students) and Faculty Advisors involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 19720854
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID: 1127)	06/08/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	06/08/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	06/08/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	06/08/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	06/08/16	5/5 (100%)
Students in Research (ID: 1321)	06/08/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Yang Cao (ID: 5590169)
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- **Course Learner Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Key Personnel (including AU Faculty, Staff and Students) and Faculty Advisors involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 19720854
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Students in Research (ID: 1321)	06/08/16	5/5 (100%)
Belmont Report and CITI Course Introduction (ID: 1127)	06/08/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	06/08/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	06/08/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	06/08/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	06/08/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	06/08/16	5/5 (100%)

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** Responsible Conduct of Research for Social and Behavioral
- **Course Learner Group:** Social, Behavioral and Education Sciences RCR
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

- **Report ID:** 19720851
- **Completion Date:** 06/14/2016
- **Expiration Date:** 06/13/2021
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Authorship (RCR-Basic) (ID: 16597)	06/13/16	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	06/13/16	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	06/13/16	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	06/13/16	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	06/13/16	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	06/13/16	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	06/14/16	5/5 (100%)
Plagiarism (RCR-Basic) (ID: 15156)	06/14/16	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	06/14/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
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- **Phone:** 3343323678

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- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

- **Report ID:** 19720851
- **Report Date:** 06/14/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	06/14/16	5/5 (100%)
Plagiarism (RCR-Basic) (ID: 15156)	06/14/16	5/5 (100%)
Authorship (RCR-Basic) (ID: 16597)	06/13/16	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	06/13/16	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	06/13/16	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	06/13/16	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	06/13/16	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	06/13/16	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	06/14/16	5/5 (100%)

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418458
- **Completion Date:** 14-Jul-2015
- **Expiration Date:** 14-Jul-2018
- **Minimum Passing:** 80
- **Reported Score*:** 80

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	14-Jul-2015	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k137ccdc4-e1db-414a-983b-f97d5bcc9ee3-16418458

Collaborative Institutional Training Initiative (CITI Program)
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Phone: 888-529-5929
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418458
- **Report Date:** 03-Apr-2018
- **Current Score**:** 80

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	14-Jul-2015	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k137ccdc4-e1db-414a-983b-f97d5bcc9ee3-16418458

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

CITI PROGRAM

Completion Date 14-Jul-2015
Expiration Date 14-Jul-2018
Record ID 16418458

This is to certify that:

Cheryl Seals

Has completed the following CITI Program course:

IRB Additional Modules (Curriculum Group)
Conflicts of Interest in Research Involving Human Subjects (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wbcc96680-7f48-42fd-9118-ce5a6116aecf-16418458

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

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- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Defining Research with Human Subjects - SBE
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418460
- **Completion Date:** 15-Jul-2015
- **Expiration Date:** 15-Jul-2018
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Defining Research with Human Subjects - SBE (ID: 491)	15-Jul-2015	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Defining Research with Human Subjects - SBE
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418460
- **Report Date:** 03-Apr-2018
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Defining Research with Human Subjects - SBE (ID: 491)	15-Jul-2015	5/5 (100%)

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Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

CITI PROGRAM

Completion Date 15-Jul-2015
Expiration Date 15-Jul-2018
Record ID 16418460

This is to certify that:

Cheryl Seals

Has completed the following CITI Program course:

IRB Additional Modules (Curriculum Group)
Defining Research with Human Subjects - SBE (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w3383570e-edf0-405a-a5f3-dfd84f803efb-16418460

IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic Course

You completed the mandatory elements of this course on **15-Jul-2015** with a final reported average score of **84%**.

This is the date and score recorded in the Completion Report sent to your institution.

- You may review any of the course content and retake quizzes, including those for supplemental optional modules, but your reported quiz scores and dates will not change.
- You do not receive any extra credit for this course if you retake quizzes or complete additional quizzes on supplemental materials.
- In some cases, completion of additional modules may be required for eligibility for CEU credits.
- Additional completions and new quiz scores may transfer to other CITI Program courses, if you register for courses that include those modules. You must login using the same account, and the other institution must allow transfer credit.

Required Modules	Already Taken?	Score
Belmont Report and CITI Course Introduction (ID: 1127)	14-Jul-2015	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	14-Jul-2015	5/5 (100%)

Required Modules	Already Taken?	Score
Assessing Risk - SBE (ID: 503)	14-Jul-2015	4/5 (80%)
Informed Consent - SBE (ID: 504)	14-Jul-2015	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	15-Jul-2015	5/5 (100%)
Students in Research (ID: 1321)	15-Jul-2015	9/10 (90%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	15-Jul-2015	5/5 (100%)

The following six pages will be an information design survey sample.

Interest question (Page 1) will always be the same. Articles (Page 2 – 6) will, but questions in these pages will be the same. All of the articles are from extension.org, in 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology.

Please choose your interest (Mark all the categories that you are interested in):

- ○ Art
- ○ Biology
- ○ Chemistry
- ○ Education
- ○ Geography
- ○ History
- ○ Math
- ○ Physics
- ○ Psychology
- ○ Responsibility
- ○ Technology

Please read the articles in the following five pages and answer the correlated questions.

Creative Art Helps Children Develop across Many Domains

Creative art activities can help children in all areas of development. Child care providers should plan creative activities with the child's overall development in mind. Here are some ways that art activities can support young children's development. Physical Development When child care providers offer art activities, they are supporting children's large and small muscle development, as well as their eye-hand coordination. Using crayons, markers, and paintbrushes helps children practice the fine motor control they will need for writing later on. Social Development When children work together in the art area, they learn to share, to interact with others, to be responsible for cleanup, and to put materials away. These are positive and important changes for social learning. Cognitive Development Young children can learn the names of colors and shapes through creative art activities. They find out what happens when they mix two primary colors together and get a secondary color. Sending older children outside to carefully examine a tree, feel its bark, and study the shape and color of its leaves, and then asking them to draw or paint trees helps them develop observational skills needed for science. Emotional Development Through creative art, children may be able to represent experiences that they cannot verbalize. They may draw pictures out of proportion, exaggerating things that are important to them. When we value children's creativity, we help them feel valued as people, raising their self-esteem. Imagination and Experimentation Children's active imaginations can take form through art. For example, Gene wonders what will happen if he uses three paintbrushes at one time. He asks his teacher to help him tie a rubber band around three paintbrushes. Through active experimentation, he invents a new way to paint. Although tying three paintbrushes together may not be earthshaking, Gene is learning skills that could help him invent something new, like a car that runs on solar power or a cure for cancer, when he grows up.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Using Learning Centers in Child Care

Learning centers are a purposeful way of dividing up your classroom into different subject/learning areas. The location of each learning center, placement of any furnishings or equipment, and easily available materials give a clear message to the child about what is to take place in that area. Planning for Learning Centers Establishing the centers requires some initial planning, work, and possible expense, but once they are established they save time and money. For example, you don't want to place the reading area (quiet and comfy) near the block, music, or dramatic play areas (loud and active). You also probably want the art center on hard, easy-to-clean floors and near a sink, but the science center near a window or other source of natural sunlight. Learning centers capitalize on children's natural need to explore because they are given the chance to gain experience by trying out their own ideas in a hands-on way. Once established, you can write your lesson plans according to each learning center to make sure you're offering something to enhance each subject. Then you can easily set up your planned activities for the morning/afternoon in each corresponding center, and children can play in whatever center interests them. Advantages of Learning Centers Discipline problems are reduced because groups are limited to a number which can reasonably function in each area. Classroom management is easier since children are in the area of their choice and interest. Children are engaged in hands-on activities as they explore and experiment. Caregivers can support children by supplying the resources as they learn by themselves. Caregivers can determine, by observation, the progress of the children. Caregivers can easily determine what items need to be added to each area that will encourage children in further discovery. Children understand classroom rules more easily when they apply to specific areas. Each area contains only the essentials that allow children to control and create. The purpose of the area is clear and understandable to children.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Introduction to Biomass Combustion

Combustion of biomass used to heat greenhouses. Fire, or combustion of biomass, is arguably the oldest known and most widely used controllable energy source on earth. In recent years, rising costs of fossil fuels and the development of advanced equipment have made biomass combustion an economical, efficient, and practical energy source. Principles of Combustion Combustion is familiar to all of us, but many do not realize that it is essentially a chemical reaction. In the process of combustion, two ingredients (biomass and oxygen) are combined in a high temperature environment to form carbon dioxide, water vapor, and heat. $CH_{1.44}O_{0.66} + 1.03\ O_2 = 0.72\ H_2O + CO_2$ (+Heat) Note: $CH_{1.44}O_{0.66}$ is the approximate chemical equation for the combustible portion of biomass. The amount of heat that is produced varies depending on species, climate, and other factors, but it is generally about 20 Megajoules of energy per dry kilogram of biomass. In order for combustion to be efficient and clean, the ingredients must be well mixed at the right temperatures for the right amount of time. Practically speaking, this means that you need the right amount of fuel, the right amount of air, and the right conditions. Water content in biomass is an important factor when it comes to combustion. The best burning fuels are dry. However, biomass almost always includes some amount of moisture. For example, green wood chips are usually about 50% water and 50% dry matter. Fresh leaves from a plant can be as high as 95% moisture and 5% dry matter. Ideally, biomass should be no more than 20% moisture. Feedstocks for Biomass Combustion A feedstock is merely the fuel that will be burned for energy. While wood is the most common feedstock for biomass combustion, almost any plant material can be used as a combustion feedstock. Processing Biomass for Combustion Biomass can often benefit from a certain amount of processing to make it more suitable as a combustion fuel. This includes sizing, drying, and/or densification. Utilizing Biomass as an Energy Source The smoky fireplace of past generations is a far cry from the combustion equipment that is available today. While those old fireplaces are still used in some homes, high-efficiency biomass combustion requires carefully designed and operated equipment that works well with the available fuel. Depending on your needs, biomass combustion systems can produce hot air, hot water, steam, electricity, or a combination. To find out more about equipment, efficiency, and air quality from biomass combustion, see Using Combustion Heat for Energy.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

How Teachers Can Include School Gardens in the Classroom Curriculum

School gardens are cropping up around the country as multi-faceted experiential learning labs. With the increased emphasis these days on high-stakes testing and data collection, many educators are looking for more innovative ways to present subject matter that balances academic achievement with fostering a love of learning. Research and common sense agree that the best learning environments include a variety of verbal, written, and hands-on activities for each lesson. Although new technology is playing a vital and growing role in modern education, many professionals are also seeking ways to connect students back to their environment, and instill greater life skills and a sense of community in their classrooms. Many of these skills, once taught at home, seem to be left more and more to schools. What can you teach in a school garden? What can't you teach? Most obviously, school gardens are perfectly suited to science curricula. Units such as: seed germination, plant parts, life cycles/metamorphosis, the water cycle, habitat, temperature, weather/climate, and environmental science can all be explored. Students can practice scientific inquiry and higher-order thinking in a live setting. What's more, if they bring their harvest back to the classroom to cook, they can explore the wonders of kitchen science. Math is another natural fit for school gardens. Designing, prepping, and planting garden beds affords a lot of measurement practice; as does weighing the harvest. Cooking from the garden lends itself to lessons of capacity, volume, and an exploration of fractions through measurement. Since much of all culture is centered around food, deciding what to plant, how to plant it, and how to prepare the bounty can open up infinite possibilities for social studies and multi-cultural exploration. Lesson on native foods, natural resources, early agriculture, cultural celebrations, spice trade, and traditional methods of preparing and preserving foods can all be taught in school gardens. For older students, discussions on food policy and food justice unfold as students develop a deeper understanding of where food comes from and how it makes its way to our plate. Although Language Arts may seem like a less-obvious fit for the garden, the natural world has always been a source of inspiration for poetry and creative writing. It can also be a soothing environment for reflection or for read-aloud time. In fact, there is no end to the supply of books of every genre about gardening, food, and cooking to inspire readers of all ages. Alongside lessons in core academics, gardening teaches vital life skills. One of the most exciting things about engaging youth in school gardens is the way it develops an appreciation of the natural world and a sense of interconnectedness that children may not experience in other areas of education. Planting a garden requires teamwork, patience, and perseverance. Caring for a living thing, watching it grow and thrive, and reaping the harvest teaches respect, pride, and commitment. Although these skills are rarely tested, or recorded, these are the lessons that will stick with students throughout their lifetime.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

What does it mean to foster distinctive, attractive communities with a strong sense of place?

What does it mean to foster distinctive, attractive communities with a strong sense of place? The Smart Growth Tenet: Foster distinctive, attractive communities with a strong sense of place that reflect the values, culture and vision of residents through the growth and history of their community. Why is fostering distinctive, attractive communities with a strong sense of place important? Communities with a strong sense of place build on their unique history, identity and assets to foster community pride, increase social interaction and market their community to potential businesses and residents. The results can improve economic stability, increase property values and greatly impact the lives and memories of residents. Urban sprawl is creating a new image for growing communities that is commonly referred to as "Anywhere USA." The monotony of this sprawling development pattern moves people farther away from our town centers and from each other. The results have led to the loss of millions of acres of farmland and open space, disinvestment in our cities and decreases in social interaction, diversity and civic pride. To create a distinct image and maintain a sense of place, many communities are investing in their history as the foundation for new growth. How do you apply this tenet to your community? Investing in your community's unique assets and history can create a situation where residents will become your greatest ally in guiding growth that benefits the entire community. Involving the public in planning decisions and community improvement projects is the first step in building a sense of place. While the greater public should be intimately involved in creating a vision for the community, it is the role of government officials to use the zoning ordinance, site plan review, capital improvement planning and state and federal assistance to make this vision a reality. Communities that are effective in implementing this tenet have consistent policies and regulations in place that create synergy between preservation efforts and new development and are always looking for ways to improve by building sense of place. source: Best Practices for Planning and Zoning

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Memo

Protocol title and number: #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults"

Thank you very much for your time reviewing our IRB application. We appreciate your comments, and have outlined the changes made in italics below.

IRB comments:" 1. Expand item 4 to describe the "process" recruit and consent participants; that is who (PI?), how (email or in person?), if email, what is the PI's access to email addresses, when and where (during which classes and where), etc.3. Expand item 4 to describe the process to access and complete the survey."

The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

IRB comments:" 2. Revise item 2 to describe which internet and electronic platforms (AU email? qualtrics?) will be used for the study."

Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

IRB comments:" 4. In item 5, address gender, if applicable."

For this experiment, we invite participates of all genders

IRB comments:" 5. It is important to note that the IRB is an organization responsible for protection participants in human subjects research, not a form. Revise item 7 to describe use of a consent document."

Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

IRB comments:" 6. Add as the 2nd sentence in the first paragraph that you are the PI under your faculty advisor and provide your faculty advisor's name/title. 7. Revise the 2nd sentence in the first paragraph to read something like, "You are invited to participate in a research study because you are a ..... 8. Revise the 2nd sentence in the first paragraph to be correctly written -, "...to help understand if a ..." 9. Reread the last part of the 2nd sentence in the first paragraph, for clarity. 10. Combine the last two sentences in the first paragraph to read something like, "Only individuals who are at least 18 years of old may participate in this study."

You are invited to participate in a research study because you are generation z students and aged above 18. The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better

recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering (6). Only individuals who are at least 18 years old may participate in this study.

IRB comments:" 11. Revise the 3rd sentence in the 3rd paragraph to read, "You will not directly benefit from being in this study."

You will not directly benefit from being in this study

IRB comments:" 12. Delete the last paragraph; instead add contact information for the AU IRB (see the online sample consent form)."

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

- 1-5 are in Exemption Review Application form, 6 -12 are in recruitment script. Both "to be changed" and "change" are marked.
- Phase One survey sample added as another attachment.
- The previous approved IRB removed from the attachment.
- Revised files come first then the clean ones.

Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **The OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to irbsubmit@auburn.edu.

1. PROJECT IDENTIFICATION

Date 01/30/2019

a. Project Title Framework for user sentiment analysis to improve usability of applications for generation z and young adults

b. Principal Investigator Yang Cao Degree(s) PhD

Rank/Title PhD Candidate Department/School CSSE

Phone Number 3343323678 AU Email yangcao@auburn.edu

Faculty Principal Investigator (required if PI is a student) Cheryl D. Seals

Title Associate Professor Department/School CSSE

Phone Number 3348446319 AU Email sealscd@auburn.edu

Dept Head Hari Narayanan Department/School CSSE

Phone Number 3348446312 AU Email naraynh@auburn.edu

c. Project Personnel (other than PI) - Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting). Attach a table if needed for additional personnel.

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

d. Training - Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? ■ YES ☐ NO

e. Funding Source- Is this project funded by the investigator(s)? ☐ YES ■ NO
Is this project funded by AU? ☐ YES ■ NO If YES, identify source _____
Is this project funded by an external sponsor? ☐ YES ■ NO If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for the award.
Name _____ Type _____ Grant # _____

f. List other IRBs associated with this research and submit a copy of their approval and/or protocol.
(Remove)Improving Learning Outcomes in Phonetic Transcription using automated software tools:#1

2. Mark the category or categories below that describe the proposed research:

■ 1**.** Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

■ (i) Recorded information cannot readily identify the participant (directly or indirectly/linked); **OR**

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include children when investigators do not participate in activities being observed.

■ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3**.** Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions) **Mark the applicable sub-category below (I, ii, or iii).** 104(d)(3)(i)

☐ (A) Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ (B) Any disclosure of responses outside of the research would not reasonably place subject at risk; **OR**

☐ (C) Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by the IRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one of the following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information and must be publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directly or indirectly/linked; investigator does not contact subjects and will not re-identify the subjects; **OR**

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); **OR**

☐ (iv) Research information collected by or on behalf of federal government using government generated or collected information obtained for non-research activities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. **(**Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

***Limited IRB review* – the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

****Category 3 – Benign Behavioral Interventions (BBI)* must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark all applicable)

Minors (under 19)	☐ YES ■ NO
Pregnant women, fetuses, or any products of conception	☐ YES ■ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ■ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ■ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ■ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ■ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ■ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ■ NO
Deception of participants	☐ YES ■ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this research is to create a web crawling system that will be enhanced through machine learning strategies. The study participants will provide us with data that will help us to learn their preferences to model in the proposed system. This study is to investigate the effect that our proposed framework has on software usability with a system enhanced with this method. The main objective is to create framework that can be used to design usable applications and the proposed framework will be evaluated through empirical experiments.
(2 revised -- platform specification added)
The participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. Informed consent will be granted using the recruitment script (see attached script). Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

Phase one -- Information Design
Participants will be asked about their interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology. Then 5 - 10 articles from extension.org will be provided to participants to ask which category do they think each article belongs to, and participants' interest level (ranges 1 - 10) in this article.
Those users' preference data and articles themselves will be used to train a machine learning model, which will be applied to our experimental application.
Phase two -- Usability evaluation
Participants will be provided two Andriod applications (one benchmark, one experimental) to read articles. To collect unbiased data, the order of the application review will be assigned to survey participants in random order. Usability and satisfaction data will be collected with the Usability Evaluation Questionnaire.
(1,3 revised -- one paragraph added to clarify)
The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

5. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

(4 revised -- one sentence added)

Participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. For this experiment, we invite participates of all genders (4). We will also utilize opportunistic sampling to choose participants. It will be advertised in classes to seek volunteers and we will use personal recruitment and email recruitment based on recruitment script.

6. **Does the research involve deception? ☐ YES ■ NO If YES, please provide the rationale for deception and describe the debriefing process.**

7. **Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the person would experience in daily life.**

   (5 original) Before taking part in the study, participants will be provided an IRB form to inform them of their rights. The IRB also consents that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.
   (5 revised) Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

   No this experiment will not cause any harm to the participants and they will be given the opportunity to withdraw at any time.

8. **Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.**

   Hard copy paper documents will be stored in a locked file cabinet after being entered into an Excel Spreadsheet or SQLite Database. Confidential data will not be coded in the database. Only Yang Cao (PI) and Dr. Cheryl Seals (FA) have access to participants' data.

9. **Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).**

   Data will be collected without a link of participant s data to any identifying information, recorded and analyzed as "anonymous . Participants' name won't be published.

10. Will the research involve interacting (communication or direct involvement) with participants? ☐ YES ■ NO **If YES, describe the consent process and information to be presented to subjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.**

During Phase I, the informant design, the experiment facilitators will give the participants the informed consent. There are two options to the experiment. The user can complete the survey remotely and in this case we will have no contact with the participant.

In case two, we will consent the participants and situate them in a study area were they will complete the survey. We will also perform the experiment and collect the experimental data from the experiment.

We will also use this same procedure for the Phase II systems experiment.

11. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Appendix A Recruitment Script
(Remove previous IRB attachment)Improving Learning Outcomes in Phonetic Transcription using automated software tools: #17-040 EP1705
Yang Cao Citi training
Cheryl Seals Citi training
(added attachment)
Phase One information design survey sample

Principal Investigator's Signature Yang Cao **Date** 01/30/2019

If PI is a student,
Faculty Principal Investigator's Signature Cheryl Seals **Date** 01/31/2019

Department Head's Signature N. Hari Narayanan **Date** 01/31/2019

Description added
The Auburn University Institutional Review Board has approved this document for use from 01/29/2019 to 01/28/2020. Protocol #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults

RECRUITMENT SCRIPT (verbal, in person)

6,7,8,9,10 original
I am Yang Cao a graduate student in the Department of Computer Science and Software Engineering at Auburn University. I would like to invite you to participate in my research study to help us understand can a framework created with the addition of a machine learning model to support the learning for generation z students provide better user engagement, user experience. You may participate if you are above 18 years old when you participate in the study. Please do not participate if you are under 18 years old when you participate in the study.
6,7,8,9,10 revised
You are invited to participate in a research study because you are generation z students and aged above 18 (7). The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system) (8,9). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering (6). Only individuals who are at least 18 years old may participate in this study (10).

As a participant, you will be asked to choose your interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology, and provide opinions about articles in those categories. Your time commitment will be approximately half an hour.

11 original
There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. We cannot promise you that you will receive any or all of the benefits described. There are no costs associated with participating.
11 revised
There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. You will not directly benefit from being in this study (11). There are no costs associated with participating.

If you would like to participate in this research study, email me at yangcao@auburn.edu. If you have questions, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.

12 original
Do you have any questions now? If you have questions later, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.
12 revised
If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

Creative Art Helps Children Develop across Many Domains

Creative art activities can help children in all areas of development. Child care providers should plan creative activities with the child's overall development in mind. Here are some ways that art activities can support young children's development.

Physical Development

When child care providers offer art activities, they are supporting children's large and small muscle development, as well as their eye-hand coordination. Using crayons, markers, and paintbrushes helps children practice the fine motor control they will need for writing later on.

Social Development

When children work together in the art area, they learn to share, to interact with others, to be responsible for cleanup, and to put materials away. These are positive and important changes for social learning.

Cognitive Development

Young children can learn the names of colors and shapes through creative art activities. They find out what happens when they mix two primary colors together and get a secondary color. Sending older children outside to carefully examine a tree, feel its bark, and study the shape and color of its leaves, and then asking them to draw or paint trees helps them develop observational skills needed for science.

Emotional Development

Through creative art, children may be able to represent experiences that they cannot verbalize. They may draw pictures out of proportion, exaggerating things that are important to them. When we value children's creativity, we help them feel valued as people, raising their self-esteem.

Imagination and Experimentation

Children's active imaginations can take form through art. For example, Gene wonders what will happen if he uses three paintbrushes at one time. He asks his teacher to help him tie a rubber band around three paintbrushes. Through active experimentation, he invents a new way to paint. Although tying three paintbrushes together may not be earthshaking, Gene is learning skills that could help him invent something new, like a car that runs on solar power or a cure for cancer, when he grows up.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

The Development of Creative Art Abilities in 3- to 5-Year-Olds

During the preschool years, many children show tremendous growth in their creative art abilities. Child care providers can support children's artistic development by planning art activities that encourage preschoolers' developing art skills. Here are some basic milestones in preschoolers' art development: Art for 3 and 4 Year Olds
By age 3, many children are learning to better control their hand and wrist movements. They are making forms and objects that are almost, but not quite, recognizable to adults. Circles, lines and crosses are always popular forms. Some 3 and 4 year olds may begin naming their drawings. In the middle of drawing, a child may look and say something like, "This is a truck," or, "This is Mommy." Naming artwork is a big step that shows the child has begun to think in terms of mental pictures. It doesn't matter that the drawing has little or no resemblance to Mommy. What matters is that the child has discovered that drawing is more than just something physically fun to do. It is also a way to communicate ideas.
Art for 4 and 5 Year Olds
By age 4, some of these forms have taken shape and adults can identify them as people, houses, cars or whatever the young artist intended to draw. Typical drawings at this age are pictures of people consisting of large heads that appear to have arms and legs growing out of them. There is usually little evidence of relative size in these drawings. Tiny legs sprout out of huge heads. A drawing of a butterfly may be twice as big as a dog. Whatever is most important to the child at the time gets the biggest play on the page; what is not important may simply be left out. That's why youngsters may leave out fingers, necks or other body parts. It's not that children don't notice that people have fingers; it's just that fingers are not important to them at the time they are drawing. During this stage, children may find colors very exciting. Children are not concerned with realistic color representations. They just like to use color. One child may make everything on the page red. Another may use every color in the box on one drawing. Child care providers should not require children to use certain colors or try to read any deep psychological meanings into a child's choice of colors.
Art for 5 and 6 Year Olds Five-year-olds begin including more real-life elements into their pictures, and between the ages of 5 and 6, children become much more concerned with their creations and want to keep them. Before this time, most children are interested in the sheer fun of doing an art activity, rather than the quality of their products.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Art Is a Valuable Learning Experience for Young Children in Child Care

Art activities might appear to be "just messy," but creating art is a valuable part of a child care curriculum. Art opens up new worlds for children and gives them a variety of important experiences. Crayons, markers, paint, clay and many other art materials are the tools that can help children: build strength in the arms, hands and fingers practice hand and finger control, which helps improve writing skills practice coordination of the hands and eyes explore textures, colors and tastes plan a creation and make decisions about how to create it explore and express their feelings expand their creativity Art Experiences for Babies and Toddlers

Art experiences can begin as soon as babies can hold and move a crayon. Early art usually focuses on using the senses to explore, rather than creating a picture or object to keep. The process of squishing finger paint in their hands, tearing paper or scribbling with crayons is interesting and fun for most babies. As they explore, they learn what happens when they move their hands and arms, and they feel pride and joy in their creations. Babies' and toddlers' art creations do not usually look like real objects. They are simply enjoying the pleasure of creating and exploring the materials.

Art Experiences for Preschoolers

Preschoolers may be more interested in creating art that represents a real or imaginary object or scene. Being able to think about something they can't see and then create it in a drawing or painting is a big accomplishment for a preschooler. But even in preschool, the process of creating is usually more important than the finished project. Don't be surprised if a child who worked hard to paint a picture or build a clay sculpture does not want to save it.

Supporting Children's Creative Art

Child care providers can support children's interest in art by giving them new experiences and by helping them feel their work is valued. Encourage children to explore different art media Hang some sticky paper on the wall and have children stick items to it to make collages Give children the chance to paint with their bare feet Post the children's creations on walls or surfaces for everyone to enjoy These experiences let children explore real materials with their senses. Remember to display children's artwork where they can see it easily.

Which categories do you think the above article belongs to?

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Creative Art Activities for Children with Special Needs

Child care providers often have children with special needs included in their programs. Art activities can be a valuable learning experience for many children with special needs, but the art activities given in a child care setting may need to be modified or adapted so that all children may participate in them. Child care providers should also be aware that they may need to guide children with special needs when helping them with their art activities. Here are some ideas for modifying or adapting materials and activities to children with special needs. Encourage children with special needs to participate in art activities. Use appropriate ways to let children know what art materials are available. For example, you may need to use sign language and demonstrate the materials for children with limited hearing, or you may encourage children with limited vision to touch materials while you explain what they are. Make sure materials are accessible to all children, including children with special needs. Pay attention to where materials are stored and whether children with motor challenges can get to them. Adapt art materials to the child's ability. For example, instead of using scissors that a child may not be able to grasp very well, give children with fine motor challenges pre-cut pieces of paper. Consider giving children adaptive scissors that open easily, or allow the child to tear his or her own pieces of paper. Applaud the artistic efforts of all children. Saying "You worked on that painting for 20 minutes!" or "I bet you feel proud of what you created!" will help build self-confidence and creativity. Be creative. Activities that are pre-made or that have specific directions do not help children be creative and may be too challenging for those with certain special needs. Provide children with open-ended art materials that can be used in many ways and encourage all children to use their abilities to create their own art.

Should I Physically Help a Child with Motor Challenges Create Art?

Children with severe motor challenges may need physical help to create artwork. When helping a child in the art center be sure to let her take the lead. Give only the help necessary. Encourage children to try to do it themselves first. Ask a child what she wants to do, what materials she wants to use and what kind of help she needs. Check in as you help to make sure that you are helping her create what she wants. Modifying and adapting your art center is an important way to include children with special needs in child care programs. Creating art is a worthwhile experience for all children and should be available to children with special needs as well as typically developing children. With simple modifications, you can ensure that all children can use their senses and creativity in the art center. For More Information To learn more about working with children with special needs, check out the eXtension Alliance for Better Child Care section on Child Care for Children with Special Needs. Read more about making your art program successful in the Art in Child Care section. If you are looking for specific art activity ideas to use in your child care program, take a look at the Hands-on Activities Database.

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The Development of Creative Art Abilities in 0- to 3-Year-Olds

During the first three years, young children develop their artistic skills by having fun experimenting and learning all the wonderful things they can do. Child care providers need to understand how children's art abilities develop in order to plan effective art experiences for the child care program.

Art for 0 and 1 Year Olds

When babies engage in creative art, it is a whole body experience. They often are as interested in grasping, chewing, pounding and squishing as they are in trying to actually create something. Child care providers sometimes do not provide infants with art experiences. But even at this age, the sheer exploration is worthwhile for children's development. Safety is an important concern at this age, and adult supervision is critical. We don't want babies swallowing things or hurting themselves or others. Infants enjoy sensory experiences such as water play, texture books or toys.

Art for 1 and 2 Year Olds

Children of this age are in a scribbling stage. At first, between the ages of 1 and 2, their scribbles are usually disordered and uncontrolled. Scribbles are more a product of physical activity, made by the pumping of the shoulders because children can't yet control their elbows or wrists. These young scribblers will typically try holding their crayon a variety of ways and don't often associate their movements with lines appearing on paper. Their attention spans are short, and they only scribble for one or two minutes at a time.

Art for 2 and 3 Year Olds

Gradually these scribbles become more controlled as children gain greater control of their arms, hands, and fingers, and their eye-hand coordination improves. As a result, their efforts show up as repeated motions, such as a series of oval shapes or a series of horizontal and vertical lines. By age 3, children are also putting more concentration and time into their art, sometimes spending as much as 15 minutes drawing. As children leave this age range, a very important change takes place. Even though they are still scribbling, children begin to name the scribbles. Naming artwork is a big step that shows the child has begun to think in terms of mental pictures. During the first three years, children's fine motor skills and coordination are becoming more refined. This is also a time when children come to understand that pictures represent something in real life known as representational thinking.

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Balancing Process and Product in Creative Art Activities

Well-planned art experiences are a valuable part of the child care curriculum. Early childhood art activities need to balance process and product. Process is doing, product is the result. Young children are process-oriented. For infants and toddlers, the joy of art is in the doing and making. They usually want lots of finger paint, really squish it around, and then pay no attention to what happens to their picture afterward. Preschoolers love to experiment with color and design. They do not worry that their entire page is covered in yellow, or their grass is red, or their play dough snake doesn't really look like a snake. Preschoolers may choose to keep their finished product or forget about it once it is completed. School-age children may become very product-oriented. They want to make sure their names are on their projects and may get very upset when papers tear or structures crumble. When planning art activities, be sure to allow enough time for children to get fully involved in the process. Even though we want children to develop longer attention spans, we may actually prevent them from working for longer periods of time when we focus on the product and don't let them enjoy the process of creation. Keep your schedule flexible and allow extra time for art activities that are involved or really capture children's interest. With more flexible planning, art activities can actually help children increase their attention spans.

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The Art Center in Child Care

Art Supports Children's Development

Painting, coloring, sculpting, drawing, and other forms of creative art are an important part of the child care curriculum. Creating art supports young children's development across several different domains. Using art tools helps children develop small muscle coordination and control. Children can practice thinking skills by experimenting with color, texture, and design. Art gives children an opportunity to express their ideas and feelings, relieves tension, and provides limits for self-discipline. Art allows children to achieve and expand their creativity.

Setting Up the Art Center

Because art can be such an important learning experience, it's important for child care programs to include a well-designed art center. The specific set-up of the art center depends on the ages of the children in the group. An infant room probably will not have a permanent art center. Child care providers can begin introducing infants to a few art materials when the infants can sit up and begin controlling their hand movements. Art materials for infants should be brought out when needed, and put away when the activity is over. Art materials should be stored out of the infants' reach when not in use. A toddler room may have an art center with some materials available to children throughout the day. A toddler art center might include fat crayons and paper that children can select and use independently (with adult supervision, of course). Messier materials, such as paint and glue, or materials that need more supervision, such as preschool scissors, should still be stored out of children's reach and brought out only when needed. A preschool room often has a larger and more complex art center, such as the one pictured on this page. The preschool art center may contain many more materials, such as markers, glue sticks, preschool scissors, tissue paper, and chalk. In addition, many preschool art centers include an easel where painting, drawing, and other large-motor art activities can occur. Child care providers should rotate materials periodically to expand children's creative process.

Setting and Enforcing Rules for the Art Center

To keep children safe and to encourage creativity, child care providers should set and enforce certain guidelines for preschool-age children using the art center. Some common rules include: Wearing smocks when using messy materials such as paint Painting or drawing only on the paper or object, not other surfaces Working only on your own creation, unless invited to share Putting away materials after completing project Washing hands before going to another activity

The Teacher's Role in the Art Center

Child care providers should give instruction and assistance to children in the art center while still allowing room for the creativity of the child. Some of your main roles in facilitating children's creative art include: Maintaining a supply of materials, and rotating them regularly to keep children interested Demonstrating the use of new tools and materials (e.g., how to manipulate clay or play dough, how to manipulate a paint roller) Assisting children in their creation only when asked Using open-ended questions to talk with children while they are creating Observing children's skills, especially fine motor skills, and planning new art activities to support children's development Putting children's names on their creations if they request help Adding explanations or stories to creations if requested Instructing or assisting in the drying of creations Assisting children with clean-up Displaying some of the children's art creations in the child care space

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Planning a Successful Art Center in Child Care

In order for children to create art, they need an inspiring space. The art center should look like an artist's studio, filled with children's art as well as that of well-known artists. The art center should allow children to feel creative as they explore materials to express themselves. The art center also allows children to make their own discoveries, either independently or together, and to feel confident in the choices they make.

Setting Up an Art Center in Your Classroom or Family Child Care Home

The location of your art center will depend on the space available in your classroom or home. The following are several different possibilities: Near a window: The natural light through the window is pleasant, and children will be able to look outside for inspiration. Near a sink: Placing the art center near a sink allows for easy clean-up. On a floor that is easily cleaned: Art supplies will inevitably end up on the floor, so a tile floor that can be kept clean or wiped easily is key. Outdoors: Most materials used inside can be easily taken outside to continue art activities, and clean-up is often much easier outdoors.

What an Art Center Should Look Like

Neat and organized: Children should be able to easily locate the materials. Also, if the center is organized, the expectation is that the children will help keep it that way. This way, there is already a limit in place so they know that part of their responsibility is to clean up after themselves. Well stocked with a variety of materials: Children can easily become bored with using the same materials over and over again. To maintain their interest, the art center should be stocked with many types of materials, varied by size, color, texture, etc. Limitless: With a well-stocked art center and encouragement to be creative, children should have minimal boundaries. Although rules are necessary, children should feel that they can create the art they want with the materials provided. Easy-to-clean furniture: To maintain the life of the furniture, you should plan on having smooth tabletops that are easily wiped clean. If you are unable to use an easy-to-clean table, an alternative is to use a plastic tablecloth that can be wiped clean. Appropriate seating: Both children and adults should feel comfortable in the space. Children also should have the option of standing, so art easels and large painting surfaces should be provided as well. It also is important that adults interact and join in on the creativity, so adult-sized furniture should be available. Art easels: Art is a great way for children to develop their motor skills. While at the table, they are primarily working on fine motor movements, but art easels provide a large area where they can move their arms up and down, working on their gross motor skills. Art easels are also great because they allow children to have a change of scenery so they are not always doing art at the table. Also, art easels can easily be moved outdoors so art can take place in different areas of the classroom. Storage: Some space should be available to children all of the time, while other materials should be kept out of reach.

Choosing Materials for the Art Center

The art center should have many different options for children to choose from. Some examples include: paper (manila, construction, newsprint, computer, wallpaper books, magazines, catalogs, used greeting cards, etc.) molding materials (modeling compound such as Play-Doh, clay, rolling pins, plastic knives, cookie cutters, shaving cream, etc.) paints (tempera, watercolors, finger paints, etc.) crayons, markers, pencils, chalk, and erasers colored tape children's scissors (left- and right-handed), hole punch paste, glue, tape paint brushes, sponges rubber stamps and ink pads collage materials (scraps of fabric, yarn, ribbon, feathers, glitter, buttons, macaroni, any small "beautiful junk" items) seasonal leaves, nuts, cones recycled materials (yogurt cups, fabric, yarn, tissue paper, foil, bottles) miscellaneous items for creativity

Keep in mind that most of these suggestions would be appropriate for a group of preschool-age or school-age children. An art area in a toddler classroom will look very different, because toddlers' fine motor and cognitive skills are still developing. Be especially cautious about offering materials that are choking hazards to very young children, who may still be likely to place objects in their mouths. Supervise children of all ages when they are using art materials.

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I've heard the phrase "process over product" to describe art activities. What does this phrase mean, and how can child care providers tell whether an art activity is process-focused or product-focused?

Young children love to create art, but they tend to focus much more on the process of creating and are not as interested in the finished product. It's important for child care providers to realize that many young children may not want to keep their artwork once it's finished or may not even be able to identify which piece they created. This doesn't mean the activity was a failure; it simply means that the child focused on the process but did not care about the final product. The focus in art activities should generally be on how the child is creating, the feelings of the movements she's making with her arm, what the paint looks like on the paper, how the colors combine, and other "process" activities. Art activities that focus on creating a specific product by copying a model or activities in which everyone is expected to create things exactly the same way are more product-focused. The challenge with product-focused activities is that they limit children's creativity. When children are expected to copy a model, especially if it's made by an adult, they may become frustrated because their product does not look like the model and may decide that they are "not good at art." Young children grow as artists and develop creativity when they have open-ended art activities that allow them to explore and create whatever their imaginations suggest. Be sure your art program includes an appropriate balance of process and product focus.

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Fire Ant Art

Literature

In literature, one of the best known and often illustrated ant stories for children is The Ant and the Grasshopper, a fable by Aesop, retold and illustrated by Amy Lowry Poole, a Holiday House Book, Ages 4 - 8, New York, 2000. 29 pp.: The Ant and the Grasshopper A long time ago, in the old Summer Palace at the edge of the Emperor's courtyard, there lived a grasshopper and a family of ants. The ants awoke every day before dawn and began their endless tasks of rebuilding their house of sand, which had been washed down by the evening rains, and searching for food, which they would store beneath the ground. They carried their loads grain by grain, back and forth, all day long. The grasshopper liked to sleep late into the morning, rising as the sun stretched toward noon. "Silly ants," he would say. "You work too hard. Come follow me into the courtyard, where I will sing and dance for the great Emperor." The ants kept working. "Silly ants," the grasshopper would say. "See the new moon. Feel the summer breeze. Let us go together and watch the Empress and her ladies as they prepare for midsummer's eve." But the ants ignored the grasshopper and kept working. Soon the days grew shorter and the wind brought cooler air from the north. The ants, mindful of the winter to come, worked even harder to secure their home against the impending cold and snow. They foraged for food and brought it back to their nest, saving it for those cold winter months. "Silly ants," said the grasshopper. "Don't you ever rest? Today is the harvest festival. The Emperor will feast on mooncakes and sweet greens from the fields. I will play my music for him until the moon disappears into the smooth lake water. Come and dance with me." "You will do well to do as we do," said one of the ants. "Winter is coming soon and food will be hard to find. Snow will cover your house and you will freeze without shelter." But the grasshopper ignored the ant's advice and continued to play and dance until the small hours of the morning. Winter arrived a week later and brought whirls of snow and ice. The Emperor and his court left the Summer Palace for their winter home in the great Forbidden City. The ants closed their door against the ice and snow, safe and warm, resting at last after their long days of preparation. And the grasshopper huddled beneath the palace eaves and rubbed his hands together in a mournful chirp, wishing he had heeded the ant's advice.

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Avoid Activities Masquerading as Creative Art in Child Care Settings

Creative art is an important part of the child care curriculum because it allows children to practice self-expression, fine motor skills, thinking and many other skills. Unfortunately, many activities that look like creative art do not actually encourage creativity. These activities are sometimes used in art programs and may help develop fine muscle control or eye-hand coordination, but they don't provide artistic and creative opportunities. It's important to avoid activities masquerading as creative art. Activities that masquerade as creative share three characteristics: The responsibility for making art is shifted from the child to the teacher. The activities have a high degree of structure. The product is specified, and often a model is provided to copy.

Problems with Highly Structured Craft Activities

People who have studied how creativity develops warn against the use of ditto sheets, coloring books, tracing patterns, dot-to-dot sheets, craft projects and holiday gifts with specific outcomes in creative art programs for preschoolers. These projects may be enjoyable, but they can actually discourage children from being creative.

An Example

Researchers Lowenfeld and Brittan looked at the use of models in art programs. Young children were asked to draw birds, and they did. They drew wonderful birds of all colors, with funny long legs and pointy beaks, lovely wings and beady eyes. Then the researchers gave these children a picture of birds to color and said, "Try to stay in the lines." The picture looked like a bunch of "V's" flying around the sky, and the children colored ever so carefully. A few weeks later, they gave these same kids big pieces of paper again and suggested that they draw some birds. Do you know what the children drew? No funny long legs; no pointy beaks; no lovely wings or beady eyes — just plain old "V's" in the sky. No creativity.

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Fire Ant Biology

Fire Ant Habitat

Imported fire ants, Solenopsis invicta and Solenopsis richteri (Hymenoptera: Formicidae), are social insects that usually produce hills or mounds in open areas where the colonies reside. These fire ants build mounds in almost any type of soil, but prefer open, sunny areas such as meadows, pastures, parks, playgrounds, lawns, and golf courses, as well as agricultural land and wilderness areas.

What Do Fire Ants Eat? Imported fire ants are omnivores. They eat both plants and animals to satisfy their nutritional requirements. Their menu includes carbohydrates(sugars), lipids (fats) and protein. Worker ants cannot ingest solid food particles (greater than 2 microns, 1 micron = 0.000039 of an inch), so they primarily feed on liquids.

Fire Ant Morphology, Reproduction, and Development If it weren't for the painful experiences associated with fire ants, most people might find these creatures fascinating. Their life cycle and social behavior are surprisingly complex. This article explores how a fire ant colony becomes a colony, the different types of fire ants in a colony and the roles they play within the colony, as well as their communal feeding system.

Identifying Fire Ants Properly identifying ant species is the first step in determining the need and approach for control. Accurate identification can be especially important in states where native fire ant species are common and red imported fire ants are rare. Although native fire ants are common urban pests, if they are controlled unnecessarily, especially in very dry climates, imported fire ants are more likely to invade these areas. This article explores the characteristics and aggressive nature of fire ants.

Natural Enemies of Fire Ants Biological control is the use of imported natural enemies to suppress pests and can be an effective and environmentally safe way to permanently control pests over wide areas. As such, it is the basis for many integrated pest management programs. In South America, the native habitat for imported fire ants, populations are much lower than populations in areas where imported fire ants have been accidentally introduced, such as the southern U.S. This situation is thought to arise because natural enemies (predators, parasites and pathogens) that keep populations low in South America were not imported along with this ant. Efforts have been made to introduce natural enemies to the invasive ant populations in order to provide sustainable suppression.

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What is agriculture?

Agriculture is the basis of all civilization. It is part of everything from the food we eat to the clothing we wear. Agriculture shapes many of the traditions and values that this country was built on. Agriculture is the science, art, and occupation of producing crops, raising livestock, and cultivating the soil.

Agriculture also includes: processing, financing, marketing, and distribution of agricultural products; farm production supply and service industries; the use and conservation of land and water resources; health, nutrition, and food consumption; development and maintenance of recreational resources; and related economic, sociological, political, environmental, and cultural characteristics of the food and fiber system.

Specific types of agriculture Include: Agricultural economics Agricultural engineering Agronomy Aquaculture Beef Cattle Crops Dairy Cattle Entomology Food technology Forestry Goats Horticulture Plant breeding and genetics Plant pathology Poultry Sheep Swine

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Goat Reproduction Reproductive Biology

Introduction

The increased demand for goat meat, especially in the United States, could possibly be met in part through improving reproductive efficiency in our herds. Reproduction efficiency is one of the most important economic traits in terms of livestock production. Maintaining good reproductive functions in the herd is pivotal to the success of any livestock production system. Productivity and profitability is measured by ovulation rate, conception rate, the number of kids born, the number of kids weaned and the frequency in which they are produced. Reproduction is the propagation and continuation of a species through a sequence of events. This process involves the production of hormones (i.e., estrogen, testosterone) and the development of the reproductive system to carry out germ cell development, fertilization, pregnancy and eventually parturition which is the act of giving birth(McKenzie-Jakes, 2007). Understanding the estrous (breeding) cycle and how hormones work during the cycle can help us to change those patterns and behavior to improve efficiency of reproduction to eventually benefit the goat industry.

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Bee Brood (Basic Bee Biology for Beekeepers)

There are three development stages in bees which collectively are known as brood. Bees begin their life in the tiny white egg stage. A queen will deposit one egg in each worker or drone cell. The eggs are about the diameter of a pin and stand on end in their cells. They are very difficult to see. The eggs that will develop into workers are fertilized, while the eggs that will yield drones are not. We cannot tell the difference between fertilized and unfertilized eggs but the bees can. If the queen makes a mistake, the egg is removed and destroyed by worker bees. The egg stage lasts three days. When an egg hatches it becomes a larva. The bee larva (plural: larvae) is a legless and featureless white grub. It is specialized to eat and never leaves the individual wax cell. Larvae grow at a rapid rate in a five-step development called metamorphosis, increasing 1500 times the original size. The larvae are visited 10,000 or so times during their development by adult nurse bees for inspection, feeding and eventually capping of the cells. Worker bees bring food place it in the cell. They do not directly feed the larva. The last stage, sometimes termed the prepupa, engorges on extra food before the cell is sealed with a wax capping. The pupal development stage for drones is 6.5 days, workers 6 days, and queens 5.5 days. If brood nest temperature drops, development takes longer. When fully grown and filling the cell the larva changes to a pupa (plural: pupae). The pupal stage, frequently termed capped stage, is one of change . the grub-like larva rapidly takes on the features of the adult. It does so still in the same cell that has now been capped with wax by the workers. In addition to containment in a capped cell, the last larval stage also spins a thin silk cocoon within each cell to enclose the pupa. The pupa does not eat or move. All bee larvae (female and male) receive royal jelly after the egg hatches. Royal jelly is a protein-rich food made in the glands of worker bees and placed in cells just before the egg hatches. Initially the cell with a young larva is mass provisioned. A pool of royal jelly is kept replenished in the bottom of the cell and the C-shaped larvae simply lie in a pool of its food. After 2.5 to 3 days, however, the diet of the worker and drone larva changes to a mixture of pollen and nectar and food is not so generously supplied. This is called progressive-provisioning. The queen larva remains on a diet of royal jelly, continued in generous supply, her entire larval life.

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Fire Ant Treatment: Natural and Biological Control

Natural and Biological Control

Currently, the best biological control method for fire ants is to preserve other ant species that compete with them for food and nesting sites, attack small fire ant colonies, or kill newly mated queen ants. In some areas outbreaks of other exotic ant species, such as Argentine ants and tawny crazy ants, have displaced imported fire ants. Even imported fire ants from single-queen or polygyne colonies will prey upon newly mated fire ant queens and eliminate small, neighboring colonies. Ants, in general, are considered beneficial insects because they prey upon many other arthropods and collectively till more earth than earthworms, thereby reducing soil compaction. Ways to preserve native ants include preserving their habitat and using insecticides judiciously. Introducing or conserving the natural enemies (diseases, parasites and predators) of imported fire ants can help control them. These natural enemies kill fire ants or make them less able to compete with other ant species. The most effective biological control organisms for large-scale programs are those that spread by themselves from mound to mound and persist from year to year. A number of species of parasitic "phorid" flies (Diptera: Phoridae), including Pseudacteon tricuspis, P. curvatus, P. obtusus and P. litoralis, have been released and established in parts of most southeastern states. A disease of fire ants, Kneallhazia (=Thelohania) solenopsae, is also widespread in some states. Although natural enemies will not eliminate fire ants and it may be several years before their effect is known, it is hoped that introducing natural enemies of fire ants in the U.S. will reduce their populations indefinitely. In South America, where imported fire ants and their natural enemies originate, fire ant species are not usually considered pests but rather just another ant species. See Natural Enemies of Fire Ants. Several other parasites and pathogens have been marketed for fire ant control. The predatory straw-itch mite, Pyemotes tritici (Lagreze-Fossat & Montane), feeds on and paralyzes developing fire ants but has not been effective when applied as directed and is potentially hazardous to the user. Parasitic nematodes such as Steinernema spp. are roundworms that enter insects, paralyzing them and developing in their bodies. Species and strains vary in their effectiveness. Strains tested to date caused ants to temporarily move away from the treated mound, but few colonies were actually eliminated. Parasitic fungi, such as Beauveria bassiana strains and formulations, also have been evaluated as individual mound and broadcast bait treatments. However, these agents have not been shown to persist or spread in the environment. Newly mated fire ant queens, which can start new colonies, are killed by a number of organisms. These include birds, lizards, spiders, toads, dragonflies, robber flies, other ant species, and ants from surrounding colonies. Animals that eat ants, such as armadillos, may disturb mounds and eat some workers, but they are not really useful in control.

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Queen Replacement (Basic Bee Biology for Beekeepers)

Since there is only a single female reproductive in a bee colony, there is a special procedure to replace her when it becomes necessary to do so. Replacement of a queen by another queen is a process termed supersedure. Replacement of the queen and production of another colony is another behavior which is called swarming. A third means of replacing a queen, emergency queen rearing, is necessary if the queen dies suddenly, is removed by a beekeeper, or is somehow injured or lost from her colony. Queen failure may lead to reduced egg laying but workers more readily respond to reduced pheromone production. Each worker bee needs to receive a certain level of queen substance daily. This pheromone is distributed through food transmission among workers. If a queen is taken away, the level of this pheromone drops rapidly, though it is persistent. In the case of a failing queen, the queen produces insufficient amounts of queen substance, and therefore is fed back less of the pheromone by the bees of her retinue. This feedback system of queen pheromone distribution is vital for communication. The first behavior change observable in queen replacement is the laying of a fertilized egg in a queen cup. Queen cups are special cup-like precursors of queen cells. They are always present in a bee colony, though their numbers are greatest in the spring months. They are built at the lower margin of beeswax comb (lower margins of frames in a beekeeper.s hive) and in spaces where the comb is damaged or left open as a walkway to the opposite side of the comb. The queen herself places the fertilized egg in a queen cup. Worker bees can remove eggs (from queen cups or regular cells) but they are not known to transfer them. The same queen may return to the developing queen cell. (Arbitrarily, a cell occupied by an egg or developing queen is called a queen cell - it is a queen cup when empty.) By chewing on the side of the cell, the queen causes the workers to remove and kill the occupant (egg, larva or pupa) inside. It is possible to observe queen rearing repeatedly aborted in a bee colony. The original mated queen (who started the process of queen replacement by laying eggs in queen cups) may be killed before or after emergence of a virgin queen in supersedure or she may depart with a proportion of the adult workers in a swarm before a virgin queen emerges. The workers always begin to rear several new queens rather than a single one. Emergency queen cells can be distinguished from the queen cells of swarming or supersedure because they originate from a worker cell. The horizontal orientation of the worker cells selected to be converted to queen cells is quickly changed to the vertical by enlarging the base of the cell and drawing the opening outward and downward. This usually means destroying the cell walls and removing the larvae of three to four cells adjacent to the modified cell. Capped emergency cells often seem smaller than capped queen cells started from queen cups.

Which categories do you think the above article belongs to?

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Not interested at all — Very interested

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Feral Hog Reproductive Biology

Feral hogs (also called wild hogs; Sus scrofa) are characterized by high reproductive potential, with a young age at puberty, large litters, and frequent breeding. The recent expanding range of this non-native species provides evidence of its high reproductive capacity. In general, the various aspects of the reproductive biology of feral hogs in the United States are intermediate between that of domestic swine and the Eurasian wild boar. However, these various reproductive parameters can vary widely between populations of these non-native animals due to both genetic and environmental factors. Female feral hogs can reach sexual maturity as young as 3-4 months of age; however, most wild sows reach puberty by the time they are one year old. Females of this species are polyestrous, being able to come into estrus every 18-24 days if they are not successfully bred. The ovulation rate typically averages 7-8 shed ova but can range from 3-15. Uterine implantation is biased toward left horn but is typically not significant. The feral hog's gestation period averages 112-120 days and can vary from 100-140 days. Fetal litters in feral hogs average 5-6 embryos/fetuses and range from 1-14. The observed intrauterine mortality in this species is approximately 30%. In general, fetal litters are often male-biased, but this sex composition is normally not significant. There is also an observed shift from male-biased to female-biased composition as the litter size increases. The ovulation rates, litter sizes, and pregnancy rates all increase with the sow's age. Both the nutritional input and reproductive output levels in feral sows are also positively correlated. Sows build a farrowing nest within 24 hours prior to giving birth to provide protection for their offspring. The newborn or neonatal litters in feral hogs average 4-6 piglets and can range from 1-12. Similar to the newborn litter size, the number of lactating teats per sow averages 4-6 and varies from 1-12. As such, the number of lactating teats is highly correlated with the number of piglets in the sow's litter. The litter size in feral sows reportedly decreases after about the 5th-7th litter or 4-5 years of age. The oldest known feral sow, which was documented to still be capable of breeding, was 14 years of age. Similar to the females, male feral hogs are sexually mature as young as 4-5 months of age, and most boars reach puberty within the first year of life. In general, most boars participate in breeding by 12-18 months of age. The testicular weight in feral hogs increases until 3 years of age, and then decreases after 5 years of age. Boars compete in male-male fighting for breeding opportunities with females. Mature boars develop shoulder shields of thickened subcutaneous tissue that protects these animals during male-male fighting. Such fights can be intense, with either or both combatants getting injured, or possibly even killed. Because success in these fights is related to size, most breeding done in feral hog populations is by the larger and older males. Multiple paternity of feral hog litters does occur but is reported to be very uncommon. Reproductive activity can also affect the weights in these animals during certain times of the year. For example, the body mass of mature boars has been reported to drop during the breeding season, with some individuals losing up to 20-25% of their body weight. This is due to a combination of increased testosterone production and the resulting reduced foraging done by these boars at that time. Reproduction in feral hog populations can occur during any month, with both sows and boars being capable of breeding year-round (Fig. 2). Typically there are 1-2 seasonal peaks in breeding. However, annual patterns with one or two seasonal peaks can occur within the same population, varying from year to year. Regional photo-period, rainfall and nutrition all influence the breeding season in a feral hog population. Feral sows are capable of producing more than one litter per year. The production of a second litter was observed to be common when sows lost the entire first litters; however, sows have been breeding while still nursing a litter of piglets. Normally, sows do not conceive when still nursing a litter of piglets. In eastern Tennessee, numerous wild sows were observed to have bred within a month of farrowing, however, very seldom did these females conceive. In addition, when these sows did conceive, only very small litters were produced. Production of multiple litters is more common when food resources are abundant. It is also more common among adult wild sows than younger sows.

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Reproductive Biology Goat Reproductive Physiology

Goat Reproductive Physiology Female with newborn kids.
Due to the temperature conditions in the United States, most goats are seasonal breeders, with more active breeding happening during the seasons with shorter day lengths and a period of little to no breeding during long day lengths. In females, reproduction is controlled by the estrous cycle. This represents the time from one standing heat (estrus) to the next. This cycle is usually 21 days, with the actual time for standing heat being one to three days. This cycle continues throughout the life of the female and is interrupted only by season, pregnancy and lactation (milking). The events of the estrous cycle are controlled by the relationships of the hypothalamic releasing hormones, gonadotropins, and ovarian hormones. Gonadotropin releasing hormone (GnRH) comes from the hypothalamus of the brain and causes the pituitary gland to release follicle stimulating hormone (FSH) and luteinizing hormone (LH). The hormone FSH stimulates the production of estradiol, or estrogen, and inhibin and also promotes follicular growth. Estrogen is responsible for the demonstration of estrus behavior, duct development in the mammary glands and the development of secondary sexual characteristics. Inhibin acts as a negative feedback to inhibit the release of FSH from the anterior pituitary. Luteinizing hormone stimulates ovulation and also promotes the formation and function of the corpus luteum (CL). The CL is the structure that is formed on the mammalian ovary following ovulation. It is responsible for the secretion of progesterone following ovulation. A high concentration of this hormone inhibits the release of GnRH, FSH and LH. It also functions in preparing the uterus for a possible pregnancy and suppressing estrus behavior. Failure to establish pregnancy results in the secretion of the hormone prostaglandin 2-alpha from the uterus that causes regression of the corpus luteum and allows a new estrous cycle to begin. If pregnancy is established, then progesterone will continue to be secreted. Its secretion will maintain pregnancy by decreasing uterine contractions, increasing gland development in the endometrium and promoting the development of the mammary gland. It is the interaction of these hormones and their individual functions that makes it possible to regulate and manipulate the reproductive function of the females. This interaction is the basis of hormonal treatments used in the control of goat reproduction. As previously mentioned, goats experience seasonal anestrus due to the effect of temperature and day length on their reproductive cycle. This condition might prevent the female from conceiving during months when survival of the developing fetus would be low. Pre-attached embryo survival is reduced when the humidity and temperatures are high during the months of summer. Temperature and photoperiod are two main factors that affect the commencement of the breeding season. GnRH secretion is integral to seasonal anestrus. Before the breeding season begins, the hypothalamus must be able to secrete GnRH to elicit the release of FSH and LH in sufficient amounts to maintain follicular development and initiate ovulation in females as well as stimulate testosterone production and sertoli cell function in males. Melatonin secretion is required to stimulate GnRH secretion in order to promote cycling. This hormone is synthesized and secreted during the night hours when it is converted from serotonin through circuitous neural paths. Therefore, light entering the eyes inhibits pineal gland conversion of serotonin to melatonin. The pineal gland acts as a regulator of reproductive activity since it can either stimulate or inhibit gonadal function. During short photoperiods, such as in the fall, the long duration of high melatonin secretion switches on short-day breeders, such as sheep and goats, and switches off long-day breeders likd the hamster. This explains why increased light would cause anestrus in goats, since it inhibits the conversion of serotonin. Goats are therefore considered to be short-day breeders because they begin to cycle during the shorter days of fall. The normal breeding season of goats is during September, October and November, varying for different breeds and areas of the country. It is therefore necessary for treatment strategies aimed at breeding goats outside of their normal breeding season to somehow override the light and pineal control of the hypothalamic-pituitary-gonadal axis in order to induce estrus and ovulation. Previous research has been successful in inducing estrus and subsequent ovulations by not only manipulating the light-dark cycle, but also by the administration of exogenous hormones such as melatonin and gonadotropin-releasing hormone. Reference: P.L. Senger. Pathways to Pregnancy and Parturition

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What are flying ants?

Most ant species, including fire ants, produce flying ants. Often called winged ants or alates, flying ants are fertile male or female ants that can mate. Most of the ants in a fire ant colony are sterile, wingless female workers that cannot mate. All males can fly. They are smaller than the winged females, and they have smaller heads, larger eyes, and a larger thorax. A colony produces several hundred flying ants at a given time. Flying ants leave the colony together in a swarm, often during warm weather after a rain. Mating occurs in the air, usually with ants from other mounds. After mating, males drop to the ground and die, and mated females lose their wings, start new colonies, and become queens.

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Why Pest Inspection is Important to Pest Management

Accurate identification of pests is essential to having an effective pest management program. Knowing the biology of the pest will give you valuable information on how to approach pest management. For example, if you put out mouse traps and have rat, you will have failure in your program. If not noticed in time, the initial failure may increase your problem if reproduction occurs. Identifying your pest will lead you to information about its life cycle, food sources, habitat preferences and natural enemies. Each piece of information you know about your pest will help you to devise a management program that successfully targets your particular problem. To help you identify your pest, you must inspect. Inspection will help you find out what pests you are dealing with, and locations where these pests should be targeted. Some common pests in school environments include cockroaches, ants, rodents, termites, flies, weeds, silverfish, and spiders. Each pest requires a different strategy for management.

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Botrytis Blight of Blueberry

Gray sporulation of Botrytis cinerea.

If there is a late freeze or even cold weather during bloom time, check the flowers and young fruit for the presence of Botrytis blight. If Botrytis is present, there will be a gray-green fuzzy growth on the plant tissues. Botrytis will usually cause losses early in the growing season, but a lot of rainy weather during the spring may also lead to Botrytis problems. It is not recommended to treat preventatively for this disease. Treat only if there is a frost that damages blooms or if there has been a significant cold spell. There are two options for good Botrytis blight control. One is to use a fungicide with the active ingredient fenhexamid and is in the chemistry group hydroxyanilides (FRAC code 17). Another option is to use a fungicide in the multi-site mode of action chemistry group (FRAC code M). This fungicide will be most effective if applied as a preventative spray. Consult your local Cooperative Extension Service office for current fungicide recommendations. Information also can be found in the Southeast Regional Blueberry Integrated Management Guide.

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Saponification in Biodiesel Production

Introduction to Saponification

Saponification is a chemical reaction that involves the production of a metal salt or soap. The reaction involves the attack on a methyl ester, free fatty acid, triglyceride, or other glyceride by a hydroxide ion, -OH. The hydroxide ion implies the presence of water in the system. If water could be eliminated, then there would be no soap formation. However, this is a practical impossibility. There is always some water present, and there will always be some soap formed when biodiesel is made. The exception to this is when a solid (heterogeneous) catalyst is used which does not provide the free metal ions needed to form soap. These catalysts should provide biodiesel and glycerin that are free of soap. In reality, many of these supposed heterogeneous catalysts leach metals ions into the liquid and thus require some clean-up of the reaction products. Soap must be removed from biodiesel after the reaction, and this can be done by either water washing, using a solid adsorbent mixed with the liquid, or by passing the liquid through a packed bed of ion exchange resin. Soap is not formed when biodiesel is manufactured using a supercritical technology that does not require a catalyst.

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What causes dark, firm and dry (DFD) pork?

The causes of this condition in pork muscle is linked to chemical and physicalchanges in muscle before, during and after harvest of the animal. Similar to that of PSE pork, the DFD condition is also related to acid production in pork muscle after slaughter, but the nature of the chemical change is different. PSE develops because of an accelerated rate of acid production while muscle temperature is still high. Conversely, DFD results from a lack of acid production in the muscle.Muscles destined for DFD pork have low levels of glycogen that restricts the amount of acid that can be produced, and limits pH fall. While both normal and PSE muscle end up with similar "ultimate" (final) pH values of about 5.5, DFDmuscle usually has an ultimate pH above 6.0. This reduced acidity provides increased water-holding ability in the lean, tightly binding water to muscle proteins, and contributing to a firm texture. Muscle cells swollen with retained water and tightly packed together absorb more light (darker color), and also restrict how deeply oxygen can penetrate into the tissue to "brighten" muscle pigment. A period of extended stress on the pig, caused by factors such as severe weather, long transport or unfavorable holding conditions, can deplete muscle glycogen and cause the DFD condition in pork muscle.

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How do invasive species cause harm?

Invasive species can cause harm in so many different ways that it isn't practical to cover them all here. So, below is just a sample to give you an idea of how pervasive this problem is. Many of these changes are things you can see happening around you. When a non-native species is introduced into a new environment it is freed from the natural predators, parasites, or competitors from its native habitat. This gives an advantage to non-native species competing with the native species that evolved in the ecosystem. These advantages allow the non-native species to outcompete native species for the available food, water, light, and space. Wherever an invasive plant is growing is where a native plant should be. Invasive species also have the potential to disrupt vital ecosystem functions, such as water flow, nutrient cycling, fire systems, or soil composition. An example of this is the Tamarix species. It not only uses large amounts of water, it changes the soil chemistry, making it more saline. This can adversely affect and prevent the growth of many native plant species. Tamarix has significantly changed the hydrology, soil composition, and plant communities of many habitats in the western United States. An invasive plant may add significantly to the fuel load of an area, either in mass or because it contains volatile compounds. This can mean that fires burn hotter and faster than the native plants in that habitat have evolved for. After such a fire, the invasive plant quickly germinates or resprouts while the native plants are either killed or perhaps recover much more slowly. Changes that damage native plant communities also affect the wildlife communities that depend on them for food and shelter. A wide range of effects have been seen in wildlife communities in these situations. Some animal species populations are reduced while others are increased. Someare even pushed to the point of extinction. Butthe overall trend seems to be a reduction in diversity. Even in cases where the same number of species are actually present, the balance between the species has been changed. We do not yet know what many of these changes herald for the future. Invasive species can damage or contaminate crops from soybeans to pine plantations, greatly increasing costs to the agricultural industry and, in turn, to the American public for both food and other products. Industries such as the cattle industry can be affected when invasive plants that are basically inedible by cattle, infest ranges or contaminate forage. Other services such as electricity have cost increases resulting from the management and control of invasive species. A great deal of money is spent by power companies to keep invasive plants from growing in right of ways, up poles, onto buildings, and along power lines under control. Natural areas used for recreation can be affected by invasive species. For example, Chinese privet and other invasive shrubs, trees, and vines can take over both clearings and the understories of forests making hunting, hiking, biking, and camping difficult or impossible. Any body of water, river, or stream is especially vulnerable to invasive species. Water by its nature allows for much easier movement for invading organisms. The news has many examples of aquatic-invasive species that can and have spread very quickly causing significant changes in a very short period of time. From water hyacinth to lion fish or Asian carp, aquatic species are causing damage to these ecosystems and the organisms that inhabit them. It is often difficult, and sometimes impossible, to fish, boat, or swim on a lake covered by invasive plants. People have been hospitalized due to injuries received while boating on rivers infested by the Asian carp, which can easily leap over a boat.

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How is agroterrorism different from bioterrorism?

Agroterrorism is an actual or threatened attack against any segment of the agricultural or food system designed to cause economic injury, disruption of the production system, human disease or political change. It may include, but is not restricted to, use of chemical, biological, or radiological agents Bioterrorism is the actual or threatened use of biological agents against individuals, business, government, or a population.The terms are closely related. Biological agents are one of the most probable agents used in agroterrorism. However, chemical or other agents can also be used in agroterrorism, and chemical agents are not defined as bioterrorism.

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Nutrient Imbalance and How to Correct It

Soils in urban areas may have a nutrient imbalance. If there are inadequate nutrients, tree growth and development will be affected. Nutrient imbalances are often caused by high pH levels, low soil fertility, or high salt content.

High or Low Soil pH

Urban soils may have a high or alkaline pH because construction materials, such as mortar and concrete, are often spilled or left on the soil. The addition of this calcium-based material, which is alkaline, raises the soil pH. Some species of trees need an alkaline soil, but other species can not tolerate a high pH level. A high pH may also cause chemical reactions with nutrients in the soil that render the nutrients unavailable to the tree. Iron, for example, becomes unavailable for a tree's growth processes when soil pH is alkaline. Sulfur may be added to soil to lower the pH. Tolerance to the local soil conditions needs to be considered when selecting a tree to plant in an urban area.

Low Soil Fertility

Soil fertility can be low in urban environments. Common causes are: Topsoil and organic matter are often removed from a site during construction. Leaves are removed from the soil surface and not allowed to decompose. This reduces the amount of nitrogen, phosphorus, and other nutrients in the soil. Biological components and organisms are not as common in urban soils. This limits soil aeration and the addition of organic matter to the soil. Changes in soil chemistry may influence the availability of soil nutrients, interrupting the nutrient cycling process.

High Salt Content

The salt level in soils may be elevated because of de-icing salts, excess fertilizer, or irrigation water high in soluble salts. This can be a problem, particularly in areas with low rainfall and extensive use of irrigation and fertilizer (Harris 1992). A soil that is high in salts has less water available to the roots. Sometimes salts can even draw moisture out of the roots. High salt levels can sometimes be reduced by leaching the salts with proper watering techniques. A symptom of high salt content in the soil is browning of leaf edges. If the soil does have a high salt content, select a species that is tolerant to high salts.

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Rangeland Resources For Teachers and Students

K-12 Teaching Resources

Science education in K-12 classrooms integrates concepts from a variety of disciplines, offering excellent teaching opportunities for enhancing young learner's awareness of natural ecosystems. No matter if you are a teacher from a rural or urban community, you can actively engage youth in classroom and outdoor activities focused on rangeland science. For example, subject areas include botany, ecology, soils, watersheds, wildlife, herbivory and grazing management, and human dimensions. Below are a few examples of rangeland teaching resources, including curricula and programs. Just like land ownership and vegetation patterns vary from west to east and geographic region, keep in mind that rangeland ecological concerns also vary by region. Teacher Resource Guide for Rangeland Principles - a 6-module curriculum related to western rangelands. It includes clear learning objectives with powerpoint presentations, activities, background materials and reading guides. This resource is targeted at grades 9-12. Developed by the University of Idaho and the Idaho Rangeland Resource Commission. Prairie Project - an educational tool related to the prairie ecosystem with a variety of lesson plans including sections on animals, energy, fire, grazing, and plants. These tools are separated into grades K-4, 5-8, and 9-12. Developed by Oklahoma State University Extension and Department of Natural Resource Ecology and Management. Rangelands Curriculum for Texas - a comprehensive curriculum with 27 lessons that include field and classroom activities, games, and community resources. Developed for grades K-6. Developed by the Welder Wildlife Foundation. Idaho Rangeland Lessons and Activities - a virtual grab bag of lessons and activities that include rangeland plants, animals, and ecoregions. These materials for grades K-12. Developed by the Idaho Rangeland Resource Commission. BLM Teaching Resources - a variety of lessons that cover topics related to public lands management, including energy, native plants, recreation, wildfire, and weeds. Materials are for ages K-12. Developed by the Bureau of Land Management.

Teacher Continuing Education

Simply getting teaching resources into the hands of professional K-12 educators does not always lead to classroom implementation. We experience that teachers are much more comfortable teaching about rangeland science concepts when they have received training. Some universities offer summer continuing education opportunities and workshops focused on rangeland topics. If you are a teacher, you should check with your local university members of the Range Science Education Council, state and national teacher associations, state Rangeland Extension Specialists, or state agricultural program leaders.

Higher Education Resources

Range at a Distance: Catalog of Distance Format Rangeland Resources - a searchable database for students or working professionals who are interested in finding information about rangeland courses offered either online or in distance-format. Developed by the Range Science Education Council. Rangeland Careers - learn about what kinds of job opportunities are available by meeting some of the people who have graduated from a university offering rangeland degrees. Developed by the Range Science Education Council.

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Hands-On Nutrition Education: No Field Trip Required!

Extending the learning environment beyond the classroom is a great way to engage students with hands-on activities and fresh perspectives and you don't have to leave the school grounds to provide students with valuable hands-on nutrition education! The food service professionals at your school play a daily role in students' nutrition. They are a key resource as they incorporate national nutrition guidelines as well as students' preferences when planning menus. Nutrition education is about more than reading labels, and food service professionals can offer students insights into selecting, preparing, and enjoying healthy foods. Furthermore, students can learn to see the lunchroom as a place to practice healthy eating rather than a place to indulge between classes. Let's Go!, a program designed to combat childhood obesity, offers some ideas of educational activities that involve the lunchroom and food service staff. Lessons geared towards young children, like "Eat Your Way Though the Rainbow," aim to provide a connection between the classroom and the lunchroom. Activities for middle school students include learning about portion sizes and basic nutrition lessons. For more nutrition lesson ideas, check out the following worksheets from Let's Go!: Cafeteria to Classroom Connection Cafeteria as Learning Lab Also consider inviting the school nurse, health teacher, physical education teacher, or PTO/PTA members to guest teach in your classroom to give students more insights about the importance of good nutrition. The more areas of the school that embrace and teach healthy eating, the better students will understand how good nutrition impacts their whole life.

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Farm to School Resources- Colorado Department of Education

The term "Farm to School" often suggests images of freshly picked produce waiting to be shipped to your local school district, but how these products actually get from field to cafeteria is another story. Districts must not only consider cost and convenience, but food safety and procurement regulations as well. That being said, Farm to School can seem a bit overwhelming. The Colorado Department of Education Office of School Nutrition (CDE OSN), has compiled some resources to assist districts in implementing a successful Farm to School program. If it's program operations information you're looking for, the Colorado Farm to School Task Force has you covered. Started in 2010 through a grant funded by the Colorado Department of Agriculture, the task force provides webinars, evaluation and marketing tools, food safety information and maps of surrounding schools participating in Farm to School. . They hold quarterly meetings open to all who are interested. Get inspired by checking out their Farm to School Champions webpage where you can read success stories from a variety of districts. Do procurement regulations have you worried? Don't fret. The USDA's Procuring Local Foods for Child Nutrition Programs guide contains ready-to-use information about menu planning and buying local. Speaking of buying local, Colorado Proud's, Colorado Produce Calendar indicates what produce is in season during each month (an easy way to help decrease the cost of local produce). . Moreover, creating a bid for procuring local foods has been made simple with the Farm to School Bid Template. Whether you are looking to revamp your school meals program with Farm to School or simply add more local options to your menu, we probably have the resource you're looking for. If you call someplace other than Colorado home, be sure to check with your local state agency for any specific Farm to School regulations in your state. Additionally, The USDA Farm to School website contains great resources as well.

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Introduction to Biomass Combustion

Combustion of biomass used to heat greenhouses.

Fire, or combustion of biomass, is arguably the oldest known and most widely used controllable energy source on earth. In recent years, rising costs of fossil fuels and the development of advanced equipment have made biomass combustion an economical, efficient, and practical energy source.

Principles of Combustion

Combustion is familiar to all of us, but many do not realize that it is essentially a chemical reaction. In the process of combustion, two ingredients (biomass and oxygen) are combined in a high temperature environment to form carbon dioxide, water vapor, and heat. $CH_{1.44}O_{0.66} + 1.03\ O_2 = 0.72\ H_2O + CO_2$ (+Heat) Note: $CH_{1.44}O_{0.66}$ is the approximate chemical equation for the combustible portion of biomass. The amount of heat that is produced varies depending on species, climate, and other factors, but it is generally about 20 Megajoules of energy per dry kilogram of biomass. In order for combustion to be efficient and clean, the ingredients must be well mixed at the right temperatures for the right amount of time. Practically speaking, this means that you need the right amount of fuel, the right amount of air, and the right conditions. Water content in biomass is an important factor when it comes to combustion. The best burning fuels are dry. However, biomass almost always includes some amount of moisture. For example, green wood chips are usually about 50% water and 50% dry matter. Fresh leaves from a plant can be as high as 95% moisture and 5% dry matter. Ideally, biomass should be no more than 20% moisture.

Feedstocks for Biomass Combustion

A feedstock is merely the fuel that will be burned for energy. While wood is the most common feedstock for biomass combustion, almost any plant material can be used as a combustion feedstock.

Processing Biomass for Combustion

Biomass can often benefit from a certain amount of processing to make it more suitable as a combustion fuel. This includes sizing, drying, and/or densification.

Utilizing Biomass as an Energy Source

The smoky fireplace of past generations is a far cry from the combustion equipment that is available today. While those old fireplaces are still used in some homes, high-efficiency biomass combustion requires carefully designed and operated equipment that works well with the available fuel. Depending on your needs, biomass combustion systems can produce hot air, hot water, steam, electricity, or a combination. To find out more about equipment, efficiency, and air quality from biomass combustion, see Using Combustion Heat for Energy.

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Not interested at all — Very interested

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Safe Chemical Handling in Biodiesel Production

Introduction

Biodiesel is a relatively safe product. It is considered nonflammable and biodegradable. However, the components to make biodiesel can be hazardous in some situations. Biodiesel is made by reacting vegetable oil or animal fat with an alcohol (methanol or ethanol) and a catalyst (sodium hydroxide or potassium hydroxide). Sulfuric and hydrochloric acids are also used in biodiesel production. Methanol, the catalysts, and the acids are toxic chemicals. Methanol is colorless and tasteless and can cause blindness or death if it enters the body through the nose, mouth, or skin. It is a cumulative poison: repeated, brief exposures can cause a toxic reaction. Methanol is also very flammable and burns with an almost invisible flame, making the fire difficult to see. Methanol vapors are heavy, and can travel along the ground to a source of ignition. See Handling Alcohols in Biodiesel Production for more information on safely handling methanol. Sodium hydroxide and potassium hydroxide are strong bases which can burn unprotected skin and kill nerve cells before pain can be felt. When sodium hydroxide or potassium hydroxide is mixed with alcohol and stirred, a fine mist can be produced which can cause irritation to the respiratory tract. See Handling Strong Bases in Biodiesel Production for information on safely handling these chemicals. Sulfuric and hydrochloric acids can cause chemical burns; eye, nose, and throat irritation; and shortness of breath, in addition to more serious injuries. See Handling Strong Acids in Biodiesel Production for information on safely handling these acids.

Government Help and Resources

The Occupational Safety and Health Administration (OSHA) requires that material safety data sheets (MSDS) be provided by chemical suppliers. It is imperative to have these sheets prominently displayed and within easy reach of personnel who come into contact with these materials. These sheets should cover the range of all products used in the plant. They provide the key to treatment in case of an accidental exposure and/or spill as well as some preventative measures. The National Research Council has developed a 448-page lab safety publication: Prudent Practices in the Laboratory: Handling and Disposing of Chemicals. This publication can be purchased or read online for free at the above link. It recommends that a chemical hygiene plan be instituted in every lab, including adequate ventilation and clearly stated guidelines for minimum exposure to hazardous chemicals. The plan should also include an employee training plan, adequate record keeping, signs and labels indicating potential hazards and safety procedures, and procedures for spills and accidents. The Emergency Planning and Community Right to Know Act (EPCRA) was passed to allow governments and communities to know about hazardous chemicals in their area. This law requires facilities to appoint an emergency response coordinator and to notify the State Emergency Response Commission and Local Emergency Planning Commission of the presence of any "extremely hazardous substance" if it has such a substance in excess of the substance's threshold planning quantity.

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Biodiesel Production Principles and Processes

Introduction

The process to make biodiesel involves a chemical reaction. This means that the biodiesel industry is a chemical industry. Those involved in making biodiesel must have a good understanding of the underlying chemistry to ensure they are making quality fuel in a safe manner. Find these topics and many other related Farm Energy media resources at the Farm Energy Media archive. Biodiesel is an alternative fuel for diesel engines that is produced by chemically reacting a vegetable oil or animal fat with an alcohol such as methanol or ethanol. In words, the reaction is: Oil + alcohol ? biodiesel + glycerin The photo shows a bottle of biodiesel and glycerin (also called glycerol). The biodiesel is the lighter-colored layer at the top. The darker-colored crude glycerin has settled to the bottom. It is important to realize that unmodified vegetable oil, sometimes called straight vegetable oil (SVO) or waste vegetable oil (WVO), is not biodiesel. Some people have used SVO or WVO in diesel engines with varying degrees of success. The primary problem is the high viscosity and low volatility of the unmodified vegetable oils. Without exception, U.S. engine manufacturers have recommended against the use of SVO and WVO. More discussion of SVO and WVO can be found here. Biodiesel is usually preferred over SVO and WVO because the chemical reaction converts the oil or fat into compounds that are closer to the hydrocarbons found in regular diesel fuel. The chemical reaction that converts a vegetable oil or animal fat to biodiesel is called "transesterification." This is a long name for a simple process of combining a chemical compound called an "ester" and an alcohol to make another ester and another alcohol. Oils and fats are included in the ester family. When they react with methanol or ethanol, they make methyl or ethyl esters and a new alcohol called glycerol or, more commonly, glycerin. The vegetable oils and animal fats used to make biodiesel can come from virtually any source. All of these products consist of chemicals called triglycerides, so biodiesel can be made from soybean oil, canola oil, beef tallow, and pork lard, and even from such exotic oils as walnut oil or avocado oil. Even used cooking oil or waste oil can be used to make biodiesel. However, these oils present special challenges for biodiesel production because they contain contaminants such as water, meat scraps, and breading that must be filtered out before the oil is converted to biodiesel. Methanol is the most common alcohol used for making biodiesel. It is sometimes called methyl alcohol or wood alcohol. It is very toxic, and swallowing as little as a spoonful can cause blindness or even death. Dangerous exposure can also occur from breathing methanol vapors or absorbing methanol through skin contact. In the United States, ethanol is usually more expensive than methanol, so it is used less frequently to make biodiesel. It is the alcohol that is found in alcoholic drinks, so it is not toxic in small amounts. However, it is subject to very challenging government regulations because of the tax requirements associated with alcoholic beverages. The chemical reaction used to make biodiesel requires a catalyst. A catalyst is usually a chemical added to the reaction mixture to speed up the reaction. Since the catalyst is not consumed in the reaction, it will be left over at the end in some form. In biodiesel production, the actual compound that catalyzes the reaction is called methoxide. One common way to make methoxide is to dissolve sodium hydroxide or potassium hydroxide in methanol. Large producers buy a solution of sodium methoxide in methanol that is much safer to work with. High-quality biodiesel is defined by compliance with the American Society for Testing and Materials (ASTM) specification D6751. Fuel testing to verify compliance can be expensive, especially for small producers, but it is the most reliable way to ensure that fuel consumers will have access to high-quality fuel.

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How to Obtain Continuing Education Units for Military Families Personal Finance Webinars

The Military Families Learning Network Personal Finance team offers 1.5 continuing education units to AFC-credentialed participants for live and recorded personal finance webinars.

Procedures for obtaining CEUs via live webinars

AFC-credentialed participants can earn 1.5 CEUs by attending 90-minute online Personal Finance webinars that are presented online with a live speaker. A link to an online evaluation is shown at the end of the webinar. Visit this link and complete the evaluation. At the conclusion of the evaluation, a second link to the post-test quiz is shown. Click on this link and complete the post-test quiz. Successfully pass the quiz with a score of 80% or higher. Participants scoring 80% or higher will receive a Certificate of Completion via email. Participants will use this Certificate to obtain their CEUs from AFCPE (up to the maximum limit allowed) by following the instructions available on their website here.

Procedures for obtaining CEUs via recorded webinars

AFC-credentialed participants can earn 1.5 CEUs by watching a recording of our live webinars and taking a short quiz on the material covered. A score of 80% or higher is required to earn a Certificate of Completion. For webinars presented prior to March 2015, participants must create an account on campus.extension.org. For webinars presented in or after March 2015, use the post-test link provided on the learn.extension.org page for that webinar. Participants must watch the desired recorded webinar. Complete the evaluation, followed by the quiz. Participants must complete the quiz associated with the webinar and score 80% correct or higher. Participants who score 80% or higher will receive a Certificate of Completion immediately if using campus.extension.org and via email if taking quiz from Qualtrics link. Participants will use this Certificate to obtain their CEUs from AFCPE by following the instructions on their website here.

The award of all CEUs are subject to AFCPE's requirements and are contingent on AFCPE's guidelines. Participants must also agree to the Military Families Learning Network's Code of Ethics.

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Food, Fun, and Education: How to Include Healthy Foods in Classroom Games

Education is getting more complex for the teachers, yet the need for healthy lifestyle choices is constantly growing. Everyone loves a good game, whether it's a board game, simulation game, or a gaming device. Games can also be educational tools; Ed Dieterle, a Senior Program Officer for Research, Measurement and Evaluation for the Bill and Melinda Gates Foundation, said that "for a student sitting in the median who doesn't have a game, his or her learning achievement would have increased by 12% if he or she had that game." Shapiro's study also found that "play is useful because it stimulates real life experience – physical, emotional and/or intellectual – in a safe, iterative and social environment, not because it has winners and losers. The achievement lies in the act of learning and understanding itself." Many teachers have already realized using beneficial game-based learning strategies can be quite effective, others are still hesitant or overwhelmed at finding good ways to engage the students in learning and games. Incorporating games into healthy lifestyle choices is a way to make eating and choosing healthier options less intimidating, including games in school curriculum is also a good way to make learning fun and memorable. A few tips for including games in the classroom are listed below, Use Competition – students love to compete as long as they aren't losing too much. Having relays, using timed-answer games, including an educational version of games like Jeopardy, Family Feud and others are great ways to get kids excited about educational and nutritional information. Keep Education – mix in fun activities with the existing educational materials. If you're having a pre-test study, or review, turn it into a game by seeing which group of students can get the most answers. Simple things like dividing the classroom and giving a small reward to the winning team will motivate, but be sure to mix the student groups up so everyone gets a chance to be recognized. Have a jingle-contest to see which student can make the most creative song with the material you're covering. Review the Game– at the end of each game, give the students time to think out loud about their answers, what they learned or what questions they may have. As the teacher, be sure to ask questions to facilitate educational input. Go over educational information as well as why it's important to eat healthy. If you can tie facts with something they enjoy, odds of memorization is greatly improved. You can also find games explained in greater detail here. The use of tablets is also quite popular in some school districts, using educational based games on forms of technology allows students to learn through technology. Check with local Extension Offices or school boards to find education based nutrition aps and games that can be used to teach in the classrooms. Many games are already employed in the classrooms, adapting them to have healthy rewards or adding some nutritious information is often quite simple. Many times, having subtle changes will bring healthy choices to the forefront of a student's mind. Making small adaptations to the current curriculum is easy. Below are some simple ways to include healthy food into discussions: When working on math word problems, use healthy foods or exercises in examples. To study ratios, get the classroom out of their chairs and move them around. In social studies classes, look at what different peoples eat and their dining practices and even how differing diets affect health. In younger classrooms, have the students get moving by acting out historical events. In science, when talking about plants or working on science projects grow something healthy and let the kids try it once it's ripe. Talk about the ways foods effect growth. A great active game would be to have the youth demonstrate the cycle of growth – a small seed (curl up as small as you can), growth (have them stretch upwards), have winds, rain, intense sunlight or an earthquake (students sway, wither, shake or stretch higher). Incorporating games in the classroom can enhance learning, increase fun, and get the students interacting on a positive level with their fellow classmates.

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Not interested at all — Very interested

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Impact of Financial Literacy Education

Brief Description: This study examined the impact of a personal finance course on a sample of high school graduates who were followed for five years after graduation. Students who took the course were compared to those who had not and were not found to be any more financially literate. In addition, students who took the course did not evaluate themselves to be more savings-oriented and did not appear to have better financial behaviors than those who had not taken the course. Being a full-time college student or graduate, however, did positively and significantly impact financial behavior.

Implications: Findings of this study raise questions about the long-term effectiveness of high school financial literacy courses and their ability to improve students' financial decision-making in later life. This finding is consistent with several previous studies. Current content and/or methods used to teach personal finance may need to be reconsidered (e.g., increased use of methods with interactivity). This recommendation is consistent with studies by the Jump$tart Coalition which found that high school students who play a stock market game are significantly more financially literate than those

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Regional Centers of Excellence in Nutrition Education and Obesity Prevention – National Coordination Center located at the University of Kentucky

In fiscal year 2014, the USDA established the Regional Nutrition Education and Obesity Prevention Centers of Excellence (RNECE) to demonstrate the effectiveness of the SNAP-Ed and EFNEP programs and to identify changes to improve both programs. The RNECE will supplement and enhance ongoing program monitoring efforts and evaluation activities to strengthen the evidence-base of SNAP-Ed and EFNEP programs by assuring their effectiveness, innovation, replicability, sustainability and cost-effectiveness. The collaboration between NIFA and FNS has provided funding for one National Coordination Center and four Regional Centers. National Coordination Center: University of Kentucky North Central Region: Purdue University Northeastern Region: Cornell University Southern Region: University of North Carolina at Chapel Hill Western Region: Colorado State University AFRI recently released a request for funding that plans to support an additional Regional Center and one Signature Research Project. The overarching goal of the RNECE is to improve the health of low-income Americans by fostering a culture of health through multiple strategies, including nutrition education and complementary public health approaches implemented at each level of the socio-ecological framework through policy, systems and environmental changes. The work of the RNECE will build the evidence-base for nutrition education and obesity prevention strategies and interventions that produce measurable improvements in health, obesity, nutrition, and physical activity-related outcomes; and develop effective education, extension, environmental, systems and policy translational activities that promote health and prevent/reduce obesity in disadvantaged low-income families and children. Findings from RNECE will be communicated to all EFNEP and SNAP-Ed implementing agencies, the scientific community and the general public. Please visit our website to learn more about the work of the Centers of Excellence: www.rnece-ncc.org.

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National Feed Management Education Project

The National Feed Management Education Project was started in 2005 with the goal to increase the understanding of agricultural professionals about the area of Feed Management, with an emphasis on Environmental and Financial Sustainability of Livestock and Poultry Operations. The education project has been funded by the USDA-Natural Resources Conservation Service (NRCS) Conservation Innovation grant program. A primary outcome of the project has been a process for the implementation of the Natural Resources Conservation Service's Feed Management 592 Practice Standard for beef, dairy, poultry, and swine. The primary audiences for the education program are: Animal Nutritionists, NRCS staff Conservation District staff private nutrient management planners Meet the National Feed Management Education Team Access the Products From the National Feed Management Education Project

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What is slope, and why is it important?

Slope can be defined as the angle, inclination, steepness, or gradient of a straight line. Slope often is used to describe the steepness of the ground's surface. Slope can be measured as the rise (the increase in elevation in some unit of measure) over the run (the horizontal distance measured in the same units as the rise). Many geographic information systems (GIS) can analyze digital elevation data (elevation points, contour lines, digital elevation models, etc.) and derive both slope and aspect data sets. Slope is an important landscape metric. Some examples of its applications include:- to help describe landforms,- to model surface runoff, - to characterize habitat, - to classify soils, - to assess the potential for development, and - to model wildfire risk.

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Not interested at all — Very interested

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Composting and the Benefits: Achieving Practice Change through Education to Reduce Nutrient Loads and Increase Adoption of Best Management Practices

Purpose

Florida houses roughly 500,000 horses and is also home to 700 freshwater springs; Marion County is, "Horse Capital of the World" and houses two first magnitude springs and each is currently in a restoration plan with the Florida Department Environmental Protection Agency (FDEP). The Florida Department of Agriculture and Consumer Services (FDACS) equine Best Management Practices (BMP) Manual recommends composting as an excellent manure management option. Composting is a controlled biological process that decomposes and heats up organic material to produce a biologically stable humus, which can then be used as a rich soil amendment. Composting provides protection to the ground and surface waters by preventing excess nutrients from being leached out and running-off into the waters. It destroys up to 90% of weed seeds contained in manure and kills parasite eggs and pathogens. Additionally, the organic matter/compost helps prevent and control soil erosion and can improve both soil quality and productivity.

What did we do?

Individual and group programming has been developed to educate farm owners and managers about the benefits derived from composting horse manure/spent bedding. Since 2007, Over 800 farms have been seen in the county. In 2013 alone, 132 participants were involved in individual farm consultations or farm revisits, group presentations and composting workshops. Education was provided and supplemental materials were developed for clientele about composting manure, compost bin construction and composting's soil-improvement capabilities.

What have we learned?

Pre and post-test results showed a 62% (82 of 132 total participants) knowledge gain from information taught. A total of 71% (n=12 of 17 farm revisit consultations) of farms revisited improved and adopted recommended manure handling practices after receiving education. Additionally, seven farms and facilities have begun cost-share planning with Southwest Florida Water Management District (SWFWMD) for compost bin construction. Results/impacts show improved management practices and a greater understanding of BMPs, allowing for a decrease in nutrient levels to the ground and surface waters. Pictures show sample bins which were constructed as a result of individual and group programming.

Future Plans

Continued group and individual programming needs to be continued, in partnership with trade journal articles being written about manure management, protection of the ground and surface waters and the benefits derived from composting manure/bedding. Cost-share dollars, coming from state organizations, will further incentivize farms to construct and use compost facilities as part of a regular manure management plan.

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Not interested at all — Very interested

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What is the difference between raster and vector data?

Raster and vector are two very different but common data formats used to store geospatial data. Vector data use X and Y coordinates to define the locations of points, lines, and areas (polygons) that correspond to map features such as fire hydrants, trails, and parcels. As such, vector data tend to define centers and edges of features. Raster data, on the other hand, use a matrix of square areas to define where features are located. These squares, also called pixels, cells, and grids, typically are of uniform size, and their size determines the detail that can be maintained in the dataset. Because raster data represent square areas, they describe interiors rather than boundaries as is the case with vector data. Vector data are excellent for capturing and storing spatial details, while raster data are well suited for capturing, storing, and analyzing data such as elevation, temperature, soil pH, etc. that vary continuously from location to location. Raster data formats also are used to store aerial and satellite imagery.

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How Teachers Can Include School Gardens in the Classroom Curriculum

School gardens are cropping up around the country as multi-faceted experiential learning labs. With the increased emphasis these days on high-stakes testing and data collection, many educators are looking for more innovative ways to present subject matter that balances academic achievement with fostering a love of learning. Research and common sense agree that the best learning environments include a variety of verbal, written, and hands-on activities for each lesson. Although new technology is playing a vital and growing role in modern education, many professionals are also seeking ways to connect students back to their environment, and instill greater life skills and a sense of community in their classrooms. Many of these skills, once taught at home, seem to be left more and more to schools. What can you teach in a school garden? What can't you teach? Most obviously, school gardens are perfectly suited to science curricula. Units such as: seed germination, plant parts, life cycles/metamorphosis, the water cycle, habitat, temperature, weather/climate, and environmental science can all be explored. Students can practice scientific inquiry and higher-order thinking in a live setting. What's more, if they bring their harvest back to the classroom to cook, they can explore the wonders of kitchen science. Math is another natural fit for school gardens. Designing, prepping, and planting garden beds affords a lot of measurement practice; as does weighing the harvest. Cooking from the garden lends itself to lessons of capacity, volume, and an exploration of fractions through measurement. Since much of all culture is centered around food, deciding what to plant, how to plant it, and how to prepare the bounty can open up infinite possibilities for social studies and multi-cultural exploration. Lesson on native foods, natural resources, early agriculture, cultural celebrations, spice trade, and traditional methods of preparing and preserving foods can all be taught in school gardens. For older students, discussions on food policy and food justice unfold as students develop a deeper understanding of where food comes from and how it makes its way to our plate. Although Language Arts may seem like a less-obvious fit for the garden, the natural world has always been a source of inspiration for poetry and creative writing. It can also be a soothing environment for reflection or for read-aloud time. In fact, there is no end to the supply of books of every genre about gardening, food, and cooking to inspire readers of all ages. Alongside lessons in core academics, gardening teaches vital life skills. One of the most exciting things about engaging youth in school gardens is the way it develops an appreciation of the natural world and a sense of interconnectedness that children may not experience in other areas of education. Planting a garden requires teamwork, patience, and perseverance. Caring for a living thing, watching it grow and thrive, and reaping the harvest teaches respect, pride, and commitment. Although these skills are rarely tested, or recorded, these are the lessons that will stick with students throughout their lifetime.

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What's the difference between a supervised and unsupervised image classification?

Two major categories of image classification techniques include unsupervised (calculated by software) and supervised (human-guided) classification. Unsupervised classification is where the outcomes (groupings of pixels with common characteristics) are based on the software analysis of an image without the user providing sample classes. The computer uses techniques to determine which pixels are related and groups them into classes. The user can specify which algorism the software will use and the desired number of output classes but otherwise does not aid in the classification process. However, the user must have knowledge of the area being classified when the groupings of pixels with common characteristics produced by the computer have to be related to actual features on the ground (such as wetlands, developed areas, coniferous forests, etc.). Supervised classification is based on the idea that a user can select sample pixels in an image that are representative of specific classes and then direct the image processing software to use these training sites as references for the classification of all other pixels in the image. Training sites (also known as testing sets or input classes) are selected based on the knowledge of the user. The user also sets the bounds for how similar other pixels must be to group them together. These bounds are often set based on the spectral characteristics of the training area, plus or minus a certain increment (often based on "brightness" or strength of reflection in specific spectral bands). The user also designates the number of classes that the image is classified into. Many analysts use a combination of supervised and unsupervised classification processes to develop final output analysis and classified maps.

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What is the family life cycle?

The family life cycle is a series of stages through which a family may pass over time. Typical stages in family development include the periods of a single young adult, a newly married couple, a family with young children, a family with adolescents, launching the children, and a family in later life. The family life cycle emphasizes the effects of marriage, divorce, births, and deaths on families, as well as changes in income, expenses, and assets.

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Using Learning Centers in Child Care

Learning centers are a purposeful way of dividing up your classroom into different subject/learning areas. The location of each learning center, placement of any furnishings or equipment, and easily available materials give a clear message to the child about what is to take place in that area.

Planning for Learning Centers

Establishing the centers requires some initial planning, work, and possible expense, but once they are established they save time and money. For example, you don't want to place the reading area (quiet and comfy) near the block, music, or dramatic play areas (loud and active). You also probably want the art center on hard, easy-to-clean floors and near a sink, but the science center near a window or other source of natural sunlight. Learning centers capitalize on children's natural need to explore because they are given the chance to gain experience by trying out their own ideas in a hands-on way. Once established, you can write your lesson plans according to each learning center to make sure you're offering something to enhance each subject. Then you can easily set up your planned activities for the morning/afternoon in each corresponding center, and children can play in whatever center interests them.

Advantages of Learning Centers

Discipline problems are reduced because groups are limited to a number which can reasonably function in each area. Classroom management is easier since children are in the area of their choice and interest. Children are engaged in hands-on activities as they explore and experiment. Caregivers can support children by supplying the resources as they learn by themselves. Caregivers can determine, by observation, the progress of the children. Caregivers can easily determine what items need to be added to each area that will encourage children in further discovery. Children understand classroom rules more easily when they apply to specific areas. Each area contains only the essentials that allow children to control and create. The purpose of the area is clear and understandable to children.

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What does it mean to foster distinctive, attractive communities with a strong sense of place?

What does it mean to foster distinctive, attractive communities with a strong sense of place?
The Smart Growth Tenet: Foster distinctive, attractive communities with a strong sense of place that reflect the values, culture and vision of residents through the growth and history of their community.
Why is fostering distinctive, attractive communities with a strong sense of place important?
Communities with a strong sense of place build on their unique history, identity and assets to foster community pride, increase social interaction and market their community to potential businesses and residents. The results can improve economic stability, increase property values and greatly impact the lives and memories of residents. Urban sprawl is creating a new image for growing communities that is commonly referred to as "Anywhere USA." The monotony of this sprawling development pattern moves people farther away from our town centers and from each other. The results have led to the loss of millions of acres of farmland and open space, disinvestment in our cities and decreases in social interaction, diversity and civic pride. To create a distinct image and maintain a sense of place, many communities are investing in their history as the foundation for new growth.
How do you apply this tenet to your community?
Investing in your community's unique assets and history can create a situation where residents will become your greatest ally in guiding growth that benefits the entire community. Involving the public in planning decisions and community improvement projects is the first step in building a sense of place. While the greater public should be intimately involved in creating a vision for the community, it is the role of government officials to use the zoning ordinance, site plan review, capital improvement planning and state and federal assistance to make this vision a reality. Communities that are effective in implementing this tenet have consistent policies and regulations in place that create synergy between preservation efforts and new development and are always looking for ways to improve by building sense of place.

Which categories do you think the above article belongs to?

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What is a spectral signature in remote sensing?

Features on the Earth reflect, absorb, transmit, and emit electromagnetic energy from the sun. Special digital sensors have been developed to measure all types of electromagnetic energy as it interacts with objects in all of the ways listed above. The ability of sensors to measure these interactions allows us to use remote sensing to measure features and changes on the Earth and in our atmosphere. A measurement of energy commonly used in remote sensing of the Earth is reflected energy (e.g., visible light, near-infrared, etc.) coming from land and water surfaces. The amount of energy reflected from these surfaces is usually expressed as a percentage of the amount of energy striking the objects. Reflectance is 100% if all of the light striking and object bounces off and is detected by the sensor. If none of the light returns from the surface, reflectance is said to be 0%. In most cases, the reflectance value of each object for each area of the electromagnetic spectrum is somewhere between these two extremes. Across any range of wavelengths, the percent reflectance values for landscape features such as water, sand, roads, forests, etc. can be plotted and compared. Such plots are called “spectral response curves” or “spectral signatures.” Differences among spectral signatures are used to help classify remotely sensed images into classes of landscape features since the spectral signatures of like features have similar shapes. The figure below shows differences in the spectral response curves for healthy versus stressed sugar beet plants. The more detailed the spectral information recorded by a sensor, the more information that can be extracted from the spectral signatures. Hyperspectral sensors have much more detailed signatures than multispectral sensors and thus provide the ability to detect more subtle differences in aquatic and terrestrial features.

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The Building Blocks of Climate Models

In a virtual system, climate models attempt to integrate as much as possible the known factors that influence climate, from the transfer of atmospheric heat into the oceans to the reflection of solar rays by polar and mountain ice. From the climate modeler's standpoint, the processes that control the climate can be expressed by mathematical equations derived from scientific laws, empirical data, and observations. These equations are converted into computer language and, along with information about the Earth's geography - such as topography and vegetation - form the basis of a climate model. To understand how a climate model is constructed, it helps to think of the Earth's climate as a complex system of many interacting parts that include the atmosphere, oceans, land surface, and sea and land ice. Atmosphere models are the oldest and evolved during the 1960s. They have at their core the equations for fluid motion, which describe air movement, and the first law of thermodynamics, which relates to the conservation of energy, including heat. Ocean component models followed atmospheric models and were built to simulate ocean currents, salinities, and temperatures. By 1970, the first model integrated the atmosphere and ocean components into what is commonly referred to as atmosphere-ocean general circulation models, or coupled GCMs. Researchers continue to refine these coupled GCMs, by improving their resolution, for example. Models that go beyond climate, such as Earth system models, remain more experimental.

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Topography and Understanding Topographic Maps

Among the many mapping tools available, the most commonly used is the topographic map. Topography is defined as the relief (relative elevations) of a surface and the relative relations between its natural and man-made features. Topographic maps systematically portray the spatial relationship among both the physical features, such as contour lines (lines of equal elevation) and hydrographic symbols, and cultural features, such as roads and administrative boundaries. Topographic maps are also known as "topo maps." Reading a topographic map begins with understanding the extent of reduction necessary to represent a given area of the Earth's surface. This reduction is known as scale and is defined as a representation of the size of something on a drawing, photo, or map relative to the size of the real thing. The U.S. Geological Survey (USGS) has been responsible for creating topographic maps of the United States since its inception in 1879. These maps come in a variety of scales. The most common for natural resource management purposes is the 1:24,000 series (where 1 map inch = 24,000 Earth inches or 2,000 feet). Maps at this scale cover an area measuring 7.5 minutes of latitude and 7.5 minutes of longitude and are commonly called 7.5-minute quadrangle maps, also known as "quads" or "quad sheets." These mapping sheets represent 64 square miles in southern U.S. latitudes and 49 square miles in northern latitudes; thus, it takes about 57,000 7.5-minute quad sheets to cover the entire United States and its territories. These maps are used for local area planning, engineering, and recreation purposes. Maps at 1:50,000 to 1:100,000 show less detail but cover areas large enough for landscape management support. USGS also has smaller scale maps at 1:250,000, 1:500,000, and 1:1,000,000, which cover very large areas on the sheet and are used for regional and statewide planning. The USGS has an excellent webpage with graphic depictions of map scale. The content of topographic maps may seem bewildering upon first glance; however, there is a method behind all the colored points, lines, and areas distinguishing key features. The smaller features of limited extent (such as the location of houses) are often represented by points, whereas much larger features (such as the outline of a large building) may be depicted as areas. In the mapping world, these areas are often known as polygons.

Colors that catch the eye first when looking at most 7.5-minute quadrangles are these: green (vegetation) blue (water) gray or red (densely built-up areas) purple (information updated with aerial photography but not field verified)

Unique combinations of line style and color indicate similar features: brown for contour lines (which will be discussed in the next paragraph) blue for lakes, streams, irrigation ditches, etc. red for land grids and important roads black for other roads and trails, railroads, boundaries, etc. purple for updated features A series of standardized symbols are used to depict features such as springs, water tanks, wells, mines, buildings, campgrounds, and survey control points. The brown contour lines on topographic maps show elevation. Each contour line joins points of equal elevation above a specified reference, such as sea level. A contour line represents one and only one elevation and thus never splits or intersects other contour lines (expect in the rare case of an overhanging cliff). Note that the vertical distance between contour lines (the contour interval) is always equal; the smaller the contour interval, the higher (or more detailed) the vertical resolution, or the minimum separation of objects, of the map. The horizontal distance between contours, on the other hand, is determined by the steepness of the landscape and can vary greatly depending on the terrain. The closer the lines are together, the steeper the object. USGS cartographers select a contour interval that will best show the shape of the terrain for each individual quad sheet. A flat area in Iowa might need a contour interval of 10 feet to capture some sense of relief. By contrast, a mountainous region of Arizona may have contour intervals of 100 feet or more; any finer would result in contours too tightly packed together to distinguish. Concentric circles of contour lines indicate a hilltop or mountain peak, whereas concentric circles of hatched contour lines indicate a closed depression. Contour lines form a V pattern crossing streams with the V pointing upstream. Rounded contour lines generally denote hills or ridges.

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Imported Fire Ant History

More than 75 years ago, the red imported fire ant, Solenopsis invicta Buren, was accidentally brought into Mobile, Alabama, from South America. It now infests more than 325 million acres, comprising most of eleven southern states and Puerto Rico, with infestations also in New Mexico and California. It has recently been reported in northern Mexico, Australia, Taiwan and China. Another species, the black imported fire ant, Solenopsis richteri Forel, was introduced earlier, but this species is limited to northeastern Mississippi, northwestern Alabama, and Tennessee. Colonies move vertically and horizontally in the soil profile to escape floods, droughts, and extreme temperatures. When new colonies are not actively foraging, they may be unaffected by baits or other pesticides applied to the soil surface.

Technological obstacles to eradication

Pesticide treatments are expensive, time-consuming, and limited in their effectiveness. There are three basic approaches: Surface treatment using a residual contact poison. This approach is the least environmentally sound because the treated surface remains toxic for a long time. The ants may survive by foraging underground. Individual mound treatment. This approach involves applying a large volume of pesticide to reach the queen. However, it is nearly impossible to locate all of the colonies in an area and difficult to manipulate large volumes of liquid. Also, mound treatment is more expensive and time-consuming than broadcast treatments. Colonies not eliminated may move or split into several colonies. Bait treatment. This approach uses some sort of attractive substance the ants like to eat. Unfortunately, baits are not always consumed, and the bait's attractiveness is short-lived. The bait must be slow-acting and effective over a range of doses, since the dose the ants get cannot be controlled. Baits may also be attractive to and kill some native ant species that compete with fire ants.

Economic, regulatory, and environmental obstacles to eradication

The best way to treat large areas (hundreds of acres) is by an aerial application of bait. The larger the treatment area, the more slowly reinfestation occurs. However, not all areas can be treated because of label restrictions and application limitations. Even with a bait product, it is not feasible to treat the entire infested area or even a large part of a single state, and untreated areas may be reinfested. If periodic treatments are discontinued, the area may become more infested than it originally was within a year or two.

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What is geospatial technology?

Geospatial technology refers to equipment used to measure and analyze Earth's land and features. Systems such as Global Positioning System (GPS) and Geographical Information System (GIS) are used in geospatial work. "Geo" is a prefix that comes from a Greek word meaning earth. "Spatial" means relating to space. GPS was developed by the United States Department of Defense in 1973. The first satellite was launched in 1978. GPS was originally designed to help military service members as they move vehicles, planes, and ships to the correct locations around the world. Today, GPS and GIS are used for many different things. GPS can be used to help navigate airplanes, boats, and cars. GPS can also be used in outdoor recreational activities such as hiking, fishing, kayaking, and boating. In the scientific community, GPS plays an important role in the earth sciences. Meteorologists use GPS for weather forecasting and global climate studies. Geologists can use GPS to help measure tectonic motions during and in between earthquakes.

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History of Feral Hogs in the United States

Feral hogs (also called wild hogs), belonging to the species Sus scrofa, are not native to the United States. The presence of these animals in this country is solely attributable to man-made introductions, some of which were intentional while others were accidental. Basically, two types of Sus scrofa, Eurasian wild boar and domestic swine, were introduced into the United States. Because these two types are conspecifics, wherever both of them were found together in the wild, interbreeding occurred. As a result, there are now three general types of wild hogs present in this country. However, because this situation represents a very diverse hybrid complex, the distinguishing lines among these three general types are not always clear morphologically; genetic analyses may be necessary to sort out the ancestry of any one specific population of unknown origin. Historically, the first man-made introduction of hogs into the United States was on the Hawaiian Islands. These animals were carried there by the early Polynesian immigrants who first colonized these islands. Hogs were abundant on all of the islands within this archipelago at the time of the first European contact in the 18th Century. The first hogs to be brought to continental North America were of European origin. The first importation of domestic swine into North America came with the second voyage of Christopher Columbus in 1493. Among the livestock acquired in the Canary Islands to provision this expedition were eight "selected" domestic pigs that were taken onboard at the island of Gomera. These animals and their offspring became the stock that populated the newly formed settlements and outposts on the islands of Cuba, Hispaniola, and Jamaica. From these animals sprang the immense herds that sustained the Spanish explorers on their journeys to the mainland during the early 1500s. It was from these ambulatory stocks of swine used by these initial expeditions that the first well-documented feral populations of wild hogs originated in the continental United States. The expedition of Hernando de Soto is attributed as the first documented source that introduced hogs into the continental United States. From the initial stock of animals, De Soto's herd of swine increased to a reported total of 700. Over a three year period, De Soto and his army traveled through what are now 14 states. Along the 3,100-mile journey, the hogs variously escaped into the wild and were either given to or stolen by the Indians encountered by the Spaniards. De Soto was followed by many other Spanish, English, and French explorers and colonists that brought hogs to the continental U. S. (e.g., Pedro Menéndez de Avilés, Juan de Oñate, Pierre de Iberville, Fernando del Bosque, Rene-Robert Cavelier Sieur de La Salle, and Sir Walter Raleigh). The escaped hogs from these various expeditions and settlements went wild and rapidly became established in a variety of areas. Among the domestic livestock being raised in the early settlements in the European colonies in the New World, hogs were among the most common. The free-ranging of domestic livestock, including hogs, was a commonly practiced husbandry method employed in these colonies. Often, these free-ranging domestic swine went wild. Combined with the escaped stock from the earlier expeditions, these animals established the early populations of wild hogs throughout the eastern and southwestern United States. Beginning in the 1890s, pure Eurasian wild boar were introduced into several areas of the United States to provide a new huntable big game species for wealthy sportsmen. All of these initial introductions were into fenced shooting preserves (e.g., Corbin's Park, NH; Litchfield Park, NY; Hooper Bald, NC). Many were followed by secondary introductions into other locations. A number of these later releases were made into unfenced areas. In other instances, the wild boar were able to break out of and escape the fenced enclosures where they were being maintained. In such areas where feral hogs were already established, interbreeding between the two forms readily occurred, further complicating the taxonomic composition of the wild hogs found in those areas. From 1900 until the late 1980s, feral hog populations in the United States were primarily found in the southern tier of states and in states on the West Coast. Between 1989 and the present, the number of states reporting the presence of feral hogs has more than doubled. Similar to the initial introductions of this species into this continent, this new range increase has also been man-made. Concurrent with this range expansion has been an increase in the estimate national population size of this species. The range expansion in the central part of the country was reportedly largely due to clandestine releases by feral hog hunting enthusiasts. In most states the practice of releasing hogs is highly illegal. Other expansions have been the result of these animals escaping from fenced shooting preserves. The identified sport hunting sources (i.e., clandestine releases and escapes from fenced preserves) of this species increase are consistent with the fact that feral hogs have become the second most popular big game animal in North America, second only to white-tailed deer (Odocoileus virginianus) in the numbers harvested every year. Because of continuing illegal releases of feral hogs into new areas, the number of states with these animals will probably increase. In fact, the potential exists to ultimately have introduced populations of feral hogs in all 50 states at some time in the future.

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Not interested at all — Very interested

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Energy Drinks: History

1960 Energy drinks appear overseas
1980 Jolt Cola 1st "energy drink" in US
1997 Red Bull 1st energy drink to be imported
2001 US energy drink market retail sales grew to 8 million annually
A 2008 statewide Patient Poll conducted by the Pennsylvania Medical Society's Institute for Good Medicine found that: 20 percent of respondents ages 21–30 had used energy drinks in high school or college to stay awake longer to study or write a paper; 70 percent of respondents knew someone who had used an energy drink to stay awake longer to study or work. Today, new products are constantly emerging...

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The History of Crops as an Agroterrorism Target

Plant systems, the "base" of our food production system, have been targeted by military and other groups several times throughout history. In the year 346 BC, while battling Carthage, the Romans spread large quantities of salt on cultivated fields creating toxic conditions for crops. This forced local citizens to abandon the area, ultimately influencing the outcome of the war. During the U.S. Civil War, the Confederacy alleged that troops from the Union deliberately destroyed crops in the southern region of the U.S. by intentionally introducing an insect known as the harlequin bug, Murgentia histrionica. The insect caused great damage, but the direct connection to the Union was never proven. The appearance of this insect species may have occurred naturally since it was indigenous to Mexico. In World War II, Germany was accused of dropping containers of Colorado Potato Beetles on Britain. The reports indicated that these "bombs" were made of cardboard and each contained as many as 100 beetles. However, this allegation has been widely debated, with some suggesting the insect's appearance in England actually occurred as a result of an accidental introduction through food shipments. However, Germany did have a "potato beetle research" program, set up as a defense program to counter Allied biological weapons research. Also during the second World War, the Soviet Union was alleged to have developed and used different types of fungal disease agents on wheat and other cereal crops in enemy countries. During the Cold War between the U.S. and U.S.S.R., both countries stockpiled tons of wheat stem rust spores, a serious disease that can wipe out a wheat crop. Plant-based food products intended for direct consumption by people have also been targeted by terrorist activities in the past. In 1989, the U.S. Embassy in Chile received a call declaring that grapes moving from Chile to the United States and Japan were contaminated with cyanide. In fact, after investigation by the FDA, two contaminated grapes were found. However, because the amount of cyanide found was so small, the contamination wasn't deemed to be a real threat to human health. As a result of the event, several countries cut off importation of several fruit products from Chile. Chilean growers claimed losses of more than $300 million.

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Avian Influenza Homepage

Wild birds such as migratory ducks and geese have historically been known as reservoirs for avian influenza (AI) viruses. These birds normally can carry low pathogenicity avian influenza viruses in their respiratory or intestinal tracts and usually do not get sick. However, AI viruses, particularly H5 and H7 strains, can infect domestic poultry such as chickens and turkeys resulting in severe economic losses due to reduced production and increased mortality and culling. In 2014, USDA identified Eurasian H5N8 highly pathogenic avian influenza (HPAI) and mixed-origin viruses, H5N2 and a novel H5N1, in the Pacific Flyway. The HPAI H5N2 virus strain was later confirmed in several states along three of the four North American Flyways: Pacific, Central and Mississippi. This virus was associated with the HPAI outbreaks that started in the Pacific Northwest in December 2014 and spread to commercial chicken and turkey farms in the Midwest. The last case was reported in June 2015. However, by that time, the U.S. had endured the largest animal health emergency in its history, with more than 200 cases of HPAI affecting more than 50 million commercial and backyard poultry as well as wild birds across 15 states. On March 5, 2017, USDA confirmed HPAI H7 in a commercial poultry breeder flock along the Mississippi flyway in Tennessee. This HPAI H7 strain was found to be of wild bird lineage and was later confirmed by the USDA's National Veterinary Services Laboratories as a North American wild bird lineage H7N9 HPAI.

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The Special Milk Program: An Introduction

Background

The Special Milk Program (SMP) was established in 1955 to increase the milk consumption by children in schools and childcare institutions that do not participate in other Federal meal service programs. In 1966, the Special Milk Program was incorporated into the Child Nutrition Act. The Special Milk Program provides milk to children in schools, childcare institutions, and eligible camps. Through this program, schools and institutions are reimbursed for the milk they serve. In 2011, 3,848 schools and residential childcare institutions, 782 summer camps, and 527 non-residential childcare institutions participated. Schools in the National School Lunch or School Breakfast Programs also participate in the Special Milk Program to provide milk to children in half-day pre-kindergarten and kindergarten programs where children do not have access to the school meal programs. The Food and Nutrition Service administers the program at the federal level. At the state level, the Special Milk Program is usually administered by State education agencies, which operate the program through agreements with school food authorities.

How It Works

To enroll in the Special Milk Program, schools must apply and serve children who otherwise do not have access to school meal programs. Participating schools and institutions receive reimbursement from the U.S. Department of Agriculture (USDA) for each half-pint serving of milk served. The participating schools operate their milk programs on a non-profit basis and agree to use the federal reimbursement to subsidize the selling price of milk to all children. Any child at a participating school or half-day pre-kindergarten program can get milk through the Special Milk Program, regardless of their FARMS (Free and Reduced Meal Service) status.

Impact

In fiscal year 2012, over 61 million half-pints of milk were served through the Special Milk Program. A survey of 768 schools and 20,000 students assessed the impact of the free milk provision on the Special Milk Program (SMP). Free milk service increased total milk consumption of needy children, and milk programs were not disincentives to student participation in school lunch or school breakfast (1). Students in SMP schools drank 42% more milk at school than those in non-SMP programs, this relationship was seen at all grade levels. In schools that participated in the National School Lunch Program the milk consumption was almost 30% higher than in schools with the SMP but not the NSLP.

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Basic Math Skills in Child Care: Shapes and Spatial Relations

Some child care providers may think of geometry as an advanced math concept learned in high school. But even young children are aware of basic concepts related to shapes and spatial relationships. Child care providers can help young children build math skills by encouraging them to explore and compare shapes and spatial relationships.

Spatial Relationships

Spatial relationships explore the concept of where objects are in relationship to something else. When child care providers use the following words, they are teaching spatial concepts: above, below before, after high, low in front of, in back of, behind inside, outside on top of, under Learning to understand spatial relationships helps children talk about where things are located. For example, a ball may be behind the chair, or under the table, or in the box. The dog may be on the blanket, outside of the house, or in the doghouse. To help children practice spatial relationships, hide a toy in the room, and give directions to find the toy using some fo the spatial terms above. For example, you might say, "Look behind the chair."

Geometry

Understanding shapes is basic to understanding geometry. As children start to identify shapes, they develop a beginning understanding of geometry. Most preschool children begin to learn the names of basic two-dimensional shapes: circle, square, triangle and rectangle. Some preschoolers can even learn to recognize and name more complex shapes (rhombus, trapezoid, hexagon) and three-dimensional shapes (cube, sphere and pyramid). The block area is a great place to reinforce children's knowledge of shapes. As you build a structure together, encourage the child to add a specific shape. You might say, "The top of this column looks like a great place to add a half-circle. What do you think?"

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Basic Math Skills in Child Care: Matching, Classifying, and Measuring

Teaching young children how to match, classify, and measure is an important part of developing early math skills because these skills help children identify and describe relationships between items. As a child care care provider, you can help young children learn these skills in several ways. Matching mainly involves one-to-one correspondence. The game "Memory" is one good way to teach young children about matching. This game begins with pairs of pictures face down. Each player flips over two cards. If the cards match, the player keeps them and flips over two more cards. If they don't match, the player flips them face down, and the next person has a turn to find a match. Comparing involves identifying similarities and differences among objects. For example, talk about how my block is the same as, or different than, your block. Being able to compare objects and identify similarities and differences leads to the ability to classify objects. Classifying/sorting involves finding things that are the same, or alike, and grouping them by specific traits. For example, the bunch of animals in the picture to the right can be grouped based on their color or type of animal. You can have young children classify anything, including blocks, leaves, plates, or toy cars. Once they have classified items, children can compare items further to learn more specific similarities and differences between items, both within and between matched groups. Sets are simply a collection of things that have been classified together because they have something in common. In your child care program, you could find many sets, such as blocks, markers, food, people, and animals. Measuring is determining the extent or degree of something. For example, children can measure a block in many ways; height, weight, length, even temperature. If you don't have rulers or other measuring tools, help children practice measuring with everyday objects such as yarn or paper clips.

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Math in Child Care

Math is everywhere, and it's more than just learning numbers. When children sort crayons by color, put puzzles together, build with blocks, count their raisins during snack, and sing "Five Little Monkeys Jumping on the Bed," they are learning about math. These kinds of hands-on learning activities create a solid foundation for children to understand shapes, sizes, length, addition, and subtraction. Children who have the opportunity to learn math-related concepts in early childhood often do better in school and are more skilled at using math as an adult. High-quality child care programs provide young children with many opportunities to sort and classify, find similarities and differences, measure and estimate, and solve problems. For more information on how to support and nurture young children's developing math skills, see the following articles. If you are looking for specific math activities for your child care program, check out the Hands-On Activities for Child Care database.

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Breakfast and the Brain: How Eating Breakfast Impacts School Performance

The claim that breakfast is the most important meal of the day has an abundance of sound science behind it. A brief compiled by the Food Research and Action Center (FRAC) outlines the correlation between breakfast and school performance among children, based on numerous research findings. The findings include how eating, and not eating, breakfast affects academics, brain function, and overall wellness. Children who do not eat breakfast at home or at school were less able to learn. Hunger can lead to lower math scores, attention problems, and behavior, emotional, and academic problems. Furthermore, studies show that children who are consistently or often hungry are more likely to repeat a grade. It is these problems that have lead many schools to participate in school breakfast programs including the United States Department of Agriculture's (USDA) School Breakfast Program and the Breakfast in the Classroom program. Both programs make breakfast available to all students. While it is true that students can chose not to eat, children themselves have reported a belief that eating breakfast increases their energy and ability to pay attention in class. Providing breakfast at school can also ensure that children are getting enough to eat. Children who eat a complete breakfast have been shown to work faster and make fewer mistakes in math problems and to perform better on vocabulary tests than those who ate only a partial breakfast. They also show improved concentration, alertness, comprehension, memory and learning. Beyond academics, children who participate in school breakfast programs show decreased anxiety, depression, and hyperactivity. The breakfast offered can improve a child's overall nutrition by providing her/him with necessary vitamins and minerals and can actually reduce the risk of obesity! Numerous studies show how students will benefit from school lunch programs in the classroom and beyond. Visit the links below to discover how your school community can benefit from school breakfast.

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Play Helps Young Children Be Ready for School

With the increasing pressures of school readiness, many child care programs are actually cutting back on unstructured free play time. Pressured teachers believe that structured, teacher-led activities are the only way to help children be ready to read, do math, and understand science when they enter kindergarten. But what do we really know about young children and play? How does play help children learn? Many adults are mistaken about play. We view "playing" as a frivolous activity, meant to fill empty waiting periods between more important activities. But for young children, play is the centerpiece of learning. Playing is not an "extra" for young children. It's actually the single most important way they explore, learn about the world and practice and perfect new skills. When children play, they get to decide what materials to use, what to do and when to stop or change to a different activity. Children playing in a child care setting are testing out new materials, trying out roles, experimenting with cause and effect, making guesses and testing conclusions and practicing getting along with others. Researchers have shown that high-quality play experiences help improve children's memory, social skills, oral language abilities, pre-reading and pre-math skills and school adjustment. All of these will be crucially important learning skills when children get to kindergarten and beyond.

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How can I balance a checkbook that has not balanced for several months?

Balancing or reconciling a checkbook each month is a task many of us avoid. If you have tried balancing your checkbook but can find no agreement between the last number in your check register and the ending balance your financial institution has stated is in your account, you do have some alternatives: Even if you have done so before, try balancing your checkbook using the form provided by your financial institution. Simply subtracting or adding each entry in your checkbook entry does not allow for outstanding checks or deposits. The forms vary, but the basic steps are checking off checks, ATM withdrawals, automatic deposits and withdrawals, and other deposits that have cleared on your statement. Total all outstanding checks (the ones not found on the statement yet). Subtract this total from the ending balance your bank/credit union is showing. Total all outstanding deposits. Add this to the number you arrived at after subtracting the outstanding checks. By following the form provided, you are more likely to notice either deposits or withdrawals you previously overlooked and to find errors. Check the accuracy of your entries and the basic math in your checkbook register. Work your way through each transaction to see if you recorded it accurately and did the appropriate subtraction or addition correctly. Did you write a check for $54 but entered it in the checkbook register as $45? Did you subtract that $100 deposit instead of adding it? Do not look for outstanding checks or missed deposits. Concentrate only on the accuracy of the entries and the math associated with them. Allow all outstanding checks to clear before writing any more checks. In other words, stop using your checkbook. Pay with cash only, or use cash to purchase money orders to pay bills. If you have checks that have been outstanding for three or more months, contact the person or business the checks were written to and ask for the current status of the check. Has the individual/business lost or forgotten the check? Encourage them to cash it as soon as possible. If it has been cashed, review your monthly statement to confirm that it was deducted from your account. If there is another person on the same checking account? a spouse or a child? ask him or her for information on all transactions he or she may have made on the account. Were those transactions recorded on the checkbook register? Are there any double entries? Be certain that all deposits have been credited to your account, especially if you have more than one type of account with the same financial institution. Was a cash deposit erroneously credited to your savings account or to a loan instead of to your checking account? When making a deposit, always use a deposit slip, and keep your deposit receipt until the deposit is shown on your checking account statement. Use a computer program such as Quicken to manage your checkbook. Accurately enter all the information from your checkbook register and then run the reconciliation segment of the computer program. Set up an appointment with a financial consultant at your bank/credit union. Inform them in advance that you are having difficulties balancing your checkbook. Bring with you all current checkbook registers and statements. You may need to give them written permission to access your account information online so the two of you can compare information. View your account online and compare transactions. Many financial institutions now send monthly statements via e-mail, and some even allow daily access to your account information. Some sites have financial calculators that do the math for you after you enter your information. Balance your checkbook more often. When your checkbook is not balancing in the first place, that may sound contradictory, but by attempting to balance your checkbook more than once a month, you are more likely to find an error early and before it costs you overdraft fees. If you have direct deposit of your paycheck or other funds, consider balancing your checkbook every pay period, which is often every two weeks.

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What is a crush point?

A crush point exists at the point where two objects meet. The objects can be moving toward each other, or one object can be moving toward a stationary object. Crush points are hazardous because the objects coming together can easily crush body parts. The most common example of a crush-point hazard is the attachment to the drawbar of a tractor. Other examples of crush point hazards include three-point hitches and components moved by hydraulic cylinders.

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Three "Bs" in Child Care: Blocks, Balls, and Books

Some of the best toys for kids have been around for a long time. Blocks, balls, and books are simple, durable, and fun and can help children build skills. They can also be enjoyed by kids of all ages. These should be staples in every child care program.

About Blocks

Blocks are good toys, because children of different ages can use them in different ways. Infants like to carry them around and dump them into and out of containers. Toddlers like to build towers. As children get older they like to build more elaborate structures with blocks. Children use physical skills as they lift and move blocks to build things. Math skills are used as children count, match, sort, add, subtract, and notice the weight and length of blocks. Thinking and problem-solving skills are used in making a tower or other structure. A child can learn how to work with other children in the program and share ideas when building with blocks.

About Balls

Like blocks, balls are fun for children of all ages! Infants love to roll them. Toddlers enjoy rolling a ball back and forth to someone. This teaches them how to take turns – something toddlers need to learn because it leads to sharing. As children get older, they can learn how to throw and catch a ball. Children enjoy games with balls. Some children develop a love of sports and may play ball of one kind or another all their lives.

About Books

Children learn so much from books. Infants and toddlers like to look at picture books and to listen to short stories. Board books and cloth books are best for them to handle. Preschoolers enjoy stories and learning about new things. There are books about science and nature. There are books about magic and music. There are fairy tale and folk tale books. There are books about people or events, and others are fiction. Child care settings should have a variety of books available for children and a special reading time every day. Once children learn to read, child care providers can encourage children to take turns reading to one another. Consider taking children on a field trip to the library. Make books and reading times important for the children in your care.

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What is the Difference Between Physical Fitness, Exercise, and Physical Activity?

What is the Difference Between Physical Fitness, Exercise, and Physical Activity?
Health care professionals, the media and now the White House. Everywhere we turn today we hear how important exercise and physical activity are to long life and good health. But what exactly constitutes physical activity and exercise and what's the difference between the two? Let's take a closer look at how these terms relate to you and what you can do to improve your overall health no matter where you are on the fitness spectrum. Physical activity involves any bodily movement such as walking to and from work, taking the stairs instead of elevators and escalators, gardening, and doing household chores. For inactive people, there's no doubt that increasing this sort of activity can reduce risk for disease and improve health. Exercise, however, is a type of physical activity that requires planned, structured, and repetitive bodily movement with the intent of improving or maintaining your physical fitness level. Exercise can be accomplished through activities such as cycling, dancing, walking, swimming, yoga, working out at the gym, or running, just to name a few. Regular exercise, depending upon the kind, improves aerobic fitness, muscular strength, and flexibility. Aerobic fitness is the ability of the body's cardiovascular system to supply energy during continuous physical activities such as biking and running. Studies show that this type of exercise provides many health benefits such as decreasing risk for heart disease, stroke, high blood pressure, type II diabetes and some cancers. The 2008 Physical Activity Guidelines for Americans state that most health benefits occur with at least 150 minutes/week of moderate-intensity aerobic activity. Examples of aerobic activities that would meet this recommendation include walking at a brisk pace, swimming, jogging, dancing, etc. Muscular strength is the ability of the muscles to exert a force during an activity such as lifting weights. Muscle strengthening exercises involve using your muscles to work against a resistance such as your body weight, elastic bands or weights. The Physical Activity Guidelines recommend that adults participate in muscle strengthening exercises for all major muscles groups at least two days a week. Bone strengthening exercise, or any weight-bearing activity that produces a force on the bone, is also important to overall health for children and adults. This force is usually produced by impact with the ground and results in bone growth in children and healthy maintenance of bone density in adults. Examples of bone strengthening activities include jumping, walking, jogging, and weight lifting exercises. As you can see, some exercises such as walking or jogging serve a dual purpose of strengthening our bones and our aerobic system. Lastly, flexibility is the ability of the joints to move through a full range of motion. Stretching exercises can be an excellent way of increasing flexibility. While the 2008 Physical Activity Guidelines for Americans do not include specific recommendations for increasing flexibility, some individuals such as dancers and some athletes may need to include flexibility activities as part of their exercise regimen. The bottom line is that increasing your everyday physical activity and regularly participating in aerobic, muscle and bone strengthening exercises are all beneficial to your health and will improve your quality of life. So what are you waiting for? It's time to heed the advice and get active. You have nothing to lose and everything to gain. If you'd like to know more about the benefits of starting an exercise program or just increasing your everyday physical activities, visit the 2008 Physical Activity Guidelines for Americans.

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Jet Stream Activity in Climate Models

Jet streams high in the atmosphere direct where moisture lands on the surface. Global climate models (GCMs) generally do a good job at simulating jet stream activity, especially in the mid-latitudes – roughly 40 to 70 degrees north of the equator. Indeed, this is considered one of their strengths. Even so, potential problems include inadequacies where the mid-latitudes interact with the tropics (Bader et al. 2008) — namely, the subtropics, roughly centered around 30 degrees from the equator. Jet streams can be seen as meandering rivers of air, generally located about 30,000 to 40,000 feet above sea level. The polar jet stream occurs consistently along the polar front, where cold air meets warm air, fueling many mid-latitude storms. Occasionally, the polar jet stream dips down into the low mid-latitudes, influencing precipitation and temperature in the southwestern United States. A separate, and somewhat less consistent, subtropical jet stream occurs between 20 and 40 degrees latitude from the equator. As their names imply, the polar jet stream can help carry cold air southward, while the subtropical jet stream can help usher in warm, humid conditions. The subtropical jet stream in North America is more likely to get a boost during El Niño years, wielding a large effect on winter precipitation along the southern tier of U.S. states. Thus, recent improvements in modeling El Niño variability in the distant tropics have implications for modeling regional jet stream activity and its effect on winter precipitation. Still, only about a third of the 18 GCMs tested were identified as having a relatively realistic interpretation of El Niño fluctuations (Bader et al. 2008). The most skillful models tend to have relatively high resolution — with some as fine as 500 square miles — in the tropical Pacific, where El Niño has its greatest effect on sea surface temperature. In general, modelers have found it challenging to capture the historic year-to-year variability of the subtropcial jet stream in the northern hemisphere, including a recently observed shift toward the poles. Several research teams have shown a poleward shift of this jet stream, linked to the expansion of the Hadley cell circulation Seidel et al. 2007, Hu and Fu 2007). Researchers at the University of Arizona have linked the poleward shift of the jet stream to drier southwestern springs in the time frame they considered, from 1978 to 1998 (McAfee and Russell 2008). In addition, the poleward shift of the jet stream observed for the past several decades means that the regional impacts of El Niño could change along with global climate. This remains difficult to model at any scale. The modeling of tropical storms is also a challenge at the global scale. However, this challenge of modeling of tropical storms can potentially be resolved at the regional scale. The subtropical jet stream resides around the descending branch of the Hadley cell, shown in this idealized graphic at about 30 degrees in latitude. The polar jet stream resides along the polar front, where it tends to reinforce the temperature difference on either side of the front. In reality, both jet streams often meander widely north and south rather than following the straight (zonal) pattern shown here. Credit: Barbara Summey, NASA Goddard VisAnalysis Lab

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How to Encourage Your Children to Eat More Vegetables

Every parent knows the key to keeping children healthy is to get them to put down the junk food and eat more vegetables, but this is often more easily said than done. So how can you promote vegetables in your home? Try these simple tips to get your kids to love veggies! Smile. Studies have shown that if you smile while you eat vegetables, your children are more likely to want to eat them. Modeling healthy eating by not only eating vegetables around your kids, but also by clearly showing that you enjoy them, is incredibly important. Even if they've never liked that vegetable before, simply seeing you enjoy it will make them like it more. So be sure to set a good example by eating vegetables in front of your kids with a smile on your face2! Buy more vegetables than junk food. If your kitchen is filled with vegetables instead of unhealthy junk food, your kids will be more likely to reach for the carrots instead of the chips3. Try extending this to your child's school cafeteria by asking if the salad bar can be moved to a more prominent location and ask that the vending machines be moved to a less prominent location or even better removed completely. Make vegetables kid-sized. Children like to eat food they can eat easily, so cut up vegetables and keep them easily accessible in the fridge4. Try cutting them up into small, fun shapes and serving them with low-fat salad dressing or dip too! Be positive. Avoid forcing your kid to eat vegetables and punishing them when they don't. Instead, use positive reinforcement by praising them when they do finish their vegetables or when they ask for their snack to be their favorite vegetable4. Let them have a say. When kids can help decide what vegetable will be a part of dinner, they'll feel more involved and will be more excited to eat them4. See what your child likes helping with the most, from grocery shopping to meal planning to preparing the vegetables themselves. Eat together. Just eating together as a family can encourage your children to eat healthier. This has been shown to be one of the best ways to make sure your children are getting their recommended intake of vegetables1. Make vegetables fun. Giving fun names to vegetables will make them seem more fun and attractive to younger kids. It's also a great way to teach them about the benefits of vegetables by linking each food's name with how they make you healthier, like "X-ray Carrots" or "Power Punch Broccoli5." Don't be afraid of trial and error. There are some vegetables your kids might not like, and that's okay! Expose your child to a vegetable at least 10 times. If your children still don't like the taste of a certain vegetable, move forward by exploring new options and replacing the unwanted vegetable with one of their favorites4.

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What is the difference between discipline and punishment?

Discipline is a positive method of teaching a child self-control, confidence, and responsibility. The key to positive discipline is teaching a child what behavior is okay and what behavior is not okay. The focus is on what children are expected and allowed to do. It includes catching kids being good and encouraging appropriate behavior. It also includes modeling appropriate behavior. Punishment is quite different from discipline. Punishment may be physical as in spanking, hitting, or causing pain. It may be psychological as in disapproval, isolation, or shaming. Punishment focuses on past misbehavior and offers little or nothing to help a child behave better in the future. When punishment is used, the person who punishes the child becomes responsible for the child's behavior. Children who are raised in a way that stresses positive discipline will understand their own behavior better, show independence, and respect themselves and others. Positive discipline is a process, not a single act. It teaches children how to get along with other people. Children are held responsible for misbehavior, but the consequences are meaningful and related to the behavior.

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School Gardens Engage Students: Traverse Heights Elementary School

The Traverse Heights Elementary School garden program in Traverse City, Michigan teaches students about the importance of healthy food and healthy eating. Partnerships with FoodCorps and Michigan State University (MSU) Extension make their garden-to-table program a success. The partnership staff work with students in all grades to engage and team them about growing food. Traverse Heights Elementary School has been conducting their gardening program for the past five years and through it they are not only able to teach children about nutrition, agriculture, and food systems, but also math, science, and language arts. Along with the gardening program, the partnerships also like to do taste tests with healthy items such as smoothies. The Policy Specialist at Groundwork Center, Megan McDermott, says that if children plant, care for, and grow their own fruit and vegetables, they are much more likely to eat those fruits and vegetables over students who don't grow their own.

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Best Management Practices for Reducing Gas Emissions from Manure Application in Semi-Arid Regions

*Abstract
Gas emissions from animal feeding operations (AFOs) create adverse impacts ranging from short-term local effects on air quality, particularly odor, to the long-term effects from greenhouse gas generation. Best management practices (BMPs) have been designed and implemented to mitigate gas emissions from farm operations. Our study investigates emission control strategies widely used in AFOs including manure management and land application. The primary objectives were to evaluate the efficiency and identify improvement of the currently available BMPs. We simulated and monitored gaseous emissions from a range of manure application and incorporation methods. The gaseous emissions were monitored using the closed dynamic chamber (CDC) method with a Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer, which is capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. In this presentation, we will discuss the efficiency of the current manure management BMPs to reduce air emissions from dairy operations, based on the gaseous emission monitoring during the course of our experiment. Results from our study should enhance development and implementation of more flexible and more efficient air quality management approaches for dairy operations.
Why Study Gas Emissions from Manure Application Sites?
Evaluate gaseous emissions from manure application. Identify ways to improve manure management and land application BMPs.
What Did We Do?
Manure application and incorporation methods were simulated and evaluated in a greenhouse setting. Scraped dairy manure was applied at a rate of 50 tons/acre to a Millville silt loam soil. Incorporation versus no incorporation was compared. Gaseous emissions were monitored using a closed dynamic chamber with a Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer, which is capable of monitoring 15-pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. On Day 3, after emissions had subsided, the soil surface was rewetted. Emissions were monitored for 7 days.
What Have We Learned?
Emission rates for CO2 and NH3 peaked after 24 hours, with the majority of emissions occurring within the first 2 days. Rewetting had limited impact. Based on this data, it appears that rapid incorporation is needed to have a meaningful impact on reducing gaseous emissions.
Future Plans
Examine gaseous emissions from a range of manure application and incorporation methods in a field setting. The gaseous emissions will be monitored using the closed dynamic chamber method with a Fourier Transformed Infrared (FTiR) spectroscopy gas analyzer.

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Blood Pumping Mechanism of the Hoof

Blood is pumped from the heart through arteries to the hoof and is assisted in its return through a "pumping mechanism" in the hoof. This mechanism is necessary due to the position of the hoof in relation to the heart. There are no muscles in the lower leg or hoof to aid in the return of venous blood to the heart. Thus, the hoof has to pump venous blood back to the heart. An extensive network of veins called a venous plexus are located on both sides of each of the lateral cartilages and in the sensitive structures of the hoof. The compression of these veins by the plantar cushion against the lateral cartilages or the coffin bone against the hoof acts as a "pump" to force the blood up the leg and back to the heart. Blood is prevented from returning to the hoof by one-way valves in the veins of the leg. Compression of the plexuses also acts as a valve to contain blood in the vessels of the hoof below the plexuses. This produces a "hydraulic cushion" that further dissipates concussion and protects the fragile coffin bone. This valve action also creates a fluid pressure that, when the hoof is raised and the compressed veins are open, causes the blood to exit up the leg and the plexuses to fill. Each time the foot bears weight, the veins are compressed. Each time the foot is raised, the veins open, and blood is pushed in by the arterial pulse and gravity. The weight of the horse forces the blood back up the leg, which is commonly referred to as the second heart. How the coffin bone aids in pumping blood back up the horse's leg is integral for proper circulation in the horse.

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Drying and Rewetting Effects on Gas Emissions from Dairy Manure in Semi-arid Regions

Abstract
The major source of emissions in animal production sites is from animal waste (manure), which can be in solid, slurry, or liquid states, exhibiting varying physical properties. Once manure is excreted from an animal, processes of biological decomposition and formation of gaseous compounds continue, but diminish as the manure cools and dries. However, increases in gas emissions following rewetting, particularly from precipitation, have been observed in various agricultural lands. Our study investigates changes of gaseous emissions through manure drying and rewetting processes to identify the effects of climatic conditions and manure management on gaseous emissions. We carried out drying and rewetting processes of dairy manure in a greenhouse to maintain moderate wintertime temperatures (20 - 40 C) while monitoring gaseous emissions through these processes. Closed dynamic chambers (CDC) coupled with a multiplexed Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer provided gas flux estimates. The analyzer was capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. Magnitude of dairy manure gas emissions resulting from variations in moisture and temperature provide insight toward enhancing manure management decisions. Results from our study should further understanding of manure gas emission temporal dynamics that are largely dictated by heat and by drying and rewetting processes that impact the generation and delivery of gasses to the atmosphere. Our overall goal is to advance development of appropriate best management practices to reduce gas emissions for dairy operations in semi-arid regions.

Purpose
The objective of this project is to identify the effects of climatic conditions and manure management on gaseous emissions. The results from our study will be used to advance development of appropriate best management practices to reduce gas emissions for dairy operations in semi-arid regions.

What Did We Do?
We investigated changes in gaseous emissions by carrying out drying and rewetting processes of dairy manure in a greenhouse to maintain moderate summertime temperatures (20 - 40 oC) while monitoring gaseous emissions. Closed dynamic chambers (CDC) coupled with a multiplexed Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer provided gas flux estimates. The analyzer was capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. Gas emissions from two dairy manure samples were monitored to compare the magnitude of gas fluxes during 14 days of manure drying and rewetting processes.

What Have We Learned?
An increase in surface water content occurring after a rewetting event (e.g., simulated 5 mm of rain) represents an abrupt increase in manure moisture content, which can promote microbial activity and a commensurate increase in gas emissions from manure. In our study, we found gas fluxes were actually suppressed during and shortly after the rewetting process, mainly due to reduction in air-filled pore space causing reduced gas diffusivity in the manure crust layer. As the wet layer dried, gas emissions eventually increased to levels prior to wetting.

Future Plans
Future experiments include: (1) simulation of manure drying-rewetting with various amount of water and rewetting times, (2) considering the immediate response time and effective period of the pulse response of the gas fluxes after rewetting which might have been missed in our study, (3) Further investigation of the effect of the crust layer on water and gas transport from and into manure.

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Physical Development in Child Care

Physical development is an important area of child development that includes children's physical growth, as well as their increasing ability to control the muscles of their bodies. Children's physical development follows a predictable pattern, but each child grows at his or her own rate. Active play helps children develop their motor skills. Child care programs can support children's physical development by providing safe surroundings, good nutrition and plenty of time for active play and exploration.

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The Name Game: Sending the Right Message

Why do restaurants use appealing descriptive adjectives like “succulent” or “fresh” on their menus? Because it makes dishes sound more appealing and can even make us enjoy our meal more! This very same low- cost technique can also be used to make healthy foods in school meals more appealing to students. In this webinar, David Just, PhD, Behavioral Economist and Co-Director of the Cornell Center for Behavioral Economics in Child Nutrition Programs (BEN Center) and Smarter Lunchrooms Movement, shares the psychology behind why increasing appeal increases selection and consumption of healthy foods. He also shares some practical advice and best practices based on real-world challenges and successes.

Learning Objectives

Understanding of the psychology and evidence behind renaming and increasing the appeal of healthy dishes to increase selection and consumption Best practices for making healthy foods more appealing in the lunchroom

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Ways to Encourage Self-Help Skills in Children

Children have a drive to be independent and do things on their own. This is a healthy part of normal child development. As children grow, they learn to do more and more tasks. Child care providers can help young children become independent by allowing and encouraging them to take responsibility for themselves whenever possible. It can be faster and less messy to do things for children, but they learn so much from doing things for themselves. When children practice self-help skills such as feeding and dressing themselves, they practice their large and small motor skills, gain confidence in their ability to try new things and build their self-esteem and pride in their independence. There are four main types of self-help skills: Self-feeding. The best way to build independent feeding skills is to learn the normal developmental stages of self-feeding. Encourage children to practice feeding themselves from infancy on. Begin by offering older infants finger foods. Introduce a spoon and fork and give children plenty of time to practice. Let children be as independent as possible during mealtimes. Give them the tools they need to be successful. Consider bowls that attach to the table, child-sized utensils and small cups with handles and spouts (such as measuring cups) for pouring. Encourage children to try for themselves but provide help and encouragement when needed so they don't get frustrated. Independent dressing and grooming. Encourage children to dress and groom by themselves; just provide minimal assistance. Begin with older infants and toddlers by encouraging them to help pull socks on and off, pull up pants after diapering and help put their arms through sleeves. As children get older, encourage them to dress themselves but help with challenging steps such as zipping and buttoning. Hygiene and toileting . Look for signs of readiness for toileting. Encourage children learning to use the toilet to climb on and off the toilet seat, pull clothing up and down, and wash their hands independently. Also teach children how to brush their teeth after lunch and snacks. Be ready to provide support and help if they need it. You can find more suggestions at Keeping Children's Teeth Clean in Child Care and Hand Washing in Child Care. Encouraging children to take care of everyday hygiene routines and to use the toilet independently helps them learn how to become more independent and self-sufficient, and frees up your time to help children with other activities. Helping with daily chores like table setting and picking up toys. Encourage children to help with clean-up early on. Give toddlers responsibility for placing napkins or utensils on the table. Encourage children to begin clearing their own plates when they are old enough to carry them without dropping them. When children are involved in regular chores starting before the age of 4, they tend to be more independent in early adulthood than children without the experience of helping out. Self-help skills are worth the time and effort in a child care program. The secret to success is to give children age-appropriate experiences and provide the appropriate supports to help children be successful. Child care providers can offer opportunities for children to develop self-help skills and give them ample time to work on these important tasks. Remember that adults are important role models. We model self-help skills; children learn a great deal from watching us.

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Not interested at all — Very interested

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What is the difference between power and authority in an organization?

Power and authority are separate but related concepts. A manager in an organization has authority if he or she has the right to direct the activities of others and expect them to respond with appropriate actions to attain organizational purposes. Authority most often comes from the duties and responsibilities delegated to a position holder in a bureaucratic structure. A company president can order a product design change, for instance, or a police officer has the authority to arrest an offender of the law. Power is the possession of authority, control, or influence by which a person influences the actions of others, either by direct authority or by some other, more intangible means. A prime source of power is the possession of knowledge. A person with knowledge is oftentimes able to use that knowledge to directly or indirectly influence the actions of others. The authority of knowledge is often independent of levels or positions. Power can reinforce authority, and authority is one of the primary sources of power.

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What is a "process observer"?

A "process observer" is a position that some boards and committees choose to appoint. This individual's responsibility is exactly what the title suggests – to observe the process. Throughout the meeting, the process observer takes note of things that are handled well and those when the process did not work as well. In normal circumstances, the process observer has a few minutes at the end of the meeting to summarize the behavior of the group so that the group can learn and, if needed, improve its functioning. This is not a summary of the meeting itself, only the process. Some examples of what might be shared are: How well discussion flowed and the extent to which all participants were engaged and contributing. Any conflicts that were left unaddressed. Any side conversations or other distractions. The emotional tone of the meeting: Was it tense, supportive, etc.? Was the agenda followed? Were participants well prepared? Were comments appropriate and thoughtful? When summarizing the meeting process to the group, it can be useful for the comments to be appropriate for the general dynamics of the meeting, meeting design and management, and/or the group's developmental stage rather than targeting any one individual or group of individuals. The process observer should be selected at the beginning of the meeting, although it should not fall to the facilitator or the recorder (minute taker). It is a position that should be rotated among group members with a different observer at each meeting. The goal of having a process observer is to help keep the group's meetings functioning well and encourage group members to share responsibility for the tone and productivity of the meeting. It may be helpful for the group to have a handout or checklist for the process observer to use, particularly if this role is new to some group members. A sample template is available at New Directions Consulting.

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Cataloging and Evaluating Dairy Manure Treatment Technologies

Purpose

To provide a forum for the introduction and evaluation of technologies that can treat dairy manure to the dairy farming community and the vendors that provide these technologies.

What Did We Do?

Newtrient has developed an on-line catalog of technologies that includes information on over 150 technologies and the companies that produce them as well as the Newtrient 9-Point scoring system and specific comments on each technology by the Newtrient Technology Advancement Team.

What Have We Learned?

Our interaction with both dairy farmers and technology vendors has taught us that there is a need for accurate information on the technologies that exist, where they are used, where are they effective and how they can help the modern dairy farm address serious issues in an economical and environmentally sustainable way.

Future Plans

Future plans include expansion of the catalog to include the impact of the technology types on key environmental areas and expansion to make the application of the technologies on-farm easier to conceptualize.

Corresponding author name, title, affiliation

Mark Stoermann & Newtrient Technology Advancement Team

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What does vegetation index mean in remote sensing technology?

A vegetation index (also called a vegetative index) is a single number that quantifies vegetation biomass and/or plant vigor for each pixel in a remote sensing image. The index is computed using several spectral bands that are sensitive to plant biomass and vigor. The most common vegetation index is the normalized difference vegetation index (NDVI). NDVI compares the reflectance values of the red and near-infrared regions of the electromagnetic spectrum using the following formula: NDVI=NIR-RED/NIR+RED NIR is the pixel's reflectence value in the near-infrared band RED is the pixel's reflectence value in the red band The NDVI value, which ranges from -1.0 to 1.0 for each pixel in an image, helps identify areas of varying levels of plant biomass/vigor. Higher values indicate high biomass/high vigor.

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Nutrient Recovery Membrane Technology: Pilot-Scale Evaluation

Purpose

Animal manure contains nutrients and organic matter that are valuable to crop production. Applying manure to nearby fields can be a significant source of environmental contamination, however, if managed incorrectly. In many cases, concentrated animal production facilities are not close enough to sufficient cropland to fully utilize these resources and management of manure becomes more of a disposal issue rather than a utilization opportunity. One potential solution is to remove and concentrate manure nutrients so they can be cost effectively transported longer distances to cropland that is lacking in nutrients. The objective of this work was to design and test a pilot-scale system to implement a hydrophobic, gas-permeable, ePTFE (a synthetic fluoropolymer) membrane (U.S. patent held by USDA) to recover ammonia from swine wastewater in a solution of sulfuric acid. The pilot-scale system was designed to replicate the laboratory results and to determine critical operational controls that will assist in design of farm-scale systems.

What did we do?

Through a series of preliminary experiments, we established operational criteria and selected a membrane with an inside diameter of 0.16 in., wall thickness of 0.023 in., and a density of 0.016 lb in-3. A test system was developed with 19 membrane tubes within a 2.01-inch diameter, 24.7-inch-long reactor, giving a membrane density of 3.83 sq. in. per cubic inch of reactor volume. Wastewater first passed through a CO2 stripping column (4.016 in. diameter, 55 in. length) where a small air stream (0.0614 cfm) stripped CO2 from the wastewater and raised the pH one full unit, shifting the equilibrium to NH3 and enhancing transport across the membrane. Batch tests (0.706 ft3) were run for 9-12 days with wastewater recirculating at a rate of 0.16 gpm. The recovery fluid inside the tubular membranes was a 0.01 N sulfuric acid solution with the pH automatically maintained below 4.0 standard units and recirculating at a rate of 1/100th the wastewater flow rate. Freshly collected settled wastewater and anaerobic digester effluent were tested to determine the mass of ammonia collected, the acid required to maintain the low pH of the recovery solution, and potential ammonia losses to the atmosphere.

What have we learned?

The freshly collected wastewater had an initial mass of 35.6 g nitrogen but the NH3 was only 14.5 g, leading to a recovery of 11.8 g (33% of initial content) over 12 days. The anaerobic digester effluent had an initial mass of 33.2 g nitrogen with an NH3 mass of 31.3 g. The higher fraction of ammonia helped push the recovery to 25.7 g or 77% of the initial nitrogen content. Very little ammonia was lost with the exhaust air.

Future Plans

An optimized membrane reactor could be a viable tool in ammonia nitrogen recovery from a manure treatment system if used in conjunction with digestion. Higher economic value could be generated by further concentrating the ammonium sulfate product.

Corresponding author, title, and affiliation

John J. Classen, Associate Professor, Biological & Agricultural Engineering, NCSU

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What is technology?

Technology is a broad concept that refers to use and knowledge of tools and crafts, and how these tools and crafts affect our ability to control and adapt to the environment. In human society today, technology is a result of science and engineering. A specific definition for the word "technology" is difficult to determine, because "technology" can refer to material objects of use to humanity, such as machines, hardware or utensils, but can also encompass broader themes, including systems, methods of organization, and techniques. The term can also either be applied generally or to specific areas: examples include "construction technology", "medical technology", or "state-of-the-art technology".

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Treatment Technologies for Livestock and Poultry Manure

Historically animal manures have been handled as a solid and were either deposited directly to pasture by the animals or collected along with the bedding used in the animal shelter and applied to land as a crop nutrient. As the number of animals on farms has increased the need for more efficient methods of manure management has also developed. The emphasis of the resources on these web pages are to provide an overview of manure treatment technologies, research being done in this field, and highlight the considerations involved in selecting candidates for a particular farm.

Why Treat Manure?

Manure from animals is a very wet, bulky material, containing as much as 90% water. Of the 10% that is dry matter, much of it is carbon. The manure handling system can impact the characteristics of the animal waste stream. Water-based waste management systems may have a liquid stream with greater than 98% moisture while manure scraped from open lots can contain a very high percentage of soil. As a result, the plant nutrient content of the manure is a very small portion of the weight/volume. Hauling nutrients to cropland in the form of manure can get very expensive compared to hauling the same amount of nitrogen or phosphorus in the form of commercial fertilizer. Swine production facility with anaerobic lagoon, adjacent cropland is used for waste utilization. Correcting the imbalance in manure nutrient distribution will involve finding ways to economically move excess nutrients off the livestock or poultry farm. Many alternatives to land application of raw manure are being examined. Many of these "manure treatment technologies" have been used in one form or another for many years, while others are recent solutions. Often, technologies are used in combination to create a system that can be tailored to the species, management of the farm, climate, or other factors. Technology that may be very successful on one farm may not be appropriate for another.

Manure Treatment Technology is Not "One Size Fits All"

Treatment technologies are generally selected to meet specific treatment goals on the farm. These treatment goals include nutrient reduction (primarily nitrogen and phosphorus), odor reduction, volume reduction, energy recovery, and adding value to the manure. Manure treatment technologies are often linked together to address several challenges faced by animal producers such as excessive nutrient on farm, manure runoff and odor. There may be additional benefits to manure treatment technologies beyond the primary treatment goals such as the reduction of emissions of particulate matter or greenhouse gases.

Manure Treatment Goals and Potential Treatment Technologies

Nitrogen Reduction Phosphorus Reduction Odor Reduction Energy Recovery Adding Value to Manure Aerobic Treatment Vegetative Treatment Systems Manure Additives Vegetative Treatment Systems Solids Separation Manure Additives Aerobic Treatment Covers Anaerobic Digestion Anaerobic Digestion Thermal Technologies (Gasification, Combustion, Pyrolysis) Agronomic & Environmental Uses of Biochar (Part 1 | Part 2) Composting Vermicomposting

Recommended Reading About Manure Treatment Technologies

Livestock and Poultry Environmental Stewardship (LPES) Curriculum Lesson 25: Manure Treatment Options Heartland Regional Water Quality Initiative Alternative Technologies resources. The Heartland Region (EPA Region 7) consists of Iowa, Kansas, Missouri and Nebraska. This website includes many resources from this region as well as others from across the nation. Development of Environmentally Superior Technologies (Smithfield Agreement)

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What is mobile GIS?

Mobile GIS is taking Geographic Information Systems (GIS) out of the office and into the field. A mobile GIS allows folks out in the field to capture, store, update, manipulate, analyze, and display geospatial data and information. Mobile GIS integrates one or more of the following technologies: * mobile devices (such as a PDA, tablet, or laptop computer, and in some countries mobile phones) * Geographic Information System (GIS) software * the Global Positioning System (GPS) * wireless communications for Internet-based GIS access. For most applications, it is an extension of desktop GIS, although increasingly users are taking mobile GIS data and uploading it directly to powerful visualization tools online such as Google Earth. Mobile GIS can allow for edits and changes to be made in the field, increasing accuracy and saving time. Many mobile GIS systems are relatively inexpensive.

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Manure Management Technology Selection Guidance

Purpose

Manure is an inevitable by-product of livestock production. Traditionally, manure has been land applied for the nutrient value in crop production and improved soil quality.With livestock operations getting larger and, in many cases, concentrating in certain areas of the country, it is becoming more difficult to balance manure applications to plant uptake needs. In many places, this imbalance has led to over-application of nutrients with increased potential for surface water, ground water and air quality impairments. No two livestock operations are identical and manure management technologies are generally quite expensive, so it is important to choose the right technology for a specific livestock operation. Information is provided to assist planners and landowners in selecting the right technology to appropriately address the associated manure management concerns.

What did we do?

As with developing a good conservation plan, knowledge of manure management technologies can help landowners and operators best address resource concerns related to animal manure management. There are so many things to consider when looking at selecting various manure treatment technologies to make sure that it will function properly within an operation. From a technology standpoint, users must understand the different applications related to physical, chemical, and biological unit processes which can greatly assist an operator in choosing the most appropriate technology. By having a good understanding of the advantages and disadvantages of these technologies, better decisions can be made to address the manure-related resource concerns and help landowners: • Install conservation practices to address and avoid soil erosion, water and air quality issues. • In the use of innovative technologies that will reduce excess manure volume and nutrients and provide value-added products. • In the use of cover crops and rotational cropping systems to uptake nutrients at a rate more closely related to those from applied animal manures. • In the use of local manure to provide nutrients for locally grown crops and, when possible, discourage the importation of externally produced feed products. • When excess manure can no longer be applied to local land, to select options that make feasible the transport of manure nutrients to regions where nutrients are needed. • Better understand the benefits and limitations of the various manure management technologies. Complete-Mix Anaerobic Digester - option to reduce odors and pathogens; potential energy production Gasification (pyrolysis) system - for reduced odors; pathogen destruction; volume reduction; potential energy production. Windrow composting - reduce pathogens; volume reduction Centrifuge separation system - multiple material streams; potential nutrient partitioning.

What have we learned?

• There are several options for addressing manure distribution and application management issues. There is no silver bullet. • Each livestock operation will need to be evaluated separately, because there is no single alternative which will address all manure management issues and concerns. • Option selections are dependent on a number of factors such as: landowner objectives, manure consistency, land availability, nutrient loads, and available markets. • Several alternatives may need to be combined to meet the desired outcome. • Soil erosion, water and air quality concerns also need to be addressed when dealing with manure management issues. • Most options require significant financial investment.

Future Plans

Work with technology providers and others to further evaluate technologies and update information as necessary. Incorporate findings into NRCS handbooks and fact sheets for use by staff and landowners in selecting the best technology for particular livestock operations.

Corresponding author, title, and affiliation

Jeffrey P. Porter, P.E.; National Animal Manure and Nutrient Management Team Leader USDA-Natural Resources Conservation Service

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Assistive Technology Resources

Military Specific

Limb loss – An article in the Journal of Rehabilitation Research & Development provides examples of the resources available to service members including what each organization provides along with contact information. Computer/Electronic Accommodations Program (CAP) – Provides assistive technology and accommodations to individuals with disabilities and wounded service members so they can be employed in the federal government. Brainline Military – Provides military-specific information and assistive technology resources on traumatic brain injury (TBI) for service members. National Resource Directory – Provides a searchable database of government, national, and state assistive technologies and devices. In the box labeled "search for resources," type in assistive technology or the name of a specific technology, device, or disability, and a list of possible resources will be generated. Military In-Step – Detailed information for service members who have a military amputation on the unique characteristics of war injuries requiring an amputation, what to expect during surgery and rehabilitation, care after surgery, and the prosthesis.

National/State Specific

AbleData – A searchable database of over 40,000 assistive technology products including objective descriptions plus educational fact sheets on assistive technologies and products by state. Alliance for Technology Access (http://www.ataccess.org/) – A national and international network of technology resource centers, community-based organizations, agencies, individuals, and companies with a mission of increasing the use of technology by children and adults with disabilities and functional limitations so they can participate fully in their communities. Assistive Technology Industry Association (ATIA) – A professional organization of agencies that provide assistive technologies. It provides links to resources and partners that can provide specific information on different types of technology or devices. Brain Injury Association of America – A national organization that promotes awareness, education, treatment, research, and advocacy for individuals and their families who have some type of brain injury. DisabilityInfo.gov – A government website that links to federal, state, and local government agencies; academic institutions; and nonprofit organizations with disability programs and services in communities nationwide. National AgrAbility Project – Provides direct support to farmers and ranchers with disabilities or long-term health conditions that make it difficult to work in production agriculture. The project also has a searchable database of assistive technology solution for producers with disabilities. Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) – A professional organization dedicated to promoting the health and well-being of people with disabilities through increasing access to technology solutions. The organization provides a listing of state contacts at http://www.findatnow.org. Technology for Long-Term Care – A helpful site to explore and compare various adaptive products. It was designed for older adults but has helpful information regardless of the individual's age.

Educational

LiveAbility House – A demonstration home in the Second Life® environment that shows individuals with disabilities how different design principles and assistive technology devices can enable them to live independently in their own homes. eXtension – A website with many educational resources designed for family caregivers; provides a link to a military-specific caregiver page. Assistive Technology and You – An article that provides a brief discussion of what assistive technologies are, where to find them, and how to pay for them. Assistive Technology fact sheet by the Family Caregiver Alliance – Written for older adults but provides ideas on low cost assistive devices that can be helpful for everyday tasks.

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Introduction to School IPM

Providing safe and healthy school environments is a high-priority for communities everywhere. Schools are considered to be sensitive environments, in which effective pest management is an essential and critically important responsibility. Students spend a major part of their day at school and the environmental standards set, have profound impacts on their health and academic success. As with any high-traffic, built environment, schools face pest and pest management challenges that impact their proper functioning. Integrated Pest Management or IPM is a strategy that ensures safe, cost-effective and sustainable pest management, reducing risks associated with pests and their management. Everyone in a school community plays a role in IPM because common human habits may create pest-conducive conditions. This IPM introductory module explains the most important simple IPM concepts and helps to increase awareness of how our everyday choices affect pest populations around us. This module will help learners to gain a basic understanding of IPM principles, which will be essential as they progress to more role-specific modules. On successful completion of this course, you will be eligible for a Certificate of Completion. This 90-minute module covers: IPM as a concept, the key elements of IPM and how IPM reduces risk. Learners will also understand the benefits of practicing IPM and how members of the school community all have IPM roles and responsibilities. Learners will understand how to perform the basic steps in an IPM program, such as pest monitoring, inspection, reporting, identifying conducive conditions and avenues of pest entry. Key pest groups and the signs of infestation will also be covered in this lesson. Presentations to Help You Teach Is this a topic that you would like to teach in a classroom setting? These presentations provide talking points in the slide notes and keep the slides concise. You can customize the PowerPoint versions to fit your needs.

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Tips for Teens: How to Contribute to Family Needs During Tough Times

If your family is going through tough times financially, consider ways you can contribute. Asking your parent(s) to talk with you the family budget and being willing to take some action to help is the first step to gaining respect and to demonstrate responsibility as a family member.

Cost? savings things that you can do to help with family expenditures are: • Turn off lights, televisions, or other electronics when not in use. • Take shorter showers to cut down on water and electric bills. • Don't stand with the refrigerator door open while deciding what to eat. • Investigate cost of cable/phone/computer usage and newspaper delivery. Help figure out your family's real needs versus wants for these services, then talk about ways to meet them. For example, could you use the public library online services for homework? Do you need a daily newspaper deliverd to the house? • Hang up your clothes after wearing so they wear longer and need less frequent washing and care. • Volunteer to help with family chores in lieu of paying for services like cleaning, lawn care, take?out food, or childcare. If you have a job, you might offer or be expected to help cover some of your expenses, especially for "wants." This could include a new pair of shoes or a night at the movies with friends.

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Cooking with Kids: Opportunities for Partnerships

From learning lifelong skills to improving diet to fostering a sense of responsibility and accomplishment, the benefits of cooking with children are well-established. While parents are encouraged to find ways to involve their children in meal preparation at home, many schools are incorporating cooking activities into their health, science and math curricula as a way to promote healthy eating. There are several resources available to schools interested in incorporating cooking into school days or afterschool programming. Cooperative Extension and Cooking Matters may be great places to start. Cooking Matters is a Share Our Strength program founded in 1993 and is part of the No Kid Hungry campaign, which is working to end childhood hunger in America. Through cooking classes and interactive grocery store tours, Cooking Matters partners teach families how to make the most of the food budget so that families prepare affordable, nutritious meals. Cooking Matters uses a collaborative model designed to enhance the effectiveness and sustainability of the cooking classes. Educational materials, training, evaluation, and national leadership are provided by Share Our Strength. Local partners, such as Cooperative Extension, deliver the program to meet the needs of their communities. Cooking Matters partners may already exist in your area! Cooperative Extension agencies in many states across the nation have thriving partnerships with Cooking Matters. Likewise, Cooperative Extension is an excellent resource and is well positioned to help bridge the gap between home and school and increase the impact of nutrition education by providing the same messages to children at school as is given to the parents and adults. Cooperative Extension educators may be able to come directly to classrooms and/or afterschool programs to provide nutrition lessons, food demonstrations, cooking opportunities, and tasting experiences. Cooperative Extension programs like SNAP-Education, Expanded Food Nutrition Education, and 4-H use research-based curricula for different age groups and grade levels. The lessons are interactive, connected to many of the common core and state standards, and fun!

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How should child care providers handle toileting accidents in young children?

In general, toileting accidents in the child care setting should be handled casually. Children who have learned to use the toilet may feel embarrassed if they wet their pants. Shaming or scolding the child will only make him more uncomfortable. Here are some quick tips for handling toileting accidents in the child care setting: Help the child change clothes. If the child is old enough to dress himself independently, have him take responsibility for changing his own clothes. Seal the soiled clothes in a plastic bag, and send them home with parents to wash. Remind the child that he is not wearing a diaper and needs to use the toilet. Encourage the child to tell you when he needs to go. Toilet learning is challenging for young children because it requires both the motor skills to control the bladder and bowels and the cognitive skills to understand and act on the urge to go. Help the child avoid accidents by reminding him to use the toilet every few hours. Many young children just learning to use the toilet may not recognize the need to go until it's too late. If a child who was once using the toilet regularly begins having frequent accidents, talk with the parents to find out if something unusual is happening in the child's life. Loss of bowel and bladder control is sometimes a sign of stress in young children. Work with the parents to find ways to help the child cope with the stress.

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Benefits of Growing Your Own Fruits and Vegetables

Benefits for you and your family:

Fresh and nutritious fruits and vegetables. Fruits and vegetables from your own garden are higher in nutrients than the ones that have traveled several thousands miles to get to your grocery store. Having your children assist you in the garden can increase the chance that they will eat more of the fruits and vegetables they have helped to grow. Growing your own fruits and vegetables can offer you the opportunity to reduce the amount of pesticides that you use in your garden, making them healthier. Growing your own fruits and vegetables will save your money at the grocery store. Gardening increases physical activity. It is a great way to engage the whole family in physical activity and lets them help to take responsibility for the garden. The fruits and vegetables grown in your garden will promote health because they are rich in nutrients, especially in phytochemicals, anti-oxidants, vitamin C, vitamin A and folate. Gardening gives you're a real sense of appreciation when you can see the bounty of your efforts. Growing a garden gives you a new appreciation for nature, when you can have the opportunity to see how things grow. Gardening may stimulate many new interests. You may want to learn more about botany, landscape architecture, photography, nutrition, and farmer's markets. Gardening gives you the opportunity to give back. If you have an abundant garden, you might give some of your produce to the local soup kitchen or food bank. This can be a great time to create memories with your children, memories that can last a lifetime. Your garden can lead to new skills, and knowledge for you and your family, your child may have a new found interest to become a chef!

Society and Community

Gardens can foster a great sense of community through parent to parent connections, teacher to student or student to student. Schools and community may decide to build a community or school garden. This is a tremendous learning tool for all involved as well a providing a source of nutritious fruits and vegetables. A community/school garden can help to foster and motivate future leaders (e.g., 4-H afterschool programs). Neighborhood Community Gardens beautify landscape, support local farmers, can create a food secure community where residents do not need to rely on vendors to supply fresh produce.

Environment

Tall fruit trees provide shade. You can use less pesticides or use natural pesticides and this will be less contamination to the environment. Produce peels and waste can create a lot of green waste and takes up a lot of space in the garbage can. Recycle them to make your own compost. It is less expensive than buying fertilizers. Turn unsightly lands into attractive landscapes. Get creative. There is a potential to grow an innovative gardens like futuristic horticulture gardens that are very cost-effective and require substantially less space. Start exploring today!!!

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Why is confidentiality so important in child care programs?

Child care programs routinely handle confidential information about enrolled children, families, and staff. Child care programs maintain confidentiality on a "need to know" basis. This information is shared only when it is necessary. This is important especially when there are specific health and safety concerns. Maintaining confidentiality also builds trust in child care programs. Fostering relationships with staff, children, and families is built on trust. When managing sensitive information, there is an ethical and legal responsibility to protect the privacy of individuals and families.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

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Not interested at all — Very interested

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Consumer Preferences for Car Loan Features

Brief Description: This work studied consumer preferences for car loan features. The results revealed preferences that conflicted with traditional financial rationality. For example, participants avoided choosing long term (six- or seven-year) loans even when the interest rate was zero. In addition, the consumers, particularly those with less education, appeared to focus predominately on the first digit of monthly payments. A $395 car payment, for example, would be viewed as much better than a $400 payment, but a $390 payment would not be viewed as much better than a $395 payment.

Implications: Policies, programs and personal efforts to increase financial education are warranted, and consumers should be encouraged to compare interest rates on their sources and uses of funds. Some irrational preferences, however, may reflect psychological phenomena that are impervious to education. Availability of alternative means of self-control is important to the extent that aversion to long-term loans is a method of restraining personal spending.

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Caring for Those with Severe Burns

Did you know that, according to Journal of Critical Care Medicine, burn injuries account for 5 percent to 10 percent of combat casualties? During military operations, burn injuries are usually caused by explosive device detonations or refueling operations. Such burn injuries can be accompanied by severe complications, including shock, infection, electrolyte imbalance, and respiratory distress. As a caregiver to a wounded warrior, you need to understand the recovery process and steps to take in the immediate aftermath of military burn injuries.

The recovery process

During the recovery process, a team of burn professionals, consisting of plastic surgeons, burn team nurses, counselors, social workers, and psychologists, helps your wounded warrior, you, and other family members. According to British Medical Journal, the recovery of burn patients is a continual process that comprises three stages—the resuscitative or critical stage, the acute stage, and long-term rehabilitation. Resuscitative or critical stage In this beginning stage of recovery, physical survival is the primary goal. Your wounded warrior may experience challenges, such as sleep disturbance, confusion, disorientation, and pain. Treatment may involve pain medication, suggestions for coping strategies, education, and support services. Acute stage Your wounded warrior may become more aware and alert and have greater awareness of his or her physical appearance and the psychological impact of the injuries. During this stage, symptoms of depression and anxiety may take effect. Options for treatment may include drug management (for example, depression and sleep medications), counseling, and relaxation techniques. Long-term rehabilitation: Reintegration is key during long-term rehabilitation. This stage begins when your wounded warrior is discharged from the hospital. He or she may experience the hassles and reality of daily activities, changes in body image, and the constant role of rehabilitation in his or her life. Treatment may consist of social skills training, peer counseling, vocational counseling, and support group participation. T

ypes of burns

Burns are categorized by degree of severity. First degree This type of burn is rarely serious and may heal by itself within days. These burns usually occur as a result of exposure to sun (sunburn) or hot liquids. Second degree Second degree burns require longer periods to heal and may result in permanent scarring. They can result from exposure to hot or scalding fluids or from flash or flame injuries. Third degree This type of burn may require skin grafting, a surgical procedure in which a partial segment of noninjured skin from the patient's body (referred to as the "donor site") is grafted to the burn area. Fourth degree Fourth degree burns can affect all layers of the skin as well as structures below the skin. They may result in permanent disability and require extensive rehabilitation.

Strategies for helping and coping

It's important to learn how to help your wounded warrior and yourself respond to your situation. Always check with your wounded warrior's doctors to learn about individualized treatment plans. Learn how to minimize and prevent negative effects of prolonged bed rest, including debilitation and loss of muscle tone, strength, and condition. Learn how to help your wounded warrior adapt to the environment and/or to equipment for enhanced independence. Anticipate the need to apply skin lotion to prevent your wounded warrior from becoming too dry. Control and prevent the formation of scars by applying pressure garments (garments worn after a burn to control scarring). Maximize wounded warrior and family education. Join a support group for caregivers who are experiencing similar wounded warrior situations. Locate such groups by contacting your local Army installation's Soldier and Family Assistance Center (SFAC).

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Production Agriculture and Stress

Farming and ranching can be stressful occupations, and that stress can have a multifaceted effect on a person. There are numerous uncontrollable factors, such as unpredictable weather, untimely equipment breakdowns, time constraints, and financial markets, that cause stress in the lives of farm families. Stress is a physical response to perceived life-threatening events. In an evolutionary sense, it allows us to determine whether we should stop and fight or flee from an external threat. Our brains do not recognize the difference between psychological or physical threats, and therefore our bodies respond in the same fashion to something we perceive as negative, overwhelming, or threatening, irrespective of the real risk to physical well-being. Each person reacts differently to stress, but some common symptoms of chronic stress include changes in a person's sleep patterns, fluctuation in a person's weight, fatigue, restlessness, and physical health conditions such as headaches, ulcers, or high blood pressure. Besides the physical effects, stress can also hinder interpersonal relationships at work and home. Chronic and uncontrolled stress can be detrimental to your health and interpersonal relationships. It might not be possible to get rid of the things causing stress in your life, but there are things you can do to help manage the stress. The following are some simple ways that a person can decrease stress: Exercise: Many farmers feel that the physical labor that they do on the farm is enough, but having a regular exercise or stretching program provides a break in your daily routine, benefits your overall health, and provides a constructive way to relieve excess energy. Strive to exercise three times per week for a minimum of 30 minutes. Caffeine: Reduce or eliminate caffeine from your diet. By eliminating this stimulant, a person may have reduced headaches, increased relaxation, improved sleep, a calmer mood—and, counterintuitively, more energy. Humor: The old adage "laughter is the best medicine" isn't inaccurate—laughter might help to reduce your stress, so explore ways (social groups, books, and so on) to add some laughter to your life. Talking: Having a strong network of friends and family can help provide necessary support during stressful times. Make sure that you have a couple of people to whom you can vent your problems to help reduce built up stress. Relaxation Techniques: There are simple relaxation techniques that can help you clear your mind and reduce tension. Techniques include deep breathing and taking mini-breaks during the day. Sleep: If you are not getting enough sleep at night to be refreshed in the morning and energetic enough for the day, then you may need to consider a midday power nap. Nutrition: Make sure that you are eating balanced meals throughout the day. Breaks: Take some time from the stressful situation by going for a walk, spending some time alone, working on a hobby, meditating, and so on.

Getting Help

There are times when things get too difficult, and you might need professional help. Professional help can include your family physician or health care provider, a mental health professional, or a support group. Listed below are some signs that indicate that you should seek professional help: Depression Changed sleeping patterns Abusive behavior Suicidal thoughts Hallucinations Consideration of changes in your marital status Inability to express positive feelings Excessive alcohol intake Feelings of guilt, isolation, panic, or being overwhelmed

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Tell Me When! How Bowl Size Impacts the Amount Children Request and Eat

The effect of plate and bowl sizes on portion size and calorie consumption by adults and children is well documented in literature. Larger the dish the more food you or the server is likely to put on it. But how much of a difference are we really talking about?

What we know about portion size from previous studies:

Adults and children serve themselves portions that are relative to the size of the plate partially because of the Delboeuf illusion that makes a standard portion size look smaller on a large plate and bigger on a small plate. People tend to scoop more food onto bigger plates without realizing it (4,5,6). Larger serving dishes and utensils also influence us to take more food (3). Even food and nutrition experts who are aware of proper portion sizes are susceptible to big bowl illusions (1)! A 2013 study from the Cornell Food and Brand Lab helps to give perspective on the extent to which size of a cereal bowl impacts how much cereal children request and how much they consume. The study sought to answer two questions: Does bowl size affect the amount of cereal requested among children and does larger portion size translate into higher consumption and waste?

What this study found:

To determine the effect of bowl size on amount of cereal requested, consumed, and wasted by children two studies were conducted. In the first study, 69 preschool aged children were randomly given either an 8 or 16 ounce bowl and asked to tell servers when the bowl contained the amount of cereal that they wanted for a morning snack. The bowls were measured and researchers found that in alignment with previous findings that children: Requested about twice as much cereal in the larger bowls than smaller bowls. The second two day study looked at consumption and waste. Eighteen school-aged children were randomly given either a small (8oz) or large (16 oz) bowl at breakfast one day and the opposite size the following day. As in the other study, participants were asked to notify servers when they received the amount of cereal that they desired. These slightly older children also requested over twice as much cereal in the larger bowls. Regardless of gender or BMI these children: Consumed 42% more cereal from the large bowl vs. the small bowl Wasted 26% more cereal when give the large bowl vs. the small bowl Children in this study were also asked to indicate what size bowl they used at home from a selection of various sized bowls to determine the average bowl size that they normally eat from at home. The average bowl size that children reported using at home held 19.2 ounces (2)! According to the Academy of Nutrition and Dietetics one serving of cereal, before adding milk should be about 1 ounce.

What we can take away from this study:

Children unintentionally request more cereal in larger bowls indicating that they use the bowl as a reference for how much food they want. To combat this bowl size trickery: Purchase smaller bowls! An eight ounce bowl will hold a full serving size of most cereals. If new bowls are not an option, measure out the cereal before putting it into the bowl to maintain portion size despite the size of the bowl. Follow these easy tips and your children may consume fewer unneeded calories and your cereal may even go farther!

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Connecting Farm to School, SNAP-Ed Nutrition Education, and Smarter Lunchrooms

Cornell Cooperative Extension (CCE) of Jefferson County, Eat Smart New York (ESNY) and Watertown City School District partnered to provide monthly nutrition lessons, food demonstrations and food tastings based on the farm to school monthly harvest produce item to nearly 2,000 students in the district. The Farm to School movement enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools. However, more than just where the food is purchased needs to be addressed in a school to make an impact on the health and nutrition of students. Constant engagement – inside and outside the cafeteria – is key to students' willingness to change their eating habits. SNAP-Ed Nutrition Education provides interactive lessons that lead to behavior change such as increased consumption of vegetables and fruits. These lessons are important to promote optimal childhood health, growth and intellectual development, which is needed for children to reach their full academic potential. The Smarter Lunchrooms Movement is dedicated to providing schools with the knowledge, motivation, and resources needed to build a lunchroom environment that makes healthy food choices the easy choice. The Movement brings evidence from the fields of economics, marketing, and psychology into the school cafeteria. Smarter Lunchrooms strategies are free or low-cost solutions that nudge students to voluntarily select the healthiest food in the lunchroom. Smarter Lunchrooms can help school nutrition services see less waste, higher participation, more satisfied students, and increased consumption of important nutrient-rich foods.[1] Combining all three programs to maximize resources and impact is a win win for all involved. In the Watertown City School District, Cornell Cooperative Extension and Eat Smart New York educators developed a schedule to provide monthly education in each of the six elementary buildings in the district. They worked with school administrators and teachers to ensure there was enough time to provide a lesson in addition to a food tasting. The lessons are fast paced, interactive and engaging. Students are learning about the how's and the why's of nutrition. The food demonstration and tasting provide an opportunity to experience foods and recipes students likely have never tried before, and allow them to decide what they like and don't like. They are encouraged to try the recipes at home with their families (and many report doing so) as well as choosing the produce items when they are available in the school cafeteria. The district's new food service director is working to incorporate the harvest of the month produce item into the school menus. Over 75% of the students indicate through surveys that they intend to increase the amount of vegetables and fruits they consume at school. To help with this, the cafeteria is implementing Smarter Lunchroom strategies such as serving both hot and cold vegetables, having vegetables at many places on the serving line, and incorporating vegetables into entrees. Additional schools in the area are recognizing the positive impacts of these program partnerships and are beginning the planning and implementation process in their own school. Contributor Amanda Root, Cornell Cooperative Extension in Jefferson County [1] Smarter Lunchrooms Movement

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Not interested at all — Very interested

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What is mechanical pest control?

Mechanical control is the management of pests by physical means such as the use of a barrier (e.g., screens or row covers), trapping, weeding or removal of the pest by hand. It may also involve changing the physical conditions in a given area, for example, changing the temperature to make an area unfavorable for pests.

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Ventilation in Housing for Small and Backyard Poultry Flocks

Ventilation is the exchange of air between the inside and outside of a poultry house. The main function of a ventilation system is to maintain adequate oxygen levels while removing carbon dioxide, moisture, dust, and odors. During summer, ventilation also is important for removing heat. To achieve an effective ventilation system for your poultry house, consider both house placement and house design.

House Placement

The location of a poultry house can have an impact on the effectiveness of its ventilation system. In northern areas where it is very cold much of the year, the house should be positioned to reduce the amount of north wind exposure. In southern areas where heat is an issue, the house should be positioned to take advantage of maximum southern prevailing winds to help provide as much natural ventilation as possible.

House Design

An effective natural ventilation system in a poultry house relies on the laws of physics to generate air movement. In particular, two important concepts are the facts that warm air rises and that warm air holds more moisture than cold air. In summer, the chimney effect causes natural ventilation to occur in a poultry house that has a ridge or eave opening in the ceiling. A constant flow of air exists if the outside temperature is cooler than the temperature at bird level inside the building. During winter, the amount of fresh air brought in should be just sufficient to allow for adequate air exchange. The incoming air enters through the roof of the building and warms as it drops toward the floor. Because the warmed air picks up moisture, the ventilation system must include a method for removing this air from the building to allow the air flow cycle to continue.

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Not interested at all — Very interested

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Geospatial Technology for Youth

Want to go on real treasure hunt? Want to know more about how maps are used to help you find where you are and where you're going? Ever get frustrated if the GPS in your phone takes you to the wrong place?
Geospatial technology is all about using maps and technological devices to design maps and locate specific points on Earth. Click below to learn how this technology works. Once you've mastered the basics, you might want to try your hand at geocaching, a treasure hunting game using satellite signals and GPS units to find the millions of hidden treasures around the world!

Which categories do you think the above article belongs to?

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Basic Math Skills in Child Care: Creating Patterns and Arranging Objects in Order

Ordering, sequencing, and patterning are important foundational skills for mathematics. Child care providers can build young children's early math skills by help them learn sequencing, seriation, and patterning. Sequencing is the ability to create and identify patterns. For example, children may stack blocks in a pattern of red, blue, red, blue, and so on. As adults, using calendars is one way we use sequencing skills. We look at a calendar and look for the pattern that helps us predict what day or month comes next. For preschoolers, sequencing means knowing which number comes next. Seriation is arranging objects in order by size, location or position. Have you ever asked children to arrange objects from smallest to largest, largest to smallest, shortest to tallest or thinnest to thickest? You've been teaching seriation. Young children who understand seriation can put numbers in order from lowest to highest, smallest to largest. Eventually, they will come to understand that 6 is higher than 5 or 20 is higher than 10. Creating Patterns Having children copy patterns or create patterns of their own (such as red, blue, red, blue, red, blue) may seem simple, but it is a great way to help children recognize order in the world and prepare for later math skills, such as multiplication. Child care providers can begin exposing young children to patterns -- long before they are ready to learn multiplication facts -- by having them make groups and count the total number of objects. For example, four groups of three objects each make a total of 12 objects (4 X 3 = 12).

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AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

REQUEST for MODIFICATION

For help, contact: **THE OFFICE OF RESEARCH COMPLIANCE (ORC)**, 115 Ramsay Hall, Auburn University
Phone: 334-844-5966 **e-mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs

Revised 2.1.2014 **Submit completed form to IRBsubmit@auburn.edu or 115 Ramsay Hall, Auburn University 36849.**

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

1. **Protocol Number:** 19-048 EX 1902
2. **Current IRB Approval Dates: From:** 02/19/2019 **To:** ----------
3. **Project Title:** Framework for user sentiment analysis to improve usability of applications for generation z and young adults

4.

Yang Cao	PhD Candidat	CSSE	3343323678	yangcao@auburn.edu
Principal Investigator	**Title**	**Department**	**Phone**	**AU E-Mail** (primary)
Yang Cao	2306 Shelby Center, Auburn AL			
PI Signature	**Mailing Address**			**Alternate E-Mail**
Cheryl D. Seals	Cheryl Seals	CSSE	3348446319	sealscd@auburn.edu
Faculty Advisor	**FA Signature**	**Department**	**Phone**	**AU E-Mail**

Name of Current Department Head: Hari Narayanan **AU E-Mail:** naraynh@auburn.edu

5. **Current External Funding Agency and Grant number:** N/A

6. **a. List any contractors, sub-contractors, other entities associated with this project:**

N/A

b. List any other IRBs associated with this project: N/A

7. **Nature of change in protocol: (Mark all that apply)**

- ☐ **Change in Key Personnel** (attach CITI forms for new personnel)
- ☐ **Change in Sites** (attach permission forms for new sites)
- ☐ **Change in methods for data storage/protection or location of data/consent documents**
- ☐ **Change in project purpose or questions**
- ☐ **Change in population or recruitment** (attach new or revised recruitment materials as needed)
- ☐ **Change in consent procedures** (attach new or revised consent documents as needed)
- ☐ **Change in data collection methods or procedures** (attach new data collection forms as needed)
- ☑ **Other (explain):** All 100 articles that will be used for information design are attached (compared to the approved 5-article-sample)

FOR ORC OFFICE USE ONLY

DATE RECEIVED IN ORC: _____ by _____
DATE OF IRB REVIEW: _____ by _____
DATE OF IRB APPROVAL: _____ by _____

MODIFICATION # _____
PROTOCOL APPROVAL CATEGORY: _____
MODIFICATION APPROVAL CATEGORY: _____
INTERVAL FOR CONTINUING REVIEW: _____

The Auburn University Institutional Review Board has approved this Document for use from 03/05/2019 to ---------- Protocol # 19-048 EX 1902

COMMENTS:

8. **Briefly list** *(numbered or bulleted)* **the activities that have occurred up to this point, particularly those that involved participants.**

The study hasn't started yet.

9. **For each item marked in Question #7, describe the requested changes to your research protocol, with an explanation and/or rationale for each.** (*Additional pages may be attached if needed to provide a complete response.)*

N/A

10. **Identify any changes in the anticipated risks and / or benefits to the participants.**

N/A

11. **Identify any changes in the safeguards or precautions that will be used to address anticipated risks.**

N/A

12. Attach a copy of all "stamped" IRB-approved documents you are currently using. *(information letters, consents, flyers, etc.)*

Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **The OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to irbsubmit@auburn.edu.

1. PROJECT IDENTIFICATION

Date 01/30/2019

a. Project Title Framework for user sentiment analysis to improve usability of applications for generation z and young adults

b. Principal Investigator Yang Cao Degree(s) PhD

Rank/Title PhD Candidate Department/School CSSE

Phone Number 3343323678 AU Email yangcao@auburn.edu

Faculty Principal Investigator (required if PI is a student) Cheryl D. Seals

Title Associate Professor Department/School CSSE

Phone Number 3348446319 AU Email sealscd@auburn.edu

Dept Head Hari Narayanan Department/School CSSE

Phone Number 3348446312 AU Email naraynh@auburn.edu

c. Project Personnel (other than PI) - Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting). Attach a table if needed for additional personnel.

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

d. Training - Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? ■ YES ☐ NO

e. Funding Source- Is this project funded by the investigator(s)? ☐ YES ■ NO
Is this project funded by AU? ☐ YES ■ NO If YES, identify source _____
Is this project funded by an external sponsor? ☐ YES ■ NO If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for the award.
Name _____ Type _____ Grant # _____

f. List other IRBs associated with this research and submit a copy of their approval and/or protocol.

2. Mark the category or categories below that describe the proposed research:

■ 1**.** Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

■ (i) Recorded information cannot readily identify the participant (directly or indirectly/linked); **OR**

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include children when investigators do not participate in activities being observed.

■ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3**.** Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions) **Mark the applicable sub-category below (I, ii, or iii).** 104(d)(3)(i)

☐ (A) Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ (B) Any disclosure of responses outside of the research would not reasonably place subject at risk; **OR**

☐ (C) Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by the IRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one of the following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information and must be publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directly or indirectly/linked; investigator does not contact subjects and will not re-identify the subjects; **OR**

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); **OR**

☐ (iv) Research information collected by or on behalf of federal government using government generated or collected information obtained for non-research activities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. **(**Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

***Limited IRB review* – the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

****Category 3 – Benign Behavioral Interventions (BBI)* must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark all applicable)

Minors (under 19)	☐ YES ■ NO
Pregnant women, fetuses, or any products of conception	☐ YES ■ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ■ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ■ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ■ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ■ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ■ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ■ NO
Deception of participants	☐ YES ■ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this research is to create a web crawling system that will be enhanced through machine learning strategies. The study participants will provide us with data that will help us to learn their preferences to model in the proposed system. This study is to investigate the effect that our proposed framework has on software usability with a system enhanced with this method. The main objective is to create framework that can be used to design usable applications and the proposed framework will be evaluated through empirical experiments.

The participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. Informed consent will be granted using the recruitment script (see attached script). Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

Phase one -- Information Design
Participants will be asked about their interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology. Then 5 - 10 articles from extension.org will be provided to participants to ask which category do they think each article belongs to, and participants' interest level (ranges 1 - 10) in this article.
Those users' preference data and articles themselves will be used to train a machine learning model, which will be applied to our experimental application.
Phase two -- Usability evaluation
Participants will be provided two Andriod applications (one benchmark, one experimental) to read articles. To collect unbiased data, the order of the application review will be assigned to survey participants in random order. Usability and satisfaction data will be collected with the Usability Evaluation Questionnaire.

The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

5. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

Participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. For this experiment, we invite participates of all genders. We will also utilize opportunistic sampling to choose participants. It will be advertised in classes to seek volunteers and we will use personal recruitment and email recruitment based on recruitment script.

6. **Does the research involve deception? ☐ YES ■ NO If YES, please provide the rationale for deception and describe the debriefing process.**

7. **Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the person would experience in daily life.**

   Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

   No this experiment will not cause any harm to the participants and they will be given the opportunity to withdraw at any time.

8. **Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.**

   Hard copy paper documents will be stored in a locked file cabinet after being entered into an Excel Spreadsheet or SQLite Database. Confidential data will not be coded in the database. Only Yang Cao (PI) and Dr. Cheryl Seals (FA) have access to participants' data.

9. **Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).**

   Data will be collected without a link of participant s data to any identifying information, recorded and analyzed as "anonymous . Participants' name won't be published.

10. Will the research involve interacting (communication or direct involvement) with participants? ☐ YES ■ NO **If YES, describe the consent process and information to be presented to subjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.**

During Phase I, the informant design, the experiment facilitators will give the participants the informed consent. There are two options to the experiment. The user can complete the survey remotely and in this case we will have no contact with the participant.

In case two, we will consent the participants and situate them in a study area were they will complete the survey. We will also perform the experiment and collect the experimental data from the experiment.

We will also use this same procedure for the Phase II systems experiment.

11. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Appendix A Recruitment Script
Yang Cao Citi training
Cheryl Seals Citi training
Phase One information design survey sample
(add new attachment)
Phase Two Usability Evaluation Pre-survey and Post-survey

Principal Investigator's Signature Yang Cao **Date** 01/30/2019

If PI is a student,
Faculty Principal Investigator's Signature Cheryl Seals **Date** 01/31/2019

Department Head's Signature N. Hari Narayanan **Date** 01/31/2019

The Auburn University Institutional Review Board has approved this document for use from 01/29/2019 to 01/28/2020. Protocol #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults

RECRUITMENT SCRIPT (verbal, in person)

You are invited to participate in a research study because you are generation z students and aged above 18. The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering. Only individuals who are at least 18 years old may participate in this study.

As a participant, you will be asked to choose your interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology, and provide opinions about articles in those categories. Your time commitment will be approximately half an hour.

There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. You will not directly benefit from being in this study. There are no costs associated with participating.

If you would like to participate in this research study, email me at yangcao@auburn.edu. If you have questions, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

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- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** History and Ethical Principles - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720860
- **Completion Date:** 06/06/2016
- **Expiration Date:** 06/06/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
History and Ethical Principles - SBE (ID: 490)	06/06/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** History and Ethical Principles - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720860
- **Report Date:** 06/06/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
History and Ethical Principles - SBE (ID: 490)	06/06/16	5/5 (100%)

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 19720852
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/06/2020
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
CITI Conflict of Interest Course - Introduction (COI-Basic) (ID: 15177)	06/06/16	No Quiz
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	06/06/16	5/5 (100%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	06/07/16	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	06/07/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Institution Unit:** CSSE
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- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 19720852
- **Report Date:** 06/07/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
CITI Conflict of Interest Course - Introduction (COI-Basic) (ID: 15177)	06/06/16	No Quiz
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	06/06/16	5/5 (100%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	06/07/16	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	06/07/16	5/5 (100%)

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research with Children - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720850
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/07/2019
- **Minimum Passing:** 80
- **Reported Score*:** 80

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Research with Children - SBE (ID: 507)	06/07/16	4/5 (80%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research with Children - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720850
- **Report Date:** 06/07/2016
- **Current Score**:** 80

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research with Children - SBE (ID: 507)	06/07/16	4/5 (80%)

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research in Public Elementary and Secondary Schools - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720849
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/07/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	06/07/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research in Public Elementary and Secondary Schools - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720849
- **Report Date:** 06/07/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	06/07/16	5/5 (100%)

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- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Cultural Competence in Research
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720859
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Cultural Competence in Research (ID: 15166)	06/08/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Course Learner Group:** Cultural Competence in Research
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720859
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Cultural Competence in Research (ID: 15166)	06/08/16	5/5 (100%)

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- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720858
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	06/08/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720858
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	06/08/16	5/5 (100%)

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- **Phone:** 3343323678

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher
- **Course Learner Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Key Personnel (including AU Faculty, Staff and Students) and Faculty Advisors involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 19720854
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID: 1127)	06/08/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	06/08/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	06/08/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	06/08/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	06/08/16	5/5 (100%)
Students in Research (ID: 1321)	06/08/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	06/08/16	5/5 (100%)

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- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher
- **Course Learner Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Key Personnel (including AU Faculty, Staff and Students) and Faculty Advisors involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 19720854
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Students in Research (ID: 1321)	06/08/16	5/5 (100%)
Belmont Report and CITI Course Introduction (ID: 1127)	06/08/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	06/08/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	06/08/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	06/08/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	06/08/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** Responsible Conduct of Research for Social and Behavioral
- **Course Learner Group:** Social, Behavioral and Education Sciences RCR
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

- **Report ID:** 19720851
- **Completion Date:** 06/14/2016
- **Expiration Date:** 06/13/2021
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Authorship (RCR-Basic) (ID: 16597)	06/13/16	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	06/13/16	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	06/13/16	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	06/13/16	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	06/13/16	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	06/13/16	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	06/14/16	5/5 (100%)
Plagiarism (RCR-Basic) (ID: 15156)	06/14/16	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	06/14/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
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- **Curriculum Group:** Responsible Conduct of Research for Social and Behavioral
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- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

- **Report ID:** 19720851
- **Report Date:** 06/14/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	06/14/16	5/5 (100%)
Plagiarism (RCR-Basic) (ID: 15156)	06/14/16	5/5 (100%)
Authorship (RCR-Basic) (ID: 16597)	06/13/16	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	06/13/16	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	06/13/16	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	06/13/16	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	06/13/16	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	06/13/16	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	06/14/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418458
- **Completion Date:** 14-Jul-2015
- **Expiration Date:** 14-Jul-2018
- **Minimum Passing:** 80
- **Reported Score*:** 80

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	14-Jul-2015	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k137ccdc4-e1db-414a-983b-f97d5bcc9ee3-16418458

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418458
- **Report Date:** 03-Apr-2018
- **Current Score**:** 80

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	14-Jul-2015	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k137ccdc4-e1db-414a-983b-f97d5bcc9ee3-16418458

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

CITI PROGRAM

Completion Date 14-Jul-2015
Expiration Date 14-Jul-2018
Record ID 16418458

This is to certify that:

Cheryl Seals

Has completed the following CITI Program course:

IRB Additional Modules (Curriculum Group)
Conflicts of Interest in Research Involving Human Subjects (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wbcc96680-7f48-42fd-9118-ce5a6116aecf-16418458

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Defining Research with Human Subjects - SBE
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418460
- **Completion Date:** 15-Jul-2015
- **Expiration Date:** 15-Jul-2018
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Defining Research with Human Subjects - SBE (ID: 491)	15-Jul-2015	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k515b2fe2-ed52-49e4-b942-d49e89c661ae-16418460

Collaborative Institutional Training Initiative (CITI Program)
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Phone: 888-529-5929
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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Defining Research with Human Subjects - SBE
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418460
- **Report Date:** 03-Apr-2018
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Defining Research with Human Subjects - SBE (ID: 491)	15-Jul-2015	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k515b2fe2-ed52-49e4-b942-d49e89c661ae-16418460

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

CITI PROGRAM

Completion Date 15-Jul-2015
Expiration Date 15-Jul-2018
Record ID 16418460

This is to certify that:

Cheryl Seals

Has completed the following CITI Program course:

IRB Additional Modules (Curriculum Group)
Defining Research with Human Subjects - SBE (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w3383570e-edf0-405a-a5f3-dfd84f803efb-16418460

IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic Course

You completed the mandatory elements of this course on **15-Jul-2015** with a final reported average score of **84%**.

This is the date and score recorded in the Completion Report sent to your institution.

- You may review any of the course content and retake quizzes, including those for supplemental optional modules, but your reported quiz scores and dates will not change.
- You do not receive any extra credit for this course if you retake quizzes or complete additional quizzes on supplemental materials.
- In some cases, completion of additional modules may be required for eligibility for CEU credits.
- Additional completions and new quiz scores may transfer to other CITI Program courses, if you register for courses that include those modules. You must login using the same account, and the other institution must allow transfer credit.

Required Modules	Already Taken?	Score
Belmont Report and CITI Course Introduction (ID: 1127)	14-Jul-2015	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	14-Jul-2015	5/5 (100%)

Required Modules	Already Taken?	Score
Assessing Risk - SBE (ID: 503)	14-Jul-2015	4/5 (80%)
Informed Consent - SBE (ID: 504)	14-Jul-2015	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	15-Jul-2015	5/5 (100%)
Students in Research (ID: 1321)	15-Jul-2015	9/10 (90%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	15-Jul-2015	5/5 (100%)

The following six pages will be an information design survey sample.

Interest question (Page 1) will always be the same. Articles (Page 2 – 6) will, but questions in these pages will be the same. All of the articles are from extension.org, in 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology.

Please choose your interest (Mark all the categories that you are interested in):

- ○ Art
- ○ Biology
- ○ Chemistry
- ○ Education
- ○ Geography
- ○ History
- ○ Math
- ○ Physics
- ○ Psychology
- ○ Responsibility
- ○ Technology

Please read the articles in the following five pages and answer the correlated questions.

Creative Art Helps Children Develop across Many Domains

Creative art activities can help children in all areas of development. Child care providers should plan creative activities with the child's overall development in mind. Here are some ways that art activities can support young children's development. Physical Development When child care providers offer art activities, they are supporting children's large and small muscle development, as well as their eye-hand coordination. Using crayons, markers, and paintbrushes helps children practice the fine motor control they will need for writing later on. Social Development When children work together in the art area, they learn to share, to interact with others, to be responsible for cleanup, and to put materials away. These are positive and important changes for social learning. Cognitive Development Young children can learn the names of colors and shapes through creative art activities. They find out what happens when they mix two primary colors together and get a secondary color. Sending older children outside to carefully examine a tree, feel its bark, and study the shape and color of its leaves, and then asking them to draw or paint trees helps them develop observational skills needed for science. Emotional Development Through creative art, children may be able to represent experiences that they cannot verbalize. They may draw pictures out of proportion, exaggerating things that are important to them. When we value children's creativity, we help them feel valued as people, raising their self-esteem. Imagination and Experimentation Children's active imaginations can take form through art. For example, Gene wonders what will happen if he uses three paintbrushes at one time. He asks his teacher to help him tie a rubber band around three paintbrushes. Through active experimentation, he invents a new way to paint. Although tying three paintbrushes together may not be earthshaking, Gene is learning skills that could help him invent something new, like a car that runs on solar power or a cure for cancer, when he grows up.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Using Learning Centers in Child Care

Learning centers are a purposeful way of dividing up your classroom into different subject/learning areas. The location of each learning center, placement of any furnishings or equipment, and easily available materials give a clear message to the child about what is to take place in that area. Planning for Learning Centers Establishing the centers requires some initial planning, work, and possible expense, but once they are established they save time and money. For example, you don't want to place the reading area (quiet and comfy) near the block, music, or dramatic play areas (loud and active). You also probably want the art center on hard, easy-to-clean floors and near a sink, but the science center near a window or other source of natural sunlight. Learning centers capitalize on children's natural need to explore because they are given the chance to gain experience by trying out their own ideas in a hands-on way. Once established, you can write your lesson plans according to each learning center to make sure you're offering something to enhance each subject. Then you can easily set up your planned activities for the morning/afternoon in each corresponding center, and children can play in whatever center interests them. Advantages of Learning Centers Discipline problems are reduced because groups are limited to a number which can reasonably function in each area. Classroom management is easier since children are in the area of their choice and interest. Children are engaged in hands-on activities as they explore and experiment. Caregivers can support children by supplying the resources as they learn by themselves. Caregivers can determine, by observation, the progress of the children. Caregivers can easily determine what items need to be added to each area that will encourage children in further discovery. Children understand classroom rules more easily when they apply to specific areas. Each area contains only the essentials that allow children to control and create. The purpose of the area is clear and understandable to children.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Introduction to Biomass Combustion

Combustion of biomass used to heat greenhouses. Fire, or combustion of biomass, is arguably the oldest known and most widely used controllable energy source on earth. In recent years, rising costs of fossil fuels and the development of advanced equipment have made biomass combustion an economical, efficient, and practical energy source. Principles of Combustion Combustion is familiar to all of us, but many do not realize that it is essentially a chemical reaction. In the process of combustion, two ingredients (biomass and oxygen) are combined in a high temperature environment to form carbon dioxide, water vapor, and heat. $CH_{1.44}O_{0.66} + 1.03\ O_2 = 0.72\ H_2O + CO_2$ (+Heat) Note: $CH_{1.44}O_{0.66}$ is the approximate chemical equation for the combustible portion of biomass. The amount of heat that is produced varies depending on species, climate, and other factors, but it is generally about 20 Megajoules of energy per dry kilogram of biomass. In order for combustion to be efficient and clean, the ingredients must be well mixed at the right temperatures for the right amount of time. Practically speaking, this means that you need the right amount of fuel, the right amount of air, and the right conditions. Water content in biomass is an important factor when it comes to combustion. The best burning fuels are dry. However, biomass almost always includes some amount of moisture. For example, green wood chips are usually about 50% water and 50% dry matter. Fresh leaves from a plant can be as high as 95% moisture and 5% dry matter. Ideally, biomass should be no more than 20% moisture. Feedstocks for Biomass Combustion A feedstock is merely the fuel that will be burned for energy. While wood is the most common feedstock for biomass combustion, almost any plant material can be used as a combustion feedstock. Processing Biomass for Combustion Biomass can often benefit from a certain amount of processing to make it more suitable as a combustion fuel. This includes sizing, drying, and/or densification. Utilizing Biomass as an Energy Source The smoky fireplace of past generations is a far cry from the combustion equipment that is available today. While those old fireplaces are still used in some homes, high-efficiency biomass combustion requires carefully designed and operated equipment that works well with the available fuel. Depending on your needs, biomass combustion systems can produce hot air, hot water, steam, electricity, or a combination. To find out more about equipment, efficiency, and air quality from biomass combustion, see Using Combustion Heat for Energy.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

How Teachers Can Include School Gardens in the Classroom Curriculum

School gardens are cropping up around the country as multi-faceted experiential learning labs. With the increased emphasis these days on high-stakes testing and data collection, many educators are looking for more innovative ways to present subject matter that balances academic achievement with fostering a love of learning. Research and common sense agree that the best learning environments include a variety of verbal, written, and hands-on activities for each lesson. Although new technology is playing a vital and growing role in modern education, many professionals are also seeking ways to connect students back to their environment, and instill greater life skills and a sense of community in their classrooms. Many of these skills, once taught at home, seem to be left more and more to schools. What can you teach in a school garden? What can't you teach? Most obviously, school gardens are perfectly suited to science curricula. Units such as: seed germination, plant parts, life cycles/metamorphosis, the water cycle, habitat, temperature, weather/climate, and environmental science can all be explored. Students can practice scientific inquiry and higher-order thinking in a live setting. What's more, if they bring their harvest back to the classroom to cook, they can explore the wonders of kitchen science. Math is another natural fit for school gardens. Designing, prepping, and planting garden beds affords a lot of measurement practice; as does weighing the harvest. Cooking from the garden lends itself to lessons of capacity, volume, and an exploration of fractions through measurement. Since much of all culture is centered around food, deciding what to plant, how to plant it, and how to prepare the bounty can open up infinite possibilities for social studies and multi-cultural exploration. Lesson on native foods, natural resources, early agriculture, cultural celebrations, spice trade, and traditional methods of preparing and preserving foods can all be taught in school gardens. For older students, discussions on food policy and food justice unfold as students develop a deeper understanding of where food comes from and how it makes its way to our plate. Although Language Arts may seem like a less-obvious fit for the garden, the natural world has always been a source of inspiration for poetry and creative writing. It can also be a soothing environment for reflection or for read-aloud time. In fact, there is no end to the supply of books of every genre about gardening, food, and cooking to inspire readers of all ages. Alongside lessons in core academics, gardening teaches vital life skills. One of the most exciting things about engaging youth in school gardens is the way it develops an appreciation of the natural world and a sense of interconnectedness that children may not experience in other areas of education. Planting a garden requires teamwork, patience, and perseverance. Caring for a living thing, watching it grow and thrive, and reaping the harvest teaches respect, pride, and commitment. Although these skills are rarely tested, or recorded, these are the lessons that will stick with students throughout their lifetime.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

What does it mean to foster distinctive, attractive communities with a strong sense of place?

What does it mean to foster distinctive, attractive communities with a strong sense of place? The Smart Growth Tenet: Foster distinctive, attractive communities with a strong sense of place that reflect the values, culture and vision of residents through the growth and history of their community. Why is fostering distinctive, attractive communities with a strong sense of place important? Communities with a strong sense of place build on their unique history, identity and assets to foster community pride, increase social interaction and market their community to potential businesses and residents. The results can improve economic stability, increase property values and greatly impact the lives and memories of residents. Urban sprawl is creating a new image for growing communities that is commonly referred to as "Anywhere USA." The monotony of this sprawling development pattern moves people farther away from our town centers and from each other. The results have led to the loss of millions of acres of farmland and open space, disinvestment in our cities and decreases in social interaction, diversity and civic pride. To create a distinct image and maintain a sense of place, many communities are investing in their history as the foundation for new growth. How do you apply this tenet to your community? Investing in your community's unique assets and history can create a situation where residents will become your greatest ally in guiding growth that benefits the entire community. Involving the public in planning decisions and community improvement projects is the first step in building a sense of place. While the greater public should be intimately involved in creating a vision for the community, it is the role of government officials to use the zoning ordinance, site plan review, capital improvement planning and state and federal assistance to make this vision a reality. Communities that are effective in implementing this tenet have consistent policies and regulations in place that create synergy between preservation efforts and new development and are always looking for ways to improve by building sense of place. source: Best Practices for Planning and Zoning

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Memo

Protocol title and number: #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults"

Thank you very much for your time reviewing our IRB application. We appreciate your comments, and have outlined the changes made in italics below.

IRB comments:" 1. Expand item 4 to describe the "process" recruit and consent participants; that is who (PI?), how (email or in person?), if email, what is the PI's access to email addresses, when and where (during which classes and where), etc.3. Expand item 4 to describe the process to access and complete the survey."

The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

IRB comments:" 2. Revise item 2 to describe which internet and electronic platforms (AU email? qualtrics?) will be used for the study."

Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

IRB comments:" 4. In item 5, address gender, if applicable."

For this experiment, we invite participates of all genders

IRB comments:" 5. It is important to note that the IRB is an organization responsible for protection participants in human subjects research, not a form. Revise item 7 to describe use of a consent document."

Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

IRB comments:" 6. Add as the 2nd sentence in the first paragraph that you are the PI under your faculty advisor and provide your faculty advisor's name/title. 7. Revise the 2nd sentence in the first paragraph to read something like, "You are invited to participate in a research study because you are a ..... 8. Revise the 2nd sentence in the first paragraph to be correctly written -, "...to help understand if a ..." 9. Reread the last part of the 2nd sentence in the first paragraph, for clarity. 10. Combine the last two sentences in the first paragraph to read something like, "Only individuals who are at least 18 years of old may participate in this study."

You are invited to participate in a research study because you are generation z students and aged above 18. The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better

recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering (6). Only individuals who are at least 18 years old may participate in this study.

IRB comments:" 11. Revise the 3rd sentence in the 3rd paragraph to read, "You will not directly benefit from being in this study."

You will not directly benefit from being in this study

IRB comments:" 12. Delete the last paragraph; instead add contact information for the AU IRB (see the online sample consent form)."

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

- 1-5 are in Exemption Review Application form, 6 -12 are in recruitment script. Both "to be changed" and "change" are marked.
- Phase One survey sample added as another attachment.
- The previous approved IRB removed from the attachment.
- Revised files come first then the clean ones.

Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **The OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to irbsubmit@auburn.edu.

1. PROJECT IDENTIFICATION

Date 01/30/2019

a. Project Title Framework for user sentiment analysis to improve usability of applications for generation z and young adults

b. Principal Investigator Yang Cao Degree(s) PhD

Rank/Title PhD Candidate Department/School CSSE

Phone Number 3343323678 AU Email yangcao@auburn.edu

Faculty Principal Investigator (required if PI is a student) Cheryl D. Seals

Title Associate Professor Department/School CSSE

Phone Number 3348446319 AU Email sealscd@auburn.edu

Dept Head Hari Narayanan Department/School CSSE

Phone Number 3348446312 AU Email naraynh@auburn.edu

c. Project Personnel (other than PI) - Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting). Attach a table if needed for additional personnel.

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

d. Training - Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? ■ YES ☐ NO

e. Funding Source- Is this project funded by the investigator(s)? ☐ YES ■ NO
Is this project funded by AU? ☐ YES ■ NO If YES, identify source _____
Is this project funded by an external sponsor? ☐ YES ■ NO If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for the award.
Name _____ Type _____ Grant # _____

f. List other IRBs associated with this research and submit a copy of their approval and/or protocol.
(Remove)Improving Learning Outcomes in Phonetic Transcription using automated software tools:#1

2. Mark the category or categories below that describe the proposed research:

■ 1**.** Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

■ (i) Recorded information cannot readily identify the participant (directly or indirectly/linked); **OR**

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include children when investigators do not participate in activities being observed.

■ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3**.** Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions) **Mark the applicable sub-category below (I, ii, or iii).** 104(d)(3)(i)

☐ (A) Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ (B) Any disclosure of responses outside of the research would not reasonably place subject at risk; **OR**

☐ (C) Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by the IRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one of the following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information and must be publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directly or indirectly/linked; investigator does not contact subjects and will not re-identify the subjects; **OR**

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); **OR**

☐ (iv) Research information collected by or on behalf of federal government using government generated or collected information obtained for non-research activities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. **(**Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

***Limited IRB review* – the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

****Category 3 – Benign Behavioral Interventions (BBI)* must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark all applicable)

Minors (under 19)	☐ YES ■ NO
Pregnant women, fetuses, or any products of conception	☐ YES ■ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ■ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ■ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ■ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ■ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ■ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ■ NO
Deception of participants	☐ YES ■ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this research is to create a web crawling system that will be enhanced through machine learning strategies. The study participants will provide us with data that will help us to learn their preferences to model in the proposed system. This study is to investigate the effect that our proposed framework has on software usability with a system enhanced with this method. The main objective is to create framework that can be used to design usable applications and the proposed framework will be evaluated through empirical experiments.
(2 revised -- platform specification added)
The participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. Informed consent will be granted using the recruitment script (see attached script). Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

Phase one -- Information Design
Participants will be asked about their interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology. Then 5 - 10 articles from extension.org will be provided to participants to ask which category do they think each article belongs to, and participants' interest level (ranges 1 - 10) in this article.
Those users' preference data and articles themselves will be used to train a machine learning model, which will be applied to our experimental application.
Phase two -- Usability evaluation
Participants will be provided two Andriod applications (one benchmark, one experimental) to read articles. To collect unbiased data, the order of the application review will be assigned to survey participants in random order. Usability and satisfaction data will be collected with the Usability Evaluation Questionnaire.
(1,3 revised -- one paragraph added to clarify)
The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

5. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

(4 revised -- one sentence added)

Participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. For this experiment, we invite participates of all genders (4). We will also utilize opportunistic sampling to choose participants. It will be advertised in classes to seek volunteers and we will use personal recruitment and email recruitment based on recruitment script.

6. **Does the research involve deception? ☐ YES ■ NO If YES, please provide the rationale for deception and describe the debriefing process.**

7. **Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the person would experience in daily life.**

   (5 original) Before taking part in the study, participants will be provided an IRB form to inform them of their rights. The IRB also consents that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.
   (5 revised) Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

   No this experiment will not cause any harm to the participants and they will be given the opportunity to withdraw at any time.

8. **Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.**

   Hard copy paper documents will be stored in a locked file cabinet after being entered into an Excel Spreadsheet or SQLite Database. Confidential data will not be coded in the database. Only Yang Cao (PI) and Dr. Cheryl Seals (FA) have access to participants' data.

9. **Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).**

   Data will be collected without a link of participant s data to any identifying information, recorded and analyzed as "anonymous . Participants' name won't be published.

10. Will the research involve interacting (communication or direct involvement) with participants? ☐ YES ■ NO **If YES, describe the consent process and information to be presented to subjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.**

During Phase I, the informant design, the experiment facilitators will give the participants the informed consent. There are two options to the experiment. The user can complete the survey remotely and in this case we will have no contact with the participant.

In case two, we will consent the participants and situate them in a study area were they will complete the survey. We will also perform the experiment and collect the experimental data from the experiment.

We will also use this same procedure for the Phase II systems experiment.

11. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Appendix A Recruitment Script
(Remove previous IRB attachment)Improving Learning Outcomes in Phonetic Transcription using automated software tools: #17-040 EP1705
Yang Cao Citi training
Cheryl Seals Citi training
(added attachment)
Phase One information design survey sample

Principal Investigator's Signature Yang Cao **Date** 01/30/2019

If PI is a student,
Faculty Principal Investigator's Signature Cheryl Seals **Date** 01/31/2019

Department Head's Signature N. Hari Narayanan **Date** 01/31/2019

Description added
The Auburn University Institutional Review Board has approved this document for use from 01/29/2019 to 01/28/2020. Protocol #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults

RECRUITMENT SCRIPT (verbal, in person)

6,7,8,9,10 original
I am Yang Cao a graduate student in the Department of Computer Science and Software Engineering at Auburn University. I would like to invite you to participate in my research study to help us understand can a framework created with the addition of a machine learning model to support the learning for generation z students provide better user engagement, user experience. You may participate if you are above 18 years old when you participate in the study. Please do not participate if you are under 18 years old when you participate in the study.
6,7,8,9,10 revised
You are invited to participate in a research study because you are generation z students and aged above 18 (7). The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system) (8,9). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering (6). Only individuals who are at least 18 years old may participate in this study (10).

As a participant, you will be asked to choose your interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology, and provide opinions about articles in those categories. Your time commitment will be approximately half an hour.

11 original
There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. We cannot promise you that you will receive any or all of the benefits described. There are no costs associated with participating.
11 revised
There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. You will not directly benefit from being in this study (11). There are no costs associated with participating.

If you would like to participate in this research study, email me at yangcao@auburn.edu. If you have questions, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.

12 original
Do you have any questions now? If you have questions later, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.
12 revised
If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

Creative Art Helps Children Develop across Many Domains

Creative art activities can help children in all areas of development. Child care providers should plan creative activities with the child's overall development in mind. Here are some ways that art activities can support young children's development.

Physical Development

When child care providers offer art activities, they are supporting children's large and small muscle development, as well as their eye-hand coordination. Using crayons, markers, and paintbrushes helps children practice the fine motor control they will need for writing later on.

Social Development

When children work together in the art area, they learn to share, to interact with others, to be responsible for cleanup, and to put materials away. These are positive and important changes for social learning.

Cognitive Development

Young children can learn the names of colors and shapes through creative art activities. They find out what happens when they mix two primary colors together and get a secondary color. Sending older children outside to carefully examine a tree, feel its bark, and study the shape and color of its leaves, and then asking them to draw or paint trees helps them develop observational skills needed for science.

Emotional Development

Through creative art, children may be able to represent experiences that they cannot verbalize. They may draw pictures out of proportion, exaggerating things that are important to them. When we value children's creativity, we help them feel valued as people, raising their self-esteem.

Imagination and Experimentation

Children's active imaginations can take form through art. For example, Gene wonders what will happen if he uses three paintbrushes at one time. He asks his teacher to help him tie a rubber band around three paintbrushes. Through active experimentation, he invents a new way to paint. Although tying three paintbrushes together may not be earthshaking, Gene is learning skills that could help him invent something new, like a car that runs on solar power or a cure for cancer, when he grows up.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

The Development of Creative Art Abilities in 3- to 5-Year-Olds

During the preschool years, many children show tremendous growth in their creative art abilities. Child care providers can support children's artistic development by planning art activities that encourage preschoolers' developing art skills. Here are some basic milestones in preschoolers' art development: Art for 3 and 4 Year Olds
By age 3, many children are learning to better control their hand and wrist movements. They are making forms and objects that are almost, but not quite, recognizable to adults. Circles, lines and crosses are always popular forms. Some 3 and 4 year olds may begin naming their drawings. In the middle of drawing, a child may look and say something like, "This is a truck," or, "This is Mommy." Naming artwork is a big step that shows the child has begun to think in terms of mental pictures. It doesn't matter that the drawing has little or no resemblance to Mommy. What matters is that the child has discovered that drawing is more than just something physically fun to do. It is also a way to communicate ideas.
Art for 4 and 5 Year Olds
By age 4, some of these forms have taken shape and adults can identify them as people, houses, cars or whatever the young artist intended to draw. Typical drawings at this age are pictures of people consisting of large heads that appear to have arms and legs growing out of them. There is usually little evidence of relative size in these drawings. Tiny legs sprout out of huge heads. A drawing of a butterfly may be twice as big as a dog. Whatever is most important to the child at the time gets the biggest play on the page; what is not important may simply be left out. That's why youngsters may leave out fingers, necks or other body parts. It's not that children don't notice that people have fingers; it's just that fingers are not important to them at the time they are drawing. During this stage, children may find colors very exciting. Children are not concerned with realistic color representations. They just like to use color. One child may make everything on the page red. Another may use every color in the box on one drawing. Child care providers should not require children to use certain colors or try to read any deep psychological meanings into a child's choice of colors.
Art for 5 and 6 Year Olds Five-year-olds begin including more real-life elements into their pictures, and between the ages of 5 and 6, children become much more concerned with their creations and want to keep them. Before this time, most children are interested in the sheer fun of doing an art activity, rather than the quality of their products.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Art Is a Valuable Learning Experience for Young Children in Child Care

Art activities might appear to be "just messy," but creating art is a valuable part of a child care curriculum. Art opens up new worlds for children and gives them a variety of important experiences. Crayons, markers, paint, clay and many other art materials are the tools that can help children: build strength in the arms, hands and fingers practice hand and finger control, which helps improve writing skills practice coordination of the hands and eyes explore textures, colors and tastes plan a creation and make decisions about how to create it explore and express their feelings expand their creativity Art Experiences for Babies and Toddlers

Art experiences can begin as soon as babies can hold and move a crayon. Early art usually focuses on using the senses to explore, rather than creating a picture or object to keep. The process of squishing finger paint in their hands, tearing paper or scribbling with crayons is interesting and fun for most babies. As they explore, they learn what happens when they move their hands and arms, and they feel pride and joy in their creations. Babies' and toddlers' art creations do not usually look like real objects. They are simply enjoying the pleasure of creating and exploring the materials.

Art Experiences for Preschoolers

Preschoolers may be more interested in creating art that represents a real or imaginary object or scene. Being able to think about something they can't see and then create it in a drawing or painting is a big accomplishment for a preschooler. But even in preschool, the process of creating is usually more important than the finished project. Don't be surprised if a child who worked hard to paint a picture or build a clay sculpture does not want to save it.

Supporting Children's Creative Art

Child care providers can support children's interest in art by giving them new experiences and by helping them feel their work is valued. Encourage children to explore different art media Hang some sticky paper on the wall and have children stick items to it to make collages Give children the chance to paint with their bare feet Post the children's creations on walls or surfaces for everyone to enjoy These experiences let children explore real materials with their senses. Remember to display children's artwork where they can see it easily.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Creative Art Activities for Children with Special Needs

Child care providers often have children with special needs included in their programs. Art activities can be a valuable learning experience for many children with special needs, but the art activities given in a child care setting may need to be modified or adapted so that all children may participate in them. Child care providers should also be aware that they may need to guide children with special needs when helping them with their art activities. Here are some ideas for modifying or adapting materials and activities to children with special needs. Encourage children with special needs to participate in art activities. Use appropriate ways to let children know what art materials are available. For example, you may need to use sign language and demonstrate the materials for children with limited hearing, or you may encourage children with limited vision to touch materials while you explain what they are. Make sure materials are accessible to all children, including children with special needs. Pay attention to where materials are stored and whether children with motor challenges can get to them. Adapt art materials to the child's ability. For example, instead of using scissors that a child may not be able to grasp very well, give children with fine motor challenges pre-cut pieces of paper. Consider giving children adaptive scissors that open easily, or allow the child to tear his or her own pieces of paper. Applaud the artistic efforts of all children. Saying "You worked on that painting for 20 minutes!" or "I bet you feel proud of what you created!" will help build self-confidence and creativity. Be creative. Activities that are pre-made or that have specific directions do not help children be creative and may be too challenging for those with certain special needs. Provide children with open-ended art materials that can be used in many ways and encourage all children to use their abilities to create their own art.

Should I Physically Help a Child with Motor Challenges Create Art?

Children with severe motor challenges may need physical help to create artwork. When helping a child in the art center be sure to let her take the lead. Give only the help necessary. Encourage children to try to do it themselves first. Ask a child what she wants to do, what materials she wants to use and what kind of help she needs. Check in as you help to make sure that you are helping her create what she wants. Modifying and adapting your art center is an important way to include children with special needs in child care programs. Creating art is a worthwhile experience for all children and should be available to children with special needs as well as typically developing children. With simple modifications, you can ensure that all children can use their senses and creativity in the art center. For More Information To learn more about working with children with special needs, check out the eXtension Alliance for Better Child Care section on Child Care for Children with Special Needs. Read more about making your art program successful in the Art in Child Care section. If you are looking for specific art activity ideas to use in your child care program, take a look at the Hands-on Activities Database.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

The Development of Creative Art Abilities in 0- to 3-Year-Olds

During the first three years, young children develop their artistic skills by having fun experimenting and learning all the wonderful things they can do. Child care providers need to understand how children's art abilities develop in order to plan effective art experiences for the child care program.

Art for 0 and 1 Year Olds

When babies engage in creative art, it is a whole body experience. They often are as interested in grasping, chewing, pounding and squishing as they are in trying to actually create something. Child care providers sometimes do not provide infants with art experiences. But even at this age, the sheer exploration is worthwhile for children's development. Safety is an important concern at this age, and adult supervision is critical. We don't want babies swallowing things or hurting themselves or others. Infants enjoy sensory experiences such as water play, texture books or toys.

Art for 1 and 2 Year Olds

Children of this age are in a scribbling stage. At first, between the ages of 1 and 2, their scribbles are usually disordered and uncontrolled. Scribbles are more a product of physical activity, made by the pumping of the shoulders because children can't yet control their elbows or wrists. These young scribblers will typically try holding their crayon a variety of ways and don't often associate their movements with lines appearing on paper. Their attention spans are short, and they only scribble for one or two minutes at a time.

Art for 2 and 3 Year Olds

Gradually these scribbles become more controlled as children gain greater control of their arms, hands, and fingers, and their eye-hand coordination improves. As a result, their efforts show up as repeated motions, such as a series of oval shapes or a series of horizontal and vertical lines. By age 3, children are also putting more concentration and time into their art, sometimes spending as much as 15 minutes drawing. As children leave this age range, a very important change takes place. Even though they are still scribbling, children begin to name the scribbles. Naming artwork is a big step that shows the child has begun to think in terms of mental pictures. During the first three years, children's fine motor skills and coordination are becoming more refined. This is also a time when children come to understand that pictures represent something in real life known as representational thinking.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

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Balancing Process and Product in Creative Art Activities

Well-planned art experiences are a valuable part of the child care curriculum. Early childhood art activities need to balance process and product. Process is doing, product is the result. Young children are process-oriented. For infants and toddlers, the joy of art is in the doing and making. They usually want lots of finger paint, really squish it around, and then pay no attention to what happens to their picture afterward. Preschoolers love to experiment with color and design. They do not worry that their entire page is covered in yellow, or their grass is red, or their play dough snake doesn't really look like a snake. Preschoolers may choose to keep their finished product or forget about it once it is completed. School-age children may become very product-oriented. They want to make sure their names are on their projects and may get very upset when papers tear or structures crumble. When planning art activities, be sure to allow enough time for children to get fully involved in the process. Even though we want children to develop longer attention spans, we may actually prevent them from working for longer periods of time when we focus on the product and don't let them enjoy the process of creation. Keep your schedule flexible and allow extra time for art activities that are involved or really capture children's interest. With more flexible planning, art activities can actually help children increase their attention spans.

Which categories do you think the above article belongs to?

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The Art Center in Child Care

Art Supports Children's Development

Painting, coloring, sculpting, drawing, and other forms of creative art are an important part of the child care curriculum. Creating art supports young children's development across several different domains. Using art tools helps children develop small muscle coordination and control. Children can practice thinking skills by experimenting with color, texture, and design. Art gives children an opportunity to express their ideas and feelings, relieves tension, and provides limits for self-discipline. Art allows children to achieve and expand their creativity.

Setting Up the Art Center

Because art can be such an important learning experience, it's important for child care programs to include a well-designed art center. The specific set-up of the art center depends on the ages of the children in the group. An infant room probably will not have a permanent art center. Child care providers can begin introducing infants to a few art materials when the infants can sit up and begin controlling their hand movements. Art materials for infants should be brought out when needed, and put away when the activity is over. Art materials should be stored out of the infants' reach when not in use. A toddler room may have an art center with some materials available to children throughout the day. A toddler art center might include fat crayons and paper that children can select and use independently (with adult supervision, of course). Messier materials, such as paint and glue, or materials that need more supervision, such as preschool scissors, should still be stored out of children's reach and brought out only when needed. A preschool room often has a larger and more complex art center, such as the one pictured on this page. The preschool art center may contain many more materials, such as markers, glue sticks, preschool scissors, tissue paper, and chalk. In addition, many preschool art centers include an easel where painting, drawing, and other large-motor art activities can occur. Child care providers should rotate materials periodically to expand children's creative process.

Setting and Enforcing Rules for the Art Center

To keep children safe and to encourage creativity, child care providers should set and enforce certain guidelines for preschool-age children using the art center. Some common rules include: Wearing smocks when using messy materials such as paint Painting or drawing only on the paper or object, not other surfaces Working only on your own creation, unless invited to share Putting away materials after completing project Washing hands before going to another activity

The Teacher's Role in the Art Center

Child care providers should give instruction and assistance to children in the art center while still allowing room for the creativity of the child. Some of your main roles in facilitating children's creative art include: Maintaining a supply of materials, and rotating them regularly to keep children interested Demonstrating the use of new tools and materials (e.g., how to manipulate clay or play dough, how to manipulate a paint roller) Assisting children in their creation only when asked Using open-ended questions to talk with children while they are creating Observing children's skills, especially fine motor skills, and planning new art activities to support children's development Putting children's names on their creations if they request help Adding explanations or stories to creations if requested Instructing or assisting in the drying of creations Assisting children with clean-up Displaying some of the children's art creations in the child care space

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Planning a Successful Art Center in Child Care

In order for children to create art, they need an inspiring space. The art center should look like an artist's studio, filled with children's art as well as that of well-known artists. The art center should allow children to feel creative as they explore materials to express themselves. The art center also allows children to make their own discoveries, either independently or together, and to feel confident in the choices they make.

Setting Up an Art Center in Your Classroom or Family Child Care Home

The location of your art center will depend on the space available in your classroom or home. The following are several different possibilities: Near a window: The natural light through the window is pleasant, and children will be able to look outside for inspiration. Near a sink: Placing the art center near a sink allows for easy clean-up. On a floor that is easily cleaned: Art supplies will inevitably end up on the floor, so a tile floor that can be kept clean or wiped easily is key. Outdoors: Most materials used inside can be easily taken outside to continue art activities, and clean-up is often much easier outdoors.

What an Art Center Should Look Like

Neat and organized: Children should be able to easily locate the materials. Also, if the center is organized, the expectation is that the children will help keep it that way. This way, there is already a limit in place so they know that part of their responsibility is to clean up after themselves. Well stocked with a variety of materials: Children can easily become bored with using the same materials over and over again. To maintain their interest, the art center should be stocked with many types of materials, varied by size, color, texture, etc. Limitless: With a well-stocked art center and encouragement to be creative, children should have minimal boundaries. Although rules are necessary, children should feel that they can create the art they want with the materials provided. Easy-to-clean furniture: To maintain the life of the furniture, you should plan on having smooth tabletops that are easily wiped clean. If you are unable to use an easy-to-clean table, an alternative is to use a plastic tablecloth that can be wiped clean. Appropriate seating: Both children and adults should feel comfortable in the space. Children also should have the option of standing, so art easels and large painting surfaces should be provided as well. It also is important that adults interact and join in on the creativity, so adult-sized furniture should be available. Art easels: Art is a great way for children to develop their motor skills. While at the table, they are primarily working on fine motor movements, but art easels provide a large area where they can move their arms up and down, working on their gross motor skills. Art easels are also great because they allow children to have a change of scenery so they are not always doing art at the table. Also, art easels can easily be moved outdoors so art can take place in different areas of the classroom. Storage: Some space should be available to children all of the time, while other materials should be kept out of reach.

Choosing Materials for the Art Center

The art center should have many different options for children to choose from. Some examples include: paper (manila, construction, newsprint, computer, wallpaper books, magazines, catalogs, used greeting cards, etc.) molding materials (modeling compound such as Play-Doh, clay, rolling pins, plastic knives, cookie cutters, shaving cream, etc.) paints (tempera, watercolors, finger paints, etc.) crayons, markers, pencils, chalk, and erasers colored tape children's scissors (left- and right-handed), hole punch paste, glue, tape paint brushes, sponges rubber stamps and ink pads collage materials (scraps of fabric, yarn, ribbon, feathers, glitter, buttons, macaroni, any small "beautiful junk" items) seasonal leaves, nuts, cones recycled materials (yogurt cups, fabric, yarn, tissue paper, foil, bottles) miscellaneous items for creativity

Keep in mind that most of these suggestions would be appropriate for a group of preschool-age or school-age children. An art area in a toddler classroom will look very different, because toddlers' fine motor and cognitive skills are still developing. Be especially cautious about offering materials that are choking hazards to very young children, who may still be likely to place objects in their mouths. Supervise children of all ages when they are using art materials.

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I've heard the phrase "process over product" to describe art activities. What does this phrase mean, and how can child care providers tell whether an art activity is process-focused or product-focused?

Young children love to create art, but they tend to focus much more on the process of creating and are not as interested in the finished product. It's important for child care providers to realize that many young children may not want to keep their artwork once it's finished or may not even be able to identify which piece they created. This doesn't mean the activity was a failure; it simply means that the child focused on the process but did not care about the final product. The focus in art activities should generally be on how the child is creating, the feelings of the movements she's making with her arm, what the paint looks like on the paper, how the colors combine, and other "process" activities. Art activities that focus on creating a specific product by copying a model or activities in which everyone is expected to create things exactly the same way are more product-focused. The challenge with product-focused activities is that they limit children's creativity. When children are expected to copy a model, especially if it's made by an adult, they may become frustrated because their product does not look like the model and may decide that they are "not good at art." Young children grow as artists and develop creativity when they have open-ended art activities that allow them to explore and create whatever their imaginations suggest. Be sure your art program includes an appropriate balance of process and product focus.

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Fire Ant Art

Literature

In literature, one of the best known and often illustrated ant stories for children is The Ant and the Grasshopper, a fable by Aesop, retold and illustrated by Amy Lowry Poole, a Holiday House Book, Ages 4 - 8, New York, 2000. 29 pp.: The Ant and the Grasshopper A long time ago, in the old Summer Palace at the edge of the Emperor's courtyard, there lived a grasshopper and a family of ants. The ants awoke every day before dawn and began their endless tasks of rebuilding their house of sand, which had been washed down by the evening rains, and searching for food, which they would store beneath the ground. They carried their loads grain by grain, back and forth, all day long. The grasshopper liked to sleep late into the morning, rising as the sun stretched toward noon. "Silly ants," he would say. "You work too hard. Come follow me into the courtyard, where I will sing and dance for the great Emperor." The ants kept working. "Silly ants," the grasshopper would say. "See the new moon. Feel the summer breeze. Let us go together and watch the Empress and her ladies as they prepare for midsummer's eve." But the ants ignored the grasshopper and kept working. Soon the days grew shorter and the wind brought cooler air from the north. The ants, mindful of the winter to come, worked even harder to secure their home against the impending cold and snow. They foraged for food and brought it back to their nest, saving it for those cold winter months. "Silly ants," said the grasshopper. "Don't you ever rest? Today is the harvest festival. The Emperor will feast on mooncakes and sweet greens from the fields. I will play my music for him until the moon disappears into the smooth lake water. Come and dance with me." "You will do well to do as we do," said one of the ants. "Winter is coming soon and food will be hard to find. Snow will cover your house and you will freeze without shelter." But the grasshopper ignored the ant's advice and continued to play and dance until the small hours of the morning. Winter arrived a week later and brought whirls of snow and ice. The Emperor and his court left the Summer Palace for their winter home in the great Forbidden City. The ants closed their door against the ice and snow, safe and warm, resting at last after their long days of preparation. And the grasshopper huddled beneath the palace eaves and rubbed his hands together in a mournful chirp, wishing he had heeded the ant's advice.

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Avoid Activities Masquerading as Creative Art in Child Care Settings

Creative art is an important part of the child care curriculum because it allows children to practice self-expression, fine motor skills, thinking and many other skills. Unfortunately, many activities that look like creative art do not actually encourage creativity. These activities are sometimes used in art programs and may help develop fine muscle control or eye-hand coordination, but they don't provide artistic and creative opportunities. It's important to avoid activities masquerading as creative art. Activities that masquerade as creative share three characteristics: The responsibility for making art is shifted from the child to the teacher. The activities have a high degree of structure. The product is specified, and often a model is provided to copy.

Problems with Highly Structured Craft Activities

People who have studied how creativity develops warn against the use of ditto sheets, coloring books, tracing patterns, dot-to-dot sheets, craft projects and holiday gifts with specific outcomes in creative art programs for preschoolers. These projects may be enjoyable, but they can actually discourage children from being creative.

An Example

Researchers Lowenfeld and Brittan looked at the use of models in art programs. Young children were asked to draw birds, and they did. They drew wonderful birds of all colors, with funny long legs and pointy beaks, lovely wings and beady eyes. Then the researchers gave these children a picture of birds to color and said, "Try to stay in the lines." The picture looked like a bunch of "V's" flying around the sky, and the children colored ever so carefully. A few weeks later, they gave these same kids big pieces of paper again and suggested that they draw some birds. Do you know what the children drew? No funny long legs; no pointy beaks; no lovely wings or beady eyes — just plain old "V's" in the sky. No creativity.

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Fire Ant Biology

Fire Ant Habitat

Imported fire ants, Solenopsis invicta and Solenopsis richteri (Hymenoptera: Formicidae), are social insects that usually produce hills or mounds in open areas where the colonies reside. These fire ants build mounds in almost any type of soil, but prefer open, sunny areas such as meadows, pastures, parks, playgrounds, lawns, and golf courses, as well as agricultural land and wilderness areas.

What Do Fire Ants Eat? Imported fire ants are omnivores. They eat both plants and animals to satisfy their nutritional requirements. Their menu includes carbohydrates(sugars), lipids (fats) and protein. Worker ants cannot ingest solid food particles (greater than 2 microns, 1 micron = 0.000039 of an inch), so they primarily feed on liquids.

Fire Ant Morphology, Reproduction, and Development If it weren't for the painful experiences associated with fire ants, most people might find these creatures fascinating. Their life cycle and social behavior are surprisingly complex. This article explores how a fire ant colony becomes a colony, the different types of fire ants in a colony and the roles they play within the colony, as well as their communal feeding system.

Identifying Fire Ants Properly identifying ant species is the first step in determining the need and approach for control. Accurate identification can be especially important in states where native fire ant species are common and red imported fire ants are rare. Although native fire ants are common urban pests, if they are controlled unnecessarily, especially in very dry climates, imported fire ants are more likely to invade these areas. This article explores the characteristics and aggressive nature of fire ants.

Natural Enemies of Fire Ants Biological control is the use of imported natural enemies to suppress pests and can be an effective and environmentally safe way to permanently control pests over wide areas. As such, it is the basis for many integrated pest management programs. In South America, the native habitat for imported fire ants, populations are much lower than populations in areas where imported fire ants have been accidentally introduced, such as the southern U.S. This situation is thought to arise because natural enemies (predators, parasites and pathogens) that keep populations low in South America were not imported along with this ant. Efforts have been made to introduce natural enemies to the invasive ant populations in order to provide sustainable suppression.

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What is agriculture?

Agriculture is the basis of all civilization. It is part of everything from the food we eat to the clothing we wear. Agriculture shapes many of the traditions and values that this country was built on. Agriculture is the science, art, and occupation of producing crops, raising livestock, and cultivating the soil.

Agriculture also includes: processing, financing, marketing, and distribution of agricultural products; farm production supply and service industries; the use and conservation of land and water resources; health, nutrition, and food consumption; development and maintenance of recreational resources; and related economic, sociological, political, environmental, and cultural characteristics of the food and fiber system.

Specific types of agriculture Include: Agricultural economics Agricultural engineering Agronomy Aquaculture Beef Cattle Crops Dairy Cattle Entomology Food technology Forestry Goats Horticulture Plant breeding and genetics Plant pathology Poultry Sheep Swine

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Goat Reproduction Reproductive Biology

Introduction

The increased demand for goat meat, especially in the United States, could possibly be met in part through improving reproductive efficiency in our herds. Reproduction efficiency is one of the most important economic traits in terms of livestock production. Maintaining good reproductive functions in the herd is pivotal to the success of any livestock production system. Productivity and profitability is measured by ovulation rate, conception rate, the number of kids born, the number of kids weaned and the frequency in which they are produced. Reproduction is the propagation and continuation of a species through a sequence of events. This process involves the production of hormones (i.e., estrogen, testosterone) and the development of the reproductive system to carry out germ cell development, fertilization, pregnancy and eventually parturition which is the act of giving birth(McKenzie-Jakes, 2007). Understanding the estrous (breeding) cycle and how hormones work during the cycle can help us to change those patterns and behavior to improve efficiency of reproduction to eventually benefit the goat industry.

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Bee Brood (Basic Bee Biology for Beekeepers)

There are three development stages in bees which collectively are known as brood. Bees begin their life in the tiny white egg stage. A queen will deposit one egg in each worker or drone cell. The eggs are about the diameter of a pin and stand on end in their cells. They are very difficult to see. The eggs that will develop into workers are fertilized, while the eggs that will yield drones are not. We cannot tell the difference between fertilized and unfertilized eggs but the bees can. If the queen makes a mistake, the egg is removed and destroyed by worker bees. The egg stage lasts three days. When an egg hatches it becomes a larva. The bee larva (plural: larvae) is a legless and featureless white grub. It is specialized to eat and never leaves the individual wax cell. Larvae grow at a rapid rate in a five-step development called metamorphosis, increasing 1500 times the original size. The larvae are visited 10,000 or so times during their development by adult nurse bees for inspection, feeding and eventually capping of the cells. Worker bees bring food place it in the cell. They do not directly feed the larva. The last stage, sometimes termed the prepupa, engorges on extra food before the cell is sealed with a wax capping. The pupal development stage for drones is 6.5 days, workers 6 days, and queens 5.5 days. If brood nest temperature drops, development takes longer. When fully grown and filling the cell the larva changes to a pupa (plural: pupae). The pupal stage, frequently termed capped stage, is one of change . the grub-like larva rapidly takes on the features of the adult. It does so still in the same cell that has now been capped with wax by the workers. In addition to containment in a capped cell, the last larval stage also spins a thin silk cocoon within each cell to enclose the pupa. The pupa does not eat or move. All bee larvae (female and male) receive royal jelly after the egg hatches. Royal jelly is a protein-rich food made in the glands of worker bees and placed in cells just before the egg hatches. Initially the cell with a young larva is mass provisioned. A pool of royal jelly is kept replenished in the bottom of the cell and the C-shaped larvae simply lie in a pool of its food. After 2.5 to 3 days, however, the diet of the worker and drone larva changes to a mixture of pollen and nectar and food is not so generously supplied. This is called progressive-provisioning. The queen larva remains on a diet of royal jelly, continued in generous supply, her entire larval life.

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Fire Ant Treatment: Natural and Biological Control

Natural and Biological Control

Currently, the best biological control method for fire ants is to preserve other ant species that compete with them for food and nesting sites, attack small fire ant colonies, or kill newly mated queen ants. In some areas outbreaks of other exotic ant species, such as Argentine ants and tawny crazy ants, have displaced imported fire ants. Even imported fire ants from single-queen or polygyne colonies will prey upon newly mated fire ant queens and eliminate small, neighboring colonies. Ants, in general, are considered beneficial insects because they prey upon many other arthropods and collectively till more earth than earthworms, thereby reducing soil compaction. Ways to preserve native ants include preserving their habitat and using insecticides judiciously. Introducing or conserving the natural enemies (diseases, parasites and predators) of imported fire ants can help control them. These natural enemies kill fire ants or make them less able to compete with other ant species. The most effective biological control organisms for large-scale programs are those that spread by themselves from mound to mound and persist from year to year. A number of species of parasitic "phorid" flies (Diptera: Phoridae), including Pseudacteon tricuspis, P. curvatus, P. obtusus and P. litoralis, have been released and established in parts of most southeastern states. A disease of fire ants, Kneallhazia (=Thelohania) solenopsae, is also widespread in some states. Although natural enemies will not eliminate fire ants and it may be several years before their effect is known, it is hoped that introducing natural enemies of fire ants in the U.S. will reduce their populations indefinitely. In South America, where imported fire ants and their natural enemies originate, fire ant species are not usually considered pests but rather just another ant species. See Natural Enemies of Fire Ants. Several other parasites and pathogens have been marketed for fire ant control. The predatory straw-itch mite, Pyemotes tritici (Lagreze-Fossat & Montane), feeds on and paralyzes developing fire ants but has not been effective when applied as directed and is potentially hazardous to the user. Parasitic nematodes such as Steinernema spp. are roundworms that enter insects, paralyzing them and developing in their bodies. Species and strains vary in their effectiveness. Strains tested to date caused ants to temporarily move away from the treated mound, but few colonies were actually eliminated. Parasitic fungi, such as Beauveria bassiana strains and formulations, also have been evaluated as individual mound and broadcast bait treatments. However, these agents have not been shown to persist or spread in the environment. Newly mated fire ant queens, which can start new colonies, are killed by a number of organisms. These include birds, lizards, spiders, toads, dragonflies, robber flies, other ant species, and ants from surrounding colonies. Animals that eat ants, such as armadillos, may disturb mounds and eat some workers, but they are not really useful in control.

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Queen Replacement (Basic Bee Biology for Beekeepers)

Since there is only a single female reproductive in a bee colony, there is a special procedure to replace her when it becomes necessary to do so. Replacement of a queen by another queen is a process termed supersedure. Replacement of the queen and production of another colony is another behavior which is called swarming. A third means of replacing a queen, emergency queen rearing, is necessary if the queen dies suddenly, is removed by a beekeeper, or is somehow injured or lost from her colony. Queen failure may lead to reduced egg laying but workers more readily respond to reduced pheromone production. Each worker bee needs to receive a certain level of queen substance daily. This pheromone is distributed through food transmission among workers. If a queen is taken away, the level of this pheromone drops rapidly, though it is persistent. In the case of a failing queen, the queen produces insufficient amounts of queen substance, and therefore is fed back less of the pheromone by the bees of her retinue. This feedback system of queen pheromone distribution is vital for communication. The first behavior change observable in queen replacement is the laying of a fertilized egg in a queen cup. Queen cups are special cup-like precursors of queen cells. They are always present in a bee colony, though their numbers are greatest in the spring months. They are built at the lower margin of beeswax comb (lower margins of frames in a beekeeper.s hive) and in spaces where the comb is damaged or left open as a walkway to the opposite side of the comb. The queen herself places the fertilized egg in a queen cup. Worker bees can remove eggs (from queen cups or regular cells) but they are not known to transfer them. The same queen may return to the developing queen cell. (Arbitrarily, a cell occupied by an egg or developing queen is called a queen cell - it is a queen cup when empty.) By chewing on the side of the cell, the queen causes the workers to remove and kill the occupant (egg, larva or pupa) inside. It is possible to observe queen rearing repeatedly aborted in a bee colony. The original mated queen (who started the process of queen replacement by laying eggs in queen cups) may be killed before or after emergence of a virgin queen in supersedure or she may depart with a proportion of the adult workers in a swarm before a virgin queen emerges. The workers always begin to rear several new queens rather than a single one. Emergency queen cells can be distinguished from the queen cells of swarming or supersedure because they originate from a worker cell. The horizontal orientation of the worker cells selected to be converted to queen cells is quickly changed to the vertical by enlarging the base of the cell and drawing the opening outward and downward. This usually means destroying the cell walls and removing the larvae of three to four cells adjacent to the modified cell. Capped emergency cells often seem smaller than capped queen cells started from queen cups.

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Feral Hog Reproductive Biology

Feral hogs (also called wild hogs; Sus scrofa) are characterized by high reproductive potential, with a young age at puberty, large litters, and frequent breeding. The recent expanding range of this non-native species provides evidence of its high reproductive capacity. In general, the various aspects of the reproductive biology of feral hogs in the United States are intermediate between that of domestic swine and the Eurasian wild boar. However, these various reproductive parameters can vary widely between populations of these non-native animals due to both genetic and environmental factors. Female feral hogs can reach sexual maturity as young as 3-4 months of age; however, most wild sows reach puberty by the time they are one year old. Females of this species are polyestrous, being able to come into estrus every 18-24 days if they are not successfully bred. The ovulation rate typically averages 7-8 shed ova but can range from 3-15. Uterine implantation is biased toward left horn but is typically not significant. The feral hog's gestation period averages 112-120 days and can vary from 100-140 days. Fetal litters in feral hogs average 5-6 embryos/fetuses and range from 1-14. The observed intrauterine mortality in this species is approximately 30%. In general, fetal litters are often male-biased, but this sex composition is normally not significant. There is also an observed shift from male-biased to female-biased composition as the litter size increases. The ovulation rates, litter sizes, and pregnancy rates all increase with the sow's age. Both the nutritional input and reproductive output levels in feral sows are also positively correlated. Sows build a farrowing nest within 24 hours prior to giving birth to provide protection for their offspring. The newborn or neonatal litters in feral hogs average 4-6 piglets and can range from 1-12. Similar to the newborn litter size, the number of lactating teats per sow averages 4-6 and varies from 1-12. As such, the number of lactating teats is highly correlated with the number of piglets in the sow's litter. The litter size in feral sows reportedly decreases after about the 5th-7th litter or 4-5 years of age. The oldest known feral sow, which was documented to still be capable of breeding, was 14 years of age. Similar to the females, male feral hogs are sexually mature as young as 4-5 months of age, and most boars reach puberty within the first year of life. In general, most boars participate in breeding by 12-18 months of age. The testicular weight in feral hogs increases until 3 years of age, and then decreases after 5 years of age. Boars compete in male-male fighting for breeding opportunities with females. Mature boars develop shoulder shields of thickened subcutaneous tissue that protects these animals during male-male fighting. Such fights can be intense, with either or both combatants getting injured, or possibly even killed. Because success in these fights is related to size, most breeding done in feral hog populations is by the larger and older males. Multiple paternity of feral hog litters does occur but is reported to be very uncommon. Reproductive activity can also affect the weights in these animals during certain times of the year. For example, the body mass of mature boars has been reported to drop during the breeding season, with some individuals losing up to 20-25% of their body weight. This is due to a combination of increased testosterone production and the resulting reduced foraging done by these boars at that time. Reproduction in feral hog populations can occur during any month, with both sows and boars being capable of breeding year-round (Fig. 2). Typically there are 1-2 seasonal peaks in breeding. However, annual patterns with one or two seasonal peaks can occur within the same population, varying from year to year. Regional photo-period, rainfall and nutrition all influence the breeding season in a feral hog population. Feral sows are capable of producing more than one litter per year. The production of a second litter was observed to be common when sows lost the entire first litters; however, sows have been breeding while still nursing a litter of piglets. Normally, sows do not conceive when still nursing a litter of piglets. In eastern Tennessee, numerous wild sows were observed to have bred within a month of farrowing, however, very seldom did these females conceive. In addition, when these sows did conceive, only very small litters were produced. Production of multiple litters is more common when food resources are abundant. It is also more common among adult wild sows than younger sows.

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Reproductive Biology Goat Reproductive Physiology

Goat Reproductive Physiology Female with newborn kids.
Due to the temperature conditions in the United States, most goats are seasonal breeders, with more active breeding happening during the seasons with shorter day lengths and a period of little to no breeding during long day lengths. In females, reproduction is controlled by the estrous cycle. This represents the time from one standing heat (estrus) to the next. This cycle is usually 21 days, with the actual time for standing heat being one to three days. This cycle continues throughout the life of the female and is interrupted only by season, pregnancy and lactation (milking). The events of the estrous cycle are controlled by the relationships of the hypothalamic releasing hormones, gonadotropins, and ovarian hormones. Gonadotropin releasing hormone (GnRH) comes from the hypothalamus of the brain and causes the pituitary gland to release follicle stimulating hormone (FSH) and luteinizing hormone (LH). The hormone FSH stimulates the production of estradiol, or estrogen, and inhibin and also promotes follicular growth. Estrogen is responsible for the demonstration of estrus behavior, duct development in the mammary glands and the development of secondary sexual characteristics. Inhibin acts as a negative feedback to inhibit the release of FSH from the anterior pituitary. Luteinizing hormone stimulates ovulation and also promotes the formation and function of the corpus luteum (CL). The CL is the structure that is formed on the mammalian ovary following ovulation. It is responsible for the secretion of progesterone following ovulation. A high concentration of this hormone inhibits the release of GnRH, FSH and LH. It also functions in preparing the uterus for a possible pregnancy and suppressing estrus behavior. Failure to establish pregnancy results in the secretion of the hormone prostaglandin 2-alpha from the uterus that causes regression of the corpus luteum and allows a new estrous cycle to begin. If pregnancy is established, then progesterone will continue to be secreted. Its secretion will maintain pregnancy by decreasing uterine contractions, increasing gland development in the endometrium and promoting the development of the mammary gland. It is the interaction of these hormones and their individual functions that makes it possible to regulate and manipulate the reproductive function of the females. This interaction is the basis of hormonal treatments used in the control of goat reproduction. As previously mentioned, goats experience seasonal anestrus due to the effect of temperature and day length on their reproductive cycle. This condition might prevent the female from conceiving during months when survival of the developing fetus would be low. Pre-attached embryo survival is reduced when the humidity and temperatures are high during the months of summer. Temperature and photoperiod are two main factors that affect the commencement of the breeding season. GnRH secretion is integral to seasonal anestrus. Before the breeding season begins, the hypothalamus must be able to secrete GnRH to elicit the release of FSH and LH in sufficient amounts to maintain follicular development and initiate ovulation in females as well as stimulate testosterone production and sertoli cell function in males. Melatonin secretion is required to stimulate GnRH secretion in order to promote cycling. This hormone is synthesized and secreted during the night hours when it is converted from serotonin through circuitous neural paths. Therefore, light entering the eyes inhibits pineal gland conversion of serotonin to melatonin. The pineal gland acts as a regulator of reproductive activity since it can either stimulate or inhibit gonadal function. During short photoperiods, such as in the fall, the long duration of high melatonin secretion switches on short-day breeders, such as sheep and goats, and switches off long-day breeders likd the hamster. This explains why increased light would cause anestrus in goats, since it inhibits the conversion of serotonin. Goats are therefore considered to be short-day breeders because they begin to cycle during the shorter days of fall. The normal breeding season of goats is during September, October and November, varying for different breeds and areas of the country. It is therefore necessary for treatment strategies aimed at breeding goats outside of their normal breeding season to somehow override the light and pineal control of the hypothalamic-pituitary-gonadal axis in order to induce estrus and ovulation. Previous research has been successful in inducing estrus and subsequent ovulations by not only manipulating the light-dark cycle, but also by the administration of exogenous hormones such as melatonin and gonadotropin-releasing hormone. Reference: P.L. Senger. Pathways to Pregnancy and Parturition

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What are flying ants?

Most ant species, including fire ants, produce flying ants. Often called winged ants or alates, flying ants are fertile male or female ants that can mate. Most of the ants in a fire ant colony are sterile, wingless female workers that cannot mate. All males can fly. They are smaller than the winged females, and they have smaller heads, larger eyes, and a larger thorax. A colony produces several hundred flying ants at a given time. Flying ants leave the colony together in a swarm, often during warm weather after a rain. Mating occurs in the air, usually with ants from other mounds. After mating, males drop to the ground and die, and mated females lose their wings, start new colonies, and become queens.

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Why Pest Inspection is Important to Pest Management

Accurate identification of pests is essential to having an effective pest management program. Knowing the biology of the pest will give you valuable information on how to approach pest management. For example, if you put out mouse traps and have rat, you will have failure in your program. If not noticed in time, the initial failure may increase your problem if reproduction occurs. Identifying your pest will lead you to information about its life cycle, food sources, habitat preferences and natural enemies. Each piece of information you know about your pest will help you to devise a management program that successfully targets your particular problem. To help you identify your pest, you must inspect. Inspection will help you find out what pests you are dealing with, and locations where these pests should be targeted. Some common pests in school environments include cockroaches, ants, rodents, termites, flies, weeds, silverfish, and spiders. Each pest requires a different strategy for management.

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Botrytis Blight of Blueberry

Gray sporulation of Botrytis cinerea.

If there is a late freeze or even cold weather during bloom time, check the flowers and young fruit for the presence of Botrytis blight. If Botrytis is present, there will be a gray-green fuzzy growth on the plant tissues. Botrytis will usually cause losses early in the growing season, but a lot of rainy weather during the spring may also lead to Botrytis problems. It is not recommended to treat preventatively for this disease. Treat only if there is a frost that damages blooms or if there has been a significant cold spell. There are two options for good Botrytis blight control. One is to use a fungicide with the active ingredient fenhexamid and is in the chemistry group hydroxyanilides (FRAC code 17). Another option is to use a fungicide in the multi-site mode of action chemistry group (FRAC code M). This fungicide will be most effective if applied as a preventative spray. Consult your local Cooperative Extension Service office for current fungicide recommendations. Information also can be found in the Southeast Regional Blueberry Integrated Management Guide.

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Saponification in Biodiesel Production

Introduction to Saponification

Saponification is a chemical reaction that involves the production of a metal salt or soap. The reaction involves the attack on a methyl ester, free fatty acid, triglyceride, or other glyceride by a hydroxide ion, -OH. The hydroxide ion implies the presence of water in the system. If water could be eliminated, then there would be no soap formation. However, this is a practical impossibility. There is always some water present, and there will always be some soap formed when biodiesel is made. The exception to this is when a solid (heterogeneous) catalyst is used which does not provide the free metal ions needed to form soap. These catalysts should provide biodiesel and glycerin that are free of soap. In reality, many of these supposed heterogeneous catalysts leach metals ions into the liquid and thus require some clean-up of the reaction products. Soap must be removed from biodiesel after the reaction, and this can be done by either water washing, using a solid adsorbent mixed with the liquid, or by passing the liquid through a packed bed of ion exchange resin. Soap is not formed when biodiesel is manufactured using a supercritical technology that does not require a catalyst.

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What causes dark, firm and dry (DFD) pork?

The causes of this condition in pork muscle is linked to chemical and physicalchanges in muscle before, during and after harvest of the animal. Similar to that of PSE pork, the DFD condition is also related to acid production in pork muscle after slaughter, but the nature of the chemical change is different. PSE develops because of an accelerated rate of acid production while muscle temperature is still high. Conversely, DFD results from a lack of acid production in the muscle.Muscles destined for DFD pork have low levels of glycogen that restricts the amount of acid that can be produced, and limits pH fall. While both normal and PSE muscle end up with similar "ultimate" (final) pH values of about 5.5, DFDmuscle usually has an ultimate pH above 6.0. This reduced acidity provides increased water-holding ability in the lean, tightly binding water to muscle proteins, and contributing to a firm texture. Muscle cells swollen with retained water and tightly packed together absorb more light (darker color), and also restrict how deeply oxygen can penetrate into the tissue to "brighten" muscle pigment. A period of extended stress on the pig, caused by factors such as severe weather, long transport or unfavorable holding conditions, can deplete muscle glycogen and cause the DFD condition in pork muscle.

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How do invasive species cause harm?

Invasive species can cause harm in so many different ways that it isn't practical to cover them all here. So, below is just a sample to give you an idea of how pervasive this problem is. Many of these changes are things you can see happening around you. When a non-native species is introduced into a new environment it is freed from the natural predators, parasites, or competitors from its native habitat. This gives an advantage to non-native species competing with the native species that evolved in the ecosystem. These advantages allow the non-native species to outcompete native species for the available food, water, light, and space. Wherever an invasive plant is growing is where a native plant should be. Invasive species also have the potential to disrupt vital ecosystem functions, such as water flow, nutrient cycling, fire systems, or soil composition. An example of this is the Tamarix species. It not only uses large amounts of water, it changes the soil chemistry, making it more saline. This can adversely affect and prevent the growth of many native plant species. Tamarix has significantly changed the hydrology, soil composition, and plant communities of many habitats in the western United States. An invasive plant may add significantly to the fuel load of an area, either in mass or because it contains volatile compounds. This can mean that fires burn hotter and faster than the native plants in that habitat have evolved for. After such a fire, the invasive plant quickly germinates or resprouts while the native plants are either killed or perhaps recover much more slowly. Changes that damage native plant communities also affect the wildlife communities that depend on them for food and shelter. A wide range of effects have been seen in wildlife communities in these situations. Some animal species populations are reduced while others are increased. Someare even pushed to the point of extinction. Butthe overall trend seems to be a reduction in diversity. Even in cases where the same number of species are actually present, the balance between the species has been changed. We do not yet know what many of these changes herald for the future. Invasive species can damage or contaminate crops from soybeans to pine plantations, greatly increasing costs to the agricultural industry and, in turn, to the American public for both food and other products. Industries such as the cattle industry can be affected when invasive plants that are basically inedible by cattle, infest ranges or contaminate forage. Other services such as electricity have cost increases resulting from the management and control of invasive species. A great deal of money is spent by power companies to keep invasive plants from growing in right of ways, up poles, onto buildings, and along power lines under control. Natural areas used for recreation can be affected by invasive species. For example, Chinese privet and other invasive shrubs, trees, and vines can take over both clearings and the understories of forests making hunting, hiking, biking, and camping difficult or impossible. Any body of water, river, or stream is especially vulnerable to invasive species. Water by its nature allows for much easier movement for invading organisms. The news has many examples of aquatic-invasive species that can and have spread very quickly causing significant changes in a very short period of time. From water hyacinth to lion fish or Asian carp, aquatic species are causing damage to these ecosystems and the organisms that inhabit them. It is often difficult, and sometimes impossible, to fish, boat, or swim on a lake covered by invasive plants. People have been hospitalized due to injuries received while boating on rivers infested by the Asian carp, which can easily leap over a boat.

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How is agroterrorism different from bioterrorism?

Agroterrorism is an actual or threatened attack against any segment of the agricultural or food system designed to cause economic injury, disruption of the production system, human disease or political change. It may include, but is not restricted to, use of chemical, biological, or radiological agents Bioterrorism is the actual or threatened use of biological agents against individuals, business, government, or a population.The terms are closely related. Biological agents are one of the most probable agents used in agroterrorism. However, chemical or other agents can also be used in agroterrorism, and chemical agents are not defined as bioterrorism.

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Nutrient Imbalance and How to Correct It

Soils in urban areas may have a nutrient imbalance. If there are inadequate nutrients, tree growth and development will be affected. Nutrient imbalances are often caused by high pH levels, low soil fertility, or high salt content.

High or Low Soil pH

Urban soils may have a high or alkaline pH because construction materials, such as mortar and concrete, are often spilled or left on the soil. The addition of this calcium-based material, which is alkaline, raises the soil pH. Some species of trees need an alkaline soil, but other species can not tolerate a high pH level. A high pH may also cause chemical reactions with nutrients in the soil that render the nutrients unavailable to the tree. Iron, for example, becomes unavailable for a tree's growth processes when soil pH is alkaline. Sulfur may be added to soil to lower the pH. Tolerance to the local soil conditions needs to be considered when selecting a tree to plant in an urban area.

Low Soil Fertility

Soil fertility can be low in urban environments. Common causes are: Topsoil and organic matter are often removed from a site during construction. Leaves are removed from the soil surface and not allowed to decompose. This reduces the amount of nitrogen, phosphorus, and other nutrients in the soil. Biological components and organisms are not as common in urban soils. This limits soil aeration and the addition of organic matter to the soil. Changes in soil chemistry may influence the availability of soil nutrients, interrupting the nutrient cycling process.

High Salt Content

The salt level in soils may be elevated because of de-icing salts, excess fertilizer, or irrigation water high in soluble salts. This can be a problem, particularly in areas with low rainfall and extensive use of irrigation and fertilizer (Harris 1992). A soil that is high in salts has less water available to the roots. Sometimes salts can even draw moisture out of the roots. High salt levels can sometimes be reduced by leaching the salts with proper watering techniques. A symptom of high salt content in the soil is browning of leaf edges. If the soil does have a high salt content, select a species that is tolerant to high salts.

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Rangeland Resources For Teachers and Students

K-12 Teaching Resources

Science education in K-12 classrooms integrates concepts from a variety of disciplines, offering excellent teaching opportunities for enhancing young learner's awareness of natural ecosystems. No matter if you are a teacher from a rural or urban community, you can actively engage youth in classroom and outdoor activities focused on rangeland science. For example, subject areas include botany, ecology, soils, watersheds, wildlife, herbivory and grazing management, and human dimensions. Below are a few examples of rangeland teaching resources, including curricula and programs. Just like land ownership and vegetation patterns vary from west to east and geographic region, keep in mind that rangeland ecological concerns also vary by region. Teacher Resource Guide for Rangeland Principles - a 6-module curriculum related to western rangelands. It includes clear learning objectives with powerpoint presentations, activities, background materials and reading guides. This resource is targeted at grades 9-12. Developed by the University of Idaho and the Idaho Rangeland Resource Commission. Prairie Project - an educational tool related to the prairie ecosystem with a variety of lesson plans including sections on animals, energy, fire, grazing, and plants. These tools are separated into grades K-4, 5-8, and 9-12. Developed by Oklahoma State University Extension and Department of Natural Resource Ecology and Management. Rangelands Curriculum for Texas - a comprehensive curriculum with 27 lessons that include field and classroom activities, games, and community resources. Developed for grades K-6. Developed by the Welder Wildlife Foundation. Idaho Rangeland Lessons and Activities - a virtual grab bag of lessons and activities that include rangeland plants, animals, and ecoregions. These materials for grades K-12. Developed by the Idaho Rangeland Resource Commission. BLM Teaching Resources - a variety of lessons that cover topics related to public lands management, including energy, native plants, recreation, wildfire, and weeds. Materials are for ages K-12. Developed by the Bureau of Land Management.

Teacher Continuing Education

Simply getting teaching resources into the hands of professional K-12 educators does not always lead to classroom implementation. We experience that teachers are much more comfortable teaching about rangeland science concepts when they have received training. Some universities offer summer continuing education opportunities and workshops focused on rangeland topics. If you are a teacher, you should check with your local university members of the Range Science Education Council, state and national teacher associations, state Rangeland Extension Specialists, or state agricultural program leaders.

Higher Education Resources

Range at a Distance: Catalog of Distance Format Rangeland Resources - a searchable database for students or working professionals who are interested in finding information about rangeland courses offered either online or in distance-format. Developed by the Range Science Education Council. Rangeland Careers - learn about what kinds of job opportunities are available by meeting some of the people who have graduated from a university offering rangeland degrees. Developed by the Range Science Education Council.

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Hands-On Nutrition Education: No Field Trip Required!

Extending the learning environment beyond the classroom is a great way to engage students with hands-on activities and fresh perspectives and you don't have to leave the school grounds to provide students with valuable hands-on nutrition education! The food service professionals at your school play a daily role in students' nutrition. They are a key resource as they incorporate national nutrition guidelines as well as students' preferences when planning menus. Nutrition education is about more than reading labels, and food service professionals can offer students insights into selecting, preparing, and enjoying healthy foods. Furthermore, students can learn to see the lunchroom as a place to practice healthy eating rather than a place to indulge between classes. Let's Go!, a program designed to combat childhood obesity, offers some ideas of educational activities that involve the lunchroom and food service staff. Lessons geared towards young children, like "Eat Your Way Though the Rainbow," aim to provide a connection between the classroom and the lunchroom. Activities for middle school students include learning about portion sizes and basic nutrition lessons. For more nutrition lesson ideas, check out the following worksheets from Let's Go!: Cafeteria to Classroom Connection Cafeteria as Learning Lab Also consider inviting the school nurse, health teacher, physical education teacher, or PTO/PTA members to guest teach in your classroom to give students more insights about the importance of good nutrition. The more areas of the school that embrace and teach healthy eating, the better students will understand how good nutrition impacts their whole life.

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Farm to School Resources- Colorado Department of Education

The term "Farm to School" often suggests images of freshly picked produce waiting to be shipped to your local school district, but how these products actually get from field to cafeteria is another story. Districts must not only consider cost and convenience, but food safety and procurement regulations as well. That being said, Farm to School can seem a bit overwhelming. The Colorado Department of Education Office of School Nutrition (CDE OSN), has compiled some resources to assist districts in implementing a successful Farm to School program. If it's program operations information you're looking for, the Colorado Farm to School Task Force has you covered. Started in 2010 through a grant funded by the Colorado Department of Agriculture, the task force provides webinars, evaluation and marketing tools, food safety information and maps of surrounding schools participating in Farm to School. . They hold quarterly meetings open to all who are interested. Get inspired by checking out their Farm to School Champions webpage where you can read success stories from a variety of districts. Do procurement regulations have you worried? Don't fret. The USDA's Procuring Local Foods for Child Nutrition Programs guide contains ready-to-use information about menu planning and buying local. Speaking of buying local, Colorado Proud's, Colorado Produce Calendar indicates what produce is in season during each month (an easy way to help decrease the cost of local produce). . Moreover, creating a bid for procuring local foods has been made simple with the Farm to School Bid Template. Whether you are looking to revamp your school meals program with Farm to School or simply add more local options to your menu, we probably have the resource you're looking for. If you call someplace other than Colorado home, be sure to check with your local state agency for any specific Farm to School regulations in your state. Additionally, The USDA Farm to School website contains great resources as well.

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Introduction to Biomass Combustion

Combustion of biomass used to heat greenhouses.

Fire, or combustion of biomass, is arguably the oldest known and most widely used controllable energy source on earth. In recent years, rising costs of fossil fuels and the development of advanced equipment have made biomass combustion an economical, efficient, and practical energy source.

Principles of Combustion

Combustion is familiar to all of us, but many do not realize that it is essentially a chemical reaction. In the process of combustion, two ingredients (biomass and oxygen) are combined in a high temperature environment to form carbon dioxide, water vapor, and heat. $CH_{1.44}O_{0.66} + 1.03\ O_2 = 0.72\ H_2O + CO_2$ (+Heat) Note: $CH_{1.44}O_{0.66}$ is the approximate chemical equation for the combustible portion of biomass. The amount of heat that is produced varies depending on species, climate, and other factors, but it is generally about 20 Megajoules of energy per dry kilogram of biomass. In order for combustion to be efficient and clean, the ingredients must be well mixed at the right temperatures for the right amount of time. Practically speaking, this means that you need the right amount of fuel, the right amount of air, and the right conditions. Water content in biomass is an important factor when it comes to combustion. The best burning fuels are dry. However, biomass almost always includes some amount of moisture. For example, green wood chips are usually about 50% water and 50% dry matter. Fresh leaves from a plant can be as high as 95% moisture and 5% dry matter. Ideally, biomass should be no more than 20% moisture.

Feedstocks for Biomass Combustion

A feedstock is merely the fuel that will be burned for energy. While wood is the most common feedstock for biomass combustion, almost any plant material can be used as a combustion feedstock.

Processing Biomass for Combustion

Biomass can often benefit from a certain amount of processing to make it more suitable as a combustion fuel. This includes sizing, drying, and/or densification.

Utilizing Biomass as an Energy Source

The smoky fireplace of past generations is a far cry from the combustion equipment that is available today. While those old fireplaces are still used in some homes, high-efficiency biomass combustion requires carefully designed and operated equipment that works well with the available fuel. Depending on your needs, biomass combustion systems can produce hot air, hot water, steam, electricity, or a combination. To find out more about equipment, efficiency, and air quality from biomass combustion, see Using Combustion Heat for Energy.

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Safe Chemical Handling in Biodiesel Production

Introduction

Biodiesel is a relatively safe product. It is considered nonflammable and biodegradable. However, the components to make biodiesel can be hazardous in some situations. Biodiesel is made by reacting vegetable oil or animal fat with an alcohol (methanol or ethanol) and a catalyst (sodium hydroxide or potassium hydroxide). Sulfuric and hydrochloric acids are also used in biodiesel production. Methanol, the catalysts, and the acids are toxic chemicals. Methanol is colorless and tasteless and can cause blindness or death if it enters the body through the nose, mouth, or skin. It is a cumulative poison: repeated, brief exposures can cause a toxic reaction. Methanol is also very flammable and burns with an almost invisible flame, making the fire difficult to see. Methanol vapors are heavy, and can travel along the ground to a source of ignition. See Handling Alcohols in Biodiesel Production for more information on safely handling methanol. Sodium hydroxide and potassium hydroxide are strong bases which can burn unprotected skin and kill nerve cells before pain can be felt. When sodium hydroxide or potassium hydroxide is mixed with alcohol and stirred, a fine mist can be produced which can cause irritation to the respiratory tract. See Handling Strong Bases in Biodiesel Production for information on safely handling these chemicals. Sulfuric and hydrochloric acids can cause chemical burns; eye, nose, and throat irritation; and shortness of breath, in addition to more serious injuries. See Handling Strong Acids in Biodiesel Production for information on safely handling these acids.

Government Help and Resources

The Occupational Safety and Health Administration (OSHA) requires that material safety data sheets (MSDS) be provided by chemical suppliers. It is imperative to have these sheets prominently displayed and within easy reach of personnel who come into contact with these materials. These sheets should cover the range of all products used in the plant. They provide the key to treatment in case of an accidental exposure and/or spill as well as some preventative measures. The National Research Council has developed a 448-page lab safety publication: Prudent Practices in the Laboratory: Handling and Disposing of Chemicals. This publication can be purchased or read online for free at the above link. It recommends that a chemical hygiene plan be instituted in every lab, including adequate ventilation and clearly stated guidelines for minimum exposure to hazardous chemicals. The plan should also include an employee training plan, adequate record keeping, signs and labels indicating potential hazards and safety procedures, and procedures for spills and accidents. The Emergency Planning and Community Right to Know Act (EPCRA) was passed to allow governments and communities to know about hazardous chemicals in their area. This law requires facilities to appoint an emergency response coordinator and to notify the State Emergency Response Commission and Local Emergency Planning Commission of the presence of any "extremely hazardous substance" if it has such a substance in excess of the substance's threshold planning quantity.

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Biodiesel Production Principles and Processes

Introduction

The process to make biodiesel involves a chemical reaction. This means that the biodiesel industry is a chemical industry. Those involved in making biodiesel must have a good understanding of the underlying chemistry to ensure they are making quality fuel in a safe manner. Find these topics and many other related Farm Energy media resources at the Farm Energy Media archive. Biodiesel is an alternative fuel for diesel engines that is produced by chemically reacting a vegetable oil or animal fat with an alcohol such as methanol or ethanol. In words, the reaction is: Oil + alcohol ? biodiesel + glycerin The photo shows a bottle of biodiesel and glycerin (also called glycerol). The biodiesel is the lighter-colored layer at the top. The darker-colored crude glycerin has settled to the bottom. It is important to realize that unmodified vegetable oil, sometimes called straight vegetable oil (SVO) or waste vegetable oil (WVO), is not biodiesel. Some people have used SVO or WVO in diesel engines with varying degrees of success. The primary problem is the high viscosity and low volatility of the unmodified vegetable oils. Without exception, U.S. engine manufacturers have recommended against the use of SVO and WVO. More discussion of SVO and WVO can be found here. Biodiesel is usually preferred over SVO and WVO because the chemical reaction converts the oil or fat into compounds that are closer to the hydrocarbons found in regular diesel fuel. The chemical reaction that converts a vegetable oil or animal fat to biodiesel is called "transesterification." This is a long name for a simple process of combining a chemical compound called an "ester" and an alcohol to make another ester and another alcohol. Oils and fats are included in the ester family. When they react with methanol or ethanol, they make methyl or ethyl esters and a new alcohol called glycerol or, more commonly, glycerin. The vegetable oils and animal fats used to make biodiesel can come from virtually any source. All of these products consist of chemicals called triglycerides, so biodiesel can be made from soybean oil, canola oil, beef tallow, and pork lard, and even from such exotic oils as walnut oil or avocado oil. Even used cooking oil or waste oil can be used to make biodiesel. However, these oils present special challenges for biodiesel production because they contain contaminants such as water, meat scraps, and breading that must be filtered out before the oil is converted to biodiesel. Methanol is the most common alcohol used for making biodiesel. It is sometimes called methyl alcohol or wood alcohol. It is very toxic, and swallowing as little as a spoonful can cause blindness or even death. Dangerous exposure can also occur from breathing methanol vapors or absorbing methanol through skin contact. In the United States, ethanol is usually more expensive than methanol, so it is used less frequently to make biodiesel. It is the alcohol that is found in alcoholic drinks, so it is not toxic in small amounts. However, it is subject to very challenging government regulations because of the tax requirements associated with alcoholic beverages. The chemical reaction used to make biodiesel requires a catalyst. A catalyst is usually a chemical added to the reaction mixture to speed up the reaction. Since the catalyst is not consumed in the reaction, it will be left over at the end in some form. In biodiesel production, the actual compound that catalyzes the reaction is called methoxide. One common way to make methoxide is to dissolve sodium hydroxide or potassium hydroxide in methanol. Large producers buy a solution of sodium methoxide in methanol that is much safer to work with. High-quality biodiesel is defined by compliance with the American Society for Testing and Materials (ASTM) specification D6751. Fuel testing to verify compliance can be expensive, especially for small producers, but it is the most reliable way to ensure that fuel consumers will have access to high-quality fuel.

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How to Obtain Continuing Education Units for Military Families Personal Finance Webinars

The Military Families Learning Network Personal Finance team offers 1.5 continuing education units to AFC-credentialed participants for live and recorded personal finance webinars.

Procedures for obtaining CEUs via live webinars

AFC-credentialed participants can earn 1.5 CEUs by attending 90-minute online Personal Finance webinars that are presented online with a live speaker. A link to an online evaluation is shown at the end of the webinar. Visit this link and complete the evaluation. At the conclusion of the evaluation, a second link to the post-test quiz is shown. Click on this link and complete the post-test quiz. Successfully pass the quiz with a score of 80% or higher. Participants scoring 80% or higher will receive a Certificate of Completion via email. Participants will use this Certificate to obtain their CEUs from AFCPE (up to the maximum limit allowed) by following the instructions available on their website here.

Procedures for obtaining CEUs via recorded webinars

AFC-credentialed participants can earn 1.5 CEUs by watching a recording of our live webinars and taking a short quiz on the material covered. A score of 80% or higher is required to earn a Certificate of Completion. For webinars presented prior to March 2015, participants must create an account on campus.extension.org. For webinars presented in or after March 2015, use the post-test link provided on the learn.extension.org page for that webinar. Participants must watch the desired recorded webinar. Complete the evaluation, followed by the quiz. Participants must complete the quiz associated with the webinar and score 80% correct or higher. Participants who score 80% or higher will receive a Certificate of Completion immediately if using campus.extension.org and via email if taking quiz from Qualtrics link. Participants will use this Certificate to obtain their CEUs from AFCPE by following the instructions on their website here.

The award of all CEUs are subject to AFCPE's requirements and are contingent on AFCPE's guidelines. Participants must also agree to the Military Families Learning Network's Code of Ethics.

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Food, Fun, and Education: How to Include Healthy Foods in Classroom Games

Education is getting more complex for the teachers, yet the need for healthy lifestyle choices is constantly growing. Everyone loves a good game, whether it's a board game, simulation game, or a gaming device. Games can also be educational tools; Ed Dieterle, a Senior Program Officer for Research, Measurement and Evaluation for the Bill and Melinda Gates Foundation, said that "for a student sitting in the median who doesn't have a game, his or her learning achievement would have increased by 12% if he or she had that game." Shapiro's study also found that "play is useful because it stimulates real life experience – physical, emotional and/or intellectual – in a safe, iterative and social environment, not because it has winners and losers. The achievement lies in the act of learning and understanding itself." Many teachers have already realized using beneficial game-based learning strategies can be quite effective, others are still hesitant or overwhelmed at finding good ways to engage the students in learning and games. Incorporating games into healthy lifestyle choices is a way to make eating and choosing healthier options less intimidating, including games in school curriculum is also a good way to make learning fun and memorable. A few tips for including games in the classroom are listed below, Use Competition – students love to compete as long as they aren't losing too much. Having relays, using timed-answer games, including an educational version of games like Jeopardy, Family Feud and others are great ways to get kids excited about educational and nutritional information. Keep Education – mix in fun activities with the existing educational materials. If you're having a pre-test study, or review, turn it into a game by seeing which group of students can get the most answers. Simple things like dividing the classroom and giving a small reward to the winning team will motivate, but be sure to mix the student groups up so everyone gets a chance to be recognized. Have a jingle-contest to see which student can make the most creative song with the material you're covering. Review the Game– at the end of each game, give the students time to think out loud about their answers, what they learned or what questions they may have. As the teacher, be sure to ask questions to facilitate educational input. Go over educational information as well as why it's important to eat healthy. If you can tie facts with something they enjoy, odds of memorization is greatly improved. You can also find games explained in greater detail here. The use of tablets is also quite popular in some school districts, using educational based games on forms of technology allows students to learn through technology. Check with local Extension Offices or school boards to find education based nutrition aps and games that can be used to teach in the classrooms. Many games are already employed in the classrooms, adapting them to have healthy rewards or adding some nutritious information is often quite simple. Many times, having subtle changes will bring healthy choices to the forefront of a student's mind. Making small adaptations to the current curriculum is easy. Below are some simple ways to include healthy food into discussions: When working on math word problems, use healthy foods or exercises in examples. To study ratios, get the classroom out of their chairs and move them around. In social studies classes, look at what different peoples eat and their dining practices and even how differing diets affect health. In younger classrooms, have the students get moving by acting out historical events. In science, when talking about plants or working on science projects grow something healthy and let the kids try it once it's ripe. Talk about the ways foods effect growth. A great active game would be to have the youth demonstrate the cycle of growth – a small seed (curl up as small as you can), growth (have them stretch upwards), have winds, rain, intense sunlight or an earthquake (students sway, wither, shake or stretch higher). Incorporating games in the classroom can enhance learning, increase fun, and get the students interacting on a positive level with their fellow classmates.

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Impact of Financial Literacy Education

Brief Description: This study examined the impact of a personal finance course on a sample of high school graduates who were followed for five years after graduation. Students who took the course were compared to those who had not and were not found to be any more financially literate. In addition, students who took the course did not evaluate themselves to be more savings-oriented and did not appear to have better financial behaviors than those who had not taken the course. Being a full-time college student or graduate, however, did positively and significantly impact financial behavior.

Implications: Findings of this study raise questions about the long-term effectiveness of high school financial literacy courses and their ability to improve students' financial decision-making in later life. This finding is consistent with several previous studies. Current content and/or methods used to teach personal finance may need to be reconsidered (e.g., increased use of methods with interactivity). This recommendation is consistent with studies by the Jump$tart Coalition which found that high school students who play a stock market game are significantly more financially literate than those

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Regional Centers of Excellence in Nutrition Education and Obesity Prevention – National Coordination Center located at the University of Kentucky

In fiscal year 2014, the USDA established the Regional Nutrition Education and Obesity Prevention Centers of Excellence (RNECE) to demonstrate the effectiveness of the SNAP-Ed and EFNEP programs and to identify changes to improve both programs. The RNECE will supplement and enhance ongoing program monitoring efforts and evaluation activities to strengthen the evidence-base of SNAP-Ed and EFNEP programs by assuring their effectiveness, innovation, replicability, sustainability and cost-effectiveness. The collaboration between NIFA and FNS has provided funding for one National Coordination Center and four Regional Centers. National Coordination Center: University of Kentucky North Central Region: Purdue University Northeastern Region: Cornell University Southern Region: University of North Carolina at Chapel Hill Western Region: Colorado State University AFRI recently released a request for funding that plans to support an additional Regional Center and one Signature Research Project. The overarching goal of the RNECE is to improve the health of low-income Americans by fostering a culture of health through multiple strategies, including nutrition education and complementary public health approaches implemented at each level of the socio-ecological framework through policy, systems and environmental changes. The work of the RNECE will build the evidence-base for nutrition education and obesity prevention strategies and interventions that produce measurable improvements in health, obesity, nutrition, and physical activity-related outcomes; and develop effective education, extension, environmental, systems and policy translational activities that promote health and prevent/reduce obesity in disadvantaged low-income families and children. Findings from RNECE will be communicated to all EFNEP and SNAP-Ed implementing agencies, the scientific community and the general public. Please visit our website to learn more about the work of the Centers of Excellence: www.rnece-ncc.org.

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National Feed Management Education Project

The National Feed Management Education Project was started in 2005 with the goal to increase the understanding of agricultural professionals about the area of Feed Management, with an emphasis on Environmental and Financial Sustainability of Livestock and Poultry Operations. The education project has been funded by the USDA-Natural Resources Conservation Service (NRCS) Conservation Innovation grant program. A primary outcome of the project has been a process for the implementation of the Natural Resources Conservation Service's Feed Management 592 Practice Standard for beef, dairy, poultry, and swine. The primary audiences for the education program are: Animal Nutritionists, NRCS staff Conservation District staff private nutrient management planners Meet the National Feed Management Education Team Access the Products From the National Feed Management Education Project

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What is slope, and why is it important?

Slope can be defined as the angle, inclination, steepness, or gradient of a straight line. Slope often is used to describe the steepness of the ground's surface. Slope can be measured as the rise (the increase in elevation in some unit of measure) over the run (the horizontal distance measured in the same units as the rise). Many geographic information systems (GIS) can analyze digital elevation data (elevation points, contour lines, digital elevation models, etc.) and derive both slope and aspect data sets. Slope is an important landscape metric. Some examples of its applications include:- to help describe landforms,- to model surface runoff, - to characterize habitat, - to classify soils, - to assess the potential for development, and - to model wildfire risk.

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Composting and the Benefits: Achieving Practice Change through Education to Reduce Nutrient Loads and Increase Adoption of Best Management Practices

Purpose

Florida houses roughly 500,000 horses and is also home to 700 freshwater springs; Marion County is, "Horse Capital of the World" and houses two first magnitude springs and each is currently in a restoration plan with the Florida Department Environmental Protection Agency (FDEP). The Florida Department of Agriculture and Consumer Services (FDACS) equine Best Management Practices (BMP) Manual recommends composting as an excellent manure management option. Composting is a controlled biological process that decomposes and heats up organic material to produce a biologically stable humus, which can then be used as a rich soil amendment. Composting provides protection to the ground and surface waters by preventing excess nutrients from being leached out and running-off into the waters. It destroys up to 90% of weed seeds contained in manure and kills parasite eggs and pathogens. Additionally, the organic matter/compost helps prevent and control soil erosion and can improve both soil quality and productivity.

What did we do?

Individual and group programming has been developed to educate farm owners and managers about the benefits derived from composting horse manure/spent bedding. Since 2007, Over 800 farms have been seen in the county. In 2013 alone, 132 participants were involved in individual farm consultations or farm revisits, group presentations and composting workshops. Education was provided and supplemental materials were developed for clientele about composting manure, compost bin construction and composting's soil-improvement capabilities.

What have we learned?

Pre and post-test results showed a 62% (82 of 132 total participants) knowledge gain from information taught. A total of 71% (n=12 of 17 farm revisit consultations) of farms revisited improved and adopted recommended manure handling practices after receiving education. Additionally, seven farms and facilities have begun cost-share planning with Southwest Florida Water Management District (SWFWMD) for compost bin construction. Results/impacts show improved management practices and a greater understanding of BMPs, allowing for a decrease in nutrient levels to the ground and surface waters. Pictures show sample bins which were constructed as a result of individual and group programming.

Future Plans

Continued group and individual programming needs to be continued, in partnership with trade journal articles being written about manure management, protection of the ground and surface waters and the benefits derived from composting manure/bedding. Cost-share dollars, coming from state organizations, will further incentivize farms to construct and use compost facilities as part of a regular manure management plan.

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Not interested at all — Very interested

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What is the difference between raster and vector data?

Raster and vector are two very different but common data formats used to store geospatial data. Vector data use X and Y coordinates to define the locations of points, lines, and areas (polygons) that correspond to map features such as fire hydrants, trails, and parcels. As such, vector data tend to define centers and edges of features. Raster data, on the other hand, use a matrix of square areas to define where features are located. These squares, also called pixels, cells, and grids, typically are of uniform size, and their size determines the detail that can be maintained in the dataset. Because raster data represent square areas, they describe interiors rather than boundaries as is the case with vector data. Vector data are excellent for capturing and storing spatial details, while raster data are well suited for capturing, storing, and analyzing data such as elevation, temperature, soil pH, etc. that vary continuously from location to location. Raster data formats also are used to store aerial and satellite imagery.

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How Teachers Can Include School Gardens in the Classroom Curriculum

School gardens are cropping up around the country as multi-faceted experiential learning labs. With the increased emphasis these days on high-stakes testing and data collection, many educators are looking for more innovative ways to present subject matter that balances academic achievement with fostering a love of learning. Research and common sense agree that the best learning environments include a variety of verbal, written, and hands-on activities for each lesson. Although new technology is playing a vital and growing role in modern education, many professionals are also seeking ways to connect students back to their environment, and instill greater life skills and a sense of community in their classrooms. Many of these skills, once taught at home, seem to be left more and more to schools. What can you teach in a school garden? What can't you teach? Most obviously, school gardens are perfectly suited to science curricula. Units such as: seed germination, plant parts, life cycles/metamorphosis, the water cycle, habitat, temperature, weather/climate, and environmental science can all be explored. Students can practice scientific inquiry and higher-order thinking in a live setting. What's more, if they bring their harvest back to the classroom to cook, they can explore the wonders of kitchen science. Math is another natural fit for school gardens. Designing, prepping, and planting garden beds affords a lot of measurement practice; as does weighing the harvest. Cooking from the garden lends itself to lessons of capacity, volume, and an exploration of fractions through measurement. Since much of all culture is centered around food, deciding what to plant, how to plant it, and how to prepare the bounty can open up infinite possibilities for social studies and multi-cultural exploration. Lesson on native foods, natural resources, early agriculture, cultural celebrations, spice trade, and traditional methods of preparing and preserving foods can all be taught in school gardens. For older students, discussions on food policy and food justice unfold as students develop a deeper understanding of where food comes from and how it makes its way to our plate. Although Language Arts may seem like a less-obvious fit for the garden, the natural world has always been a source of inspiration for poetry and creative writing. It can also be a soothing environment for reflection or for read-aloud time. In fact, there is no end to the supply of books of every genre about gardening, food, and cooking to inspire readers of all ages. Alongside lessons in core academics, gardening teaches vital life skills. One of the most exciting things about engaging youth in school gardens is the way it develops an appreciation of the natural world and a sense of interconnectedness that children may not experience in other areas of education. Planting a garden requires teamwork, patience, and perseverance. Caring for a living thing, watching it grow and thrive, and reaping the harvest teaches respect, pride, and commitment. Although these skills are rarely tested, or recorded, these are the lessons that will stick with students throughout their lifetime.

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What's the difference between a supervised and unsupervised image classification?

Two major categories of image classification techniques include unsupervised (calculated by software) and supervised (human-guided) classification. Unsupervised classification is where the outcomes (groupings of pixels with common characteristics) are based on the software analysis of an image without the user providing sample classes. The computer uses techniques to determine which pixels are related and groups them into classes. The user can specify which algorism the software will use and the desired number of output classes but otherwise does not aid in the classification process. However, the user must have knowledge of the area being classified when the groupings of pixels with common characteristics produced by the computer have to be related to actual features on the ground (such as wetlands, developed areas, coniferous forests, etc.). Supervised classification is based on the idea that a user can select sample pixels in an image that are representative of specific classes and then direct the image processing software to use these training sites as references for the classification of all other pixels in the image. Training sites (also known as testing sets or input classes) are selected based on the knowledge of the user. The user also sets the bounds for how similar other pixels must be to group them together. These bounds are often set based on the spectral characteristics of the training area, plus or minus a certain increment (often based on "brightness" or strength of reflection in specific spectral bands). The user also designates the number of classes that the image is classified into. Many analysts use a combination of supervised and unsupervised classification processes to develop final output analysis and classified maps.

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What is the family life cycle?

The family life cycle is a series of stages through which a family may pass over time. Typical stages in family development include the periods of a single young adult, a newly married couple, a family with young children, a family with adolescents, launching the children, and a family in later life. The family life cycle emphasizes the effects of marriage, divorce, births, and deaths on families, as well as changes in income, expenses, and assets.

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Using Learning Centers in Child Care

Learning centers are a purposeful way of dividing up your classroom into different subject/learning areas. The location of each learning center, placement of any furnishings or equipment, and easily available materials give a clear message to the child about what is to take place in that area.

Planning for Learning Centers

Establishing the centers requires some initial planning, work, and possible expense, but once they are established they save time and money. For example, you don't want to place the reading area (quiet and comfy) near the block, music, or dramatic play areas (loud and active). You also probably want the art center on hard, easy-to-clean floors and near a sink, but the science center near a window or other source of natural sunlight. Learning centers capitalize on children's natural need to explore because they are given the chance to gain experience by trying out their own ideas in a hands-on way. Once established, you can write your lesson plans according to each learning center to make sure you're offering something to enhance each subject. Then you can easily set up your planned activities for the morning/afternoon in each corresponding center, and children can play in whatever center interests them.

Advantages of Learning Centers

Discipline problems are reduced because groups are limited to a number which can reasonably function in each area. Classroom management is easier since children are in the area of their choice and interest. Children are engaged in hands-on activities as they explore and experiment. Caregivers can support children by supplying the resources as they learn by themselves. Caregivers can determine, by observation, the progress of the children. Caregivers can easily determine what items need to be added to each area that will encourage children in further discovery. Children understand classroom rules more easily when they apply to specific areas. Each area contains only the essentials that allow children to control and create. The purpose of the area is clear and understandable to children.

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What does it mean to foster distinctive, attractive communities with a strong sense of place?

What does it mean to foster distinctive, attractive communities with a strong sense of place?
The Smart Growth Tenet: Foster distinctive, attractive communities with a strong sense of place that reflect the values, culture and vision of residents through the growth and history of their community.
Why is fostering distinctive, attractive communities with a strong sense of place important?
Communities with a strong sense of place build on their unique history, identity and assets to foster community pride, increase social interaction and market their community to potential businesses and residents. The results can improve economic stability, increase property values and greatly impact the lives and memories of residents. Urban sprawl is creating a new image for growing communities that is commonly referred to as "Anywhere USA." The monotony of this sprawling development pattern moves people farther away from our town centers and from each other. The results have led to the loss of millions of acres of farmland and open space, disinvestment in our cities and decreases in social interaction, diversity and civic pride. To create a distinct image and maintain a sense of place, many communities are investing in their history as the foundation for new growth.
How do you apply this tenet to your community?
Investing in your community's unique assets and history can create a situation where residents will become your greatest ally in guiding growth that benefits the entire community. Involving the public in planning decisions and community improvement projects is the first step in building a sense of place. While the greater public should be intimately involved in creating a vision for the community, it is the role of government officials to use the zoning ordinance, site plan review, capital improvement planning and state and federal assistance to make this vision a reality. Communities that are effective in implementing this tenet have consistent policies and regulations in place that create synergy between preservation efforts and new development and are always looking for ways to improve by building sense of place.

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What is a spectral signature in remote sensing?

Features on the Earth reflect, absorb, transmit, and emit electromagnetic energy from the sun. Special digital sensors have been developed to measure all types of electromagnetic energy as it interacts with objects in all of the ways listed above. The ability of sensors to measure these interactions allows us to use remote sensing to measure features and changes on the Earth and in our atmosphere. A measurement of energy commonly used in remote sensing of the Earth is reflected energy (e.g., visible light, near-infrared, etc.) coming from land and water surfaces. The amount of energy reflected from these surfaces is usually expressed as a percentage of the amount of energy striking the objects. Reflectance is 100% if all of the light striking and object bounces off and is detected by the sensor. If none of the light returns from the surface, reflectance is said to be 0%. In most cases, the reflectance value of each object for each area of the electromagnetic spectrum is somewhere between these two extremes. Across any range of wavelengths, the percent reflectance values for landscape features such as water, sand, roads, forests, etc. can be plotted and compared. Such plots are called “spectral response curves” or “spectral signatures.” Differences among spectral signatures are used to help classify remotely sensed images into classes of landscape features since the spectral signatures of like features have similar shapes. The figure below shows differences in the spectral response curves for healthy versus stressed sugar beet plants. The more detailed the spectral information recorded by a sensor, the more information that can be extracted from the spectral signatures. Hyperspectral sensors have much more detailed signatures than multispectral sensors and thus provide the ability to detect more subtle differences in aquatic and terrestrial features.

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The Building Blocks of Climate Models

In a virtual system, climate models attempt to integrate as much as possible the known factors that influence climate, from the transfer of atmospheric heat into the oceans to the reflection of solar rays by polar and mountain ice. From the climate modeler's standpoint, the processes that control the climate can be expressed by mathematical equations derived from scientific laws, empirical data, and observations. These equations are converted into computer language and, along with information about the Earth's geography - such as topography and vegetation - form the basis of a climate model. To understand how a climate model is constructed, it helps to think of the Earth's climate as a complex system of many interacting parts that include the atmosphere, oceans, land surface, and sea and land ice. Atmosphere models are the oldest and evolved during the 1960s. They have at their core the equations for fluid motion, which describe air movement, and the first law of thermodynamics, which relates to the conservation of energy, including heat. Ocean component models followed atmospheric models and were built to simulate ocean currents, salinities, and temperatures. By 1970, the first model integrated the atmosphere and ocean components into what is commonly referred to as atmosphere-ocean general circulation models, or coupled GCMs. Researchers continue to refine these coupled GCMs, by improving their resolution, for example. Models that go beyond climate, such as Earth system models, remain more experimental.

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Topography and Understanding Topographic Maps

Among the many mapping tools available, the most commonly used is the topographic map. Topography is defined as the relief (relative elevations) of a surface and the relative relations between its natural and man-made features. Topographic maps systematically portray the spatial relationship among both the physical features, such as contour lines (lines of equal elevation) and hydrographic symbols, and cultural features, such as roads and administrative boundaries. Topographic maps are also known as "topo maps." Reading a topographic map begins with understanding the extent of reduction necessary to represent a given area of the Earth's surface. This reduction is known as scale and is defined as a representation of the size of something on a drawing, photo, or map relative to the size of the real thing. The U.S. Geological Survey (USGS) has been responsible for creating topographic maps of the United States since its inception in 1879. These maps come in a variety of scales. The most common for natural resource management purposes is the 1:24,000 series (where 1 map inch = 24,000 Earth inches or 2,000 feet). Maps at this scale cover an area measuring 7.5 minutes of latitude and 7.5 minutes of longitude and are commonly called 7.5-minute quadrangle maps, also known as "quads" or "quad sheets." These mapping sheets represent 64 square miles in southern U.S. latitudes and 49 square miles in northern latitudes; thus, it takes about 57,000 7.5-minute quad sheets to cover the entire United States and its territories. These maps are used for local area planning, engineering, and recreation purposes. Maps at 1:50,000 to 1:100,000 show less detail but cover areas large enough for landscape management support. USGS also has smaller scale maps at 1:250,000, 1:500,000, and 1:1,000,000, which cover very large areas on the sheet and are used for regional and statewide planning. The USGS has an excellent webpage with graphic depictions of map scale. The content of topographic maps may seem bewildering upon first glance; however, there is a method behind all the colored points, lines, and areas distinguishing key features. The smaller features of limited extent (such as the location of houses) are often represented by points, whereas much larger features (such as the outline of a large building) may be depicted as areas. In the mapping world, these areas are often known as polygons.

Colors that catch the eye first when looking at most 7.5-minute quadrangles are these: green (vegetation) blue (water) gray or red (densely built-up areas) purple (information updated with aerial photography but not field verified)

Unique combinations of line style and color indicate similar features: brown for contour lines (which will be discussed in the next paragraph) blue for lakes, streams, irrigation ditches, etc. red for land grids and important roads black for other roads and trails, railroads, boundaries, etc. purple for updated features A series of standardized symbols are used to depict features such as springs, water tanks, wells, mines, buildings, campgrounds, and survey control points. The brown contour lines on topographic maps show elevation. Each contour line joins points of equal elevation above a specified reference, such as sea level. A contour line represents one and only one elevation and thus never splits or intersects other contour lines (expect in the rare case of an overhanging cliff). Note that the vertical distance between contour lines (the contour interval) is always equal; the smaller the contour interval, the higher (or more detailed) the vertical resolution, or the minimum separation of objects, of the map. The horizontal distance between contours, on the other hand, is determined by the steepness of the landscape and can vary greatly depending on the terrain. The closer the lines are together, the steeper the object. USGS cartographers select a contour interval that will best show the shape of the terrain for each individual quad sheet. A flat area in Iowa might need a contour interval of 10 feet to capture some sense of relief. By contrast, a mountainous region of Arizona may have contour intervals of 100 feet or more; any finer would result in contours too tightly packed together to distinguish. Concentric circles of contour lines indicate a hilltop or mountain peak, whereas concentric circles of hatched contour lines indicate a closed depression. Contour lines form a V pattern crossing streams with the V pointing upstream. Rounded contour lines generally denote hills or ridges.

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Imported Fire Ant History

More than 75 years ago, the red imported fire ant, Solenopsis invicta Buren, was accidentally brought into Mobile, Alabama, from South America. It now infests more than 325 million acres, comprising most of eleven southern states and Puerto Rico, with infestations also in New Mexico and California. It has recently been reported in northern Mexico, Australia, Taiwan and China. Another species, the black imported fire ant, Solenopsis richteri Forel, was introduced earlier, but this species is limited to northeastern Mississippi, northwestern Alabama, and Tennessee. Colonies move vertically and horizontally in the soil profile to escape floods, droughts, and extreme temperatures. When new colonies are not actively foraging, they may be unaffected by baits or other pesticides applied to the soil surface.

Technological obstacles to eradication

Pesticide treatments are expensive, time-consuming, and limited in their effectiveness. There are three basic approaches: Surface treatment using a residual contact poison. This approach is the least environmentally sound because the treated surface remains toxic for a long time. The ants may survive by foraging underground. Individual mound treatment. This approach involves applying a large volume of pesticide to reach the queen. However, it is nearly impossible to locate all of the colonies in an area and difficult to manipulate large volumes of liquid. Also, mound treatment is more expensive and time-consuming than broadcast treatments. Colonies not eliminated may move or split into several colonies. Bait treatment. This approach uses some sort of attractive substance the ants like to eat. Unfortunately, baits are not always consumed, and the bait's attractiveness is short-lived. The bait must be slow-acting and effective over a range of doses, since the dose the ants get cannot be controlled. Baits may also be attractive to and kill some native ant species that compete with fire ants.

Economic, regulatory, and environmental obstacles to eradication

The best way to treat large areas (hundreds of acres) is by an aerial application of bait. The larger the treatment area, the more slowly reinfestation occurs. However, not all areas can be treated because of label restrictions and application limitations. Even with a bait product, it is not feasible to treat the entire infested area or even a large part of a single state, and untreated areas may be reinfested. If periodic treatments are discontinued, the area may become more infested than it originally was within a year or two.

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What is geospatial technology?

Geospatial technology refers to equipment used to measure and analyze Earth's land and features. Systems such as Global Positioning System (GPS) and Geographical Information System (GIS) are used in geospatial work. "Geo" is a prefix that comes from a Greek word meaning earth. "Spatial" means relating to space. GPS was developed by the United States Department of Defense in 1973. The first satellite was launched in 1978. GPS was originally designed to help military service members as they move vehicles, planes, and ships to the correct locations around the world. Today, GPS and GIS are used for many different things. GPS can be used to help navigate airplanes, boats, and cars. GPS can also be used in outdoor recreational activities such as hiking, fishing, kayaking, and boating. In the scientific community, GPS plays an important role in the earth sciences. Meteorologists use GPS for weather forecasting and global climate studies. Geologists can use GPS to help measure tectonic motions during and in between earthquakes.

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History of Feral Hogs in the United States

Feral hogs (also called wild hogs), belonging to the species Sus scrofa, are not native to the United States. The presence of these animals in this country is solely attributable to man-made introductions, some of which were intentional while others were accidental. Basically, two types of Sus scrofa, Eurasian wild boar and domestic swine, were introduced into the United States. Because these two types are conspecifics, wherever both of them were found together in the wild, interbreeding occurred. As a result, there are now three general types of wild hogs present in this country. However, because this situation represents a very diverse hybrid complex, the distinguishing lines among these three general types are not always clear morphologically; genetic analyses may be necessary to sort out the ancestry of any one specific population of unknown origin. Historically, the first man-made introduction of hogs into the United States was on the Hawaiian Islands. These animals were carried there by the early Polynesian immigrants who first colonized these islands. Hogs were abundant on all of the islands within this archipelago at the time of the first European contact in the 18th Century. The first hogs to be brought to continental North America were of European origin. The first importation of domestic swine into North America came with the second voyage of Christopher Columbus in 1493. Among the livestock acquired in the Canary Islands to provision this expedition were eight "selected" domestic pigs that were taken onboard at the island of Gomera. These animals and their offspring became the stock that populated the newly formed settlements and outposts on the islands of Cuba, Hispaniola, and Jamaica. From these animals sprang the immense herds that sustained the Spanish explorers on their journeys to the mainland during the early 1500s. It was from these ambulatory stocks of swine used by these initial expeditions that the first well-documented feral populations of wild hogs originated in the continental United States. The expedition of Hernando de Soto is attributed as the first documented source that introduced hogs into the continental United States. From the initial stock of animals, De Soto's herd of swine increased to a reported total of 700. Over a three year period, De Soto and his army traveled through what are now 14 states. Along the 3,100-mile journey, the hogs variously escaped into the wild and were either given to or stolen by the Indians encountered by the Spaniards. De Soto was followed by many other Spanish, English, and French explorers and colonists that brought hogs to the continental U. S. (e.g., Pedro Menéndez de Avilés, Juan de Oñate, Pierre de Iberville, Fernando del Bosque, Rene-Robert Cavelier Sieur de La Salle, and Sir Walter Raleigh). The escaped hogs from these various expeditions and settlements went wild and rapidly became established in a variety of areas. Among the domestic livestock being raised in the early settlements in the European colonies in the New World, hogs were among the most common. The free-ranging of domestic livestock, including hogs, was a commonly practiced husbandry method employed in these colonies. Often, these free-ranging domestic swine went wild. Combined with the escaped stock from the earlier expeditions, these animals established the early populations of wild hogs throughout the eastern and southwestern United States. Beginning in the 1890s, pure Eurasian wild boar were introduced into several areas of the United States to provide a new huntable big game species for wealthy sportsmen. All of these initial introductions were into fenced shooting preserves (e.g., Corbin's Park, NH; Litchfield Park, NY; Hooper Bald, NC). Many were followed by secondary introductions into other locations. A number of these later releases were made into unfenced areas. In other instances, the wild boar were able to break out of and escape the fenced enclosures where they were being maintained. In such areas where feral hogs were already established, interbreeding between the two forms readily occurred, further complicating the taxonomic composition of the wild hogs found in those areas. From 1900 until the late 1980s, feral hog populations in the United States were primarily found in the southern tier of states and in states on the West Coast. Between 1989 and the present, the number of states reporting the presence of feral hogs has more than doubled. Similar to the initial introductions of this species into this continent, this new range increase has also been man-made. Concurrent with this range expansion has been an increase in the estimate national population size of this species. The range expansion in the central part of the country was reportedly largely due to clandestine releases by feral hog hunting enthusiasts. In most states the practice of releasing hogs is highly illegal. Other expansions have been the result of these animals escaping from fenced shooting preserves. The identified sport hunting sources (i.e., clandestine releases and escapes from fenced preserves) of this species increase are consistent with the fact that feral hogs have become the second most popular big game animal in North America, second only to white-tailed deer (Odocoileus virginianus) in the numbers harvested every year. Because of continuing illegal releases of feral hogs into new areas, the number of states with these animals will probably increase. In fact, the potential exists to ultimately have introduced populations of feral hogs in all 50 states at some time in the future.

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Energy Drinks: History

1960 Energy drinks appear overseas
1980 Jolt Cola 1st "energy drink" in US
1997 Red Bull 1st energy drink to be imported
2001 US energy drink market retail sales grew to 8 million annually
A 2008 statewide Patient Poll conducted by the Pennsylvania Medical Society's Institute for Good Medicine found that: 20 percent of respondents ages 21–30 had used energy drinks in high school or college to stay awake longer to study or write a paper; 70 percent of respondents knew someone who had used an energy drink to stay awake longer to study or work. Today, new products are constantly emerging...

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The History of Crops as an Agroterrorism Target

Plant systems, the "base" of our food production system, have been targeted by military and other groups several times throughout history. In the year 346 BC, while battling Carthage, the Romans spread large quantities of salt on cultivated fields creating toxic conditions for crops. This forced local citizens to abandon the area, ultimately influencing the outcome of the war. During the U.S. Civil War, the Confederacy alleged that troops from the Union deliberately destroyed crops in the southern region of the U.S. by intentionally introducing an insect known as the harlequin bug, Murgentia histrionica. The insect caused great damage, but the direct connection to the Union was never proven. The appearance of this insect species may have occurred naturally since it was indigenous to Mexico. In World War II, Germany was accused of dropping containers of Colorado Potato Beetles on Britain. The reports indicated that these "bombs" were made of cardboard and each contained as many as 100 beetles. However, this allegation has been widely debated, with some suggesting the insect's appearance in England actually occurred as a result of an accidental introduction through food shipments. However, Germany did have a "potato beetle research" program, set up as a defense program to counter Allied biological weapons research. Also during the second World War, the Soviet Union was alleged to have developed and used different types of fungal disease agents on wheat and other cereal crops in enemy countries. During the Cold War between the U.S. and U.S.S.R., both countries stockpiled tons of wheat stem rust spores, a serious disease that can wipe out a wheat crop. Plant-based food products intended for direct consumption by people have also been targeted by terrorist activities in the past. In 1989, the U.S. Embassy in Chile received a call declaring that grapes moving from Chile to the United States and Japan were contaminated with cyanide. In fact, after investigation by the FDA, two contaminated grapes were found. However, because the amount of cyanide found was so small, the contamination wasn't deemed to be a real threat to human health. As a result of the event, several countries cut off importation of several fruit products from Chile. Chilean growers claimed losses of more than $300 million.

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Avian Influenza Homepage

Wild birds such as migratory ducks and geese have historically been known as reservoirs for avian influenza (AI) viruses. These birds normally can carry low pathogenicity avian influenza viruses in their respiratory or intestinal tracts and usually do not get sick. However, AI viruses, particularly H5 and H7 strains, can infect domestic poultry such as chickens and turkeys resulting in severe economic losses due to reduced production and increased mortality and culling. In 2014, USDA identified Eurasian H5N8 highly pathogenic avian influenza (HPAI) and mixed-origin viruses, H5N2 and a novel H5N1, in the Pacific Flyway. The HPAI H5N2 virus strain was later confirmed in several states along three of the four North American Flyways: Pacific, Central and Mississippi. This virus was associated with the HPAI outbreaks that started in the Pacific Northwest in December 2014 and spread to commercial chicken and turkey farms in the Midwest. The last case was reported in June 2015. However, by that time, the U.S. had endured the largest animal health emergency in its history, with more than 200 cases of HPAI affecting more than 50 million commercial and backyard poultry as well as wild birds across 15 states. On March 5, 2017, USDA confirmed HPAI H7 in a commercial poultry breeder flock along the Mississippi flyway in Tennessee. This HPAI H7 strain was found to be of wild bird lineage and was later confirmed by the USDA's National Veterinary Services Laboratories as a North American wild bird lineage H7N9 HPAI.

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The Special Milk Program: An Introduction

Background

The Special Milk Program (SMP) was established in 1955 to increase the milk consumption by children in schools and childcare institutions that do not participate in other Federal meal service programs. In 1966, the Special Milk Program was incorporated into the Child Nutrition Act. The Special Milk Program provides milk to children in schools, childcare institutions, and eligible camps. Through this program, schools and institutions are reimbursed for the milk they serve. In 2011, 3,848 schools and residential childcare institutions, 782 summer camps, and 527 non-residential childcare institutions participated. Schools in the National School Lunch or School Breakfast Programs also participate in the Special Milk Program to provide milk to children in half-day pre-kindergarten and kindergarten programs where children do not have access to the school meal programs. The Food and Nutrition Service administers the program at the federal level. At the state level, the Special Milk Program is usually administered by State education agencies, which operate the program through agreements with school food authorities.

How It Works

To enroll in the Special Milk Program, schools must apply and serve children who otherwise do not have access to school meal programs. Participating schools and institutions receive reimbursement from the U.S. Department of Agriculture (USDA) for each half-pint serving of milk served. The participating schools operate their milk programs on a non-profit basis and agree to use the federal reimbursement to subsidize the selling price of milk to all children. Any child at a participating school or half-day pre-kindergarten program can get milk through the Special Milk Program, regardless of their FARMS (Free and Reduced Meal Service) status.

Impact

In fiscal year 2012, over 61 million half-pints of milk were served through the Special Milk Program. A survey of 768 schools and 20,000 students assessed the impact of the free milk provision on the Special Milk Program (SMP). Free milk service increased total milk consumption of needy children, and milk programs were not disincentives to student participation in school lunch or school breakfast (1). Students in SMP schools drank 42% more milk at school than those in non-SMP programs, this relationship was seen at all grade levels. In schools that participated in the National School Lunch Program the milk consumption was almost 30% higher than in schools with the SMP but not the NSLP.

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Basic Math Skills in Child Care: Shapes and Spatial Relations

Some child care providers may think of geometry as an advanced math concept learned in high school. But even young children are aware of basic concepts related to shapes and spatial relationships. Child care providers can help young children build math skills by encouraging them to explore and compare shapes and spatial relationships.

Spatial Relationships

Spatial relationships explore the concept of where objects are in relationship to something else. When child care providers use the following words, they are teaching spatial concepts: above, below before, after high, low in front of, in back of, behind inside, outside on top of, under Learning to understand spatial relationships helps children talk about where things are located. For example, a ball may be behind the chair, or under the table, or in the box. The dog may be on the blanket, outside of the house, or in the doghouse. To help children practice spatial relationships, hide a toy in the room, and give directions to find the toy using some fo the spatial terms above. For example, you might say, "Look behind the chair."

Geometry

Understanding shapes is basic to understanding geometry. As children start to identify shapes, they develop a beginning understanding of geometry. Most preschool children begin to learn the names of basic two-dimensional shapes: circle, square, triangle and rectangle. Some preschoolers can even learn to recognize and name more complex shapes (rhombus, trapezoid, hexagon) and three-dimensional shapes (cube, sphere and pyramid). The block area is a great place to reinforce children's knowledge of shapes. As you build a structure together, encourage the child to add a specific shape. You might say, "The top of this column looks like a great place to add a half-circle. What do you think?"

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Basic Math Skills in Child Care: Matching, Classifying, and Measuring

Teaching young children how to match, classify, and measure is an important part of developing early math skills because these skills help children identify and describe relationships between items. As a child care care provider, you can help young children learn these skills in several ways. Matching mainly involves one-to-one correspondence. The game "Memory" is one good way to teach young children about matching. This game begins with pairs of pictures face down. Each player flips over two cards. If the cards match, the player keeps them and flips over two more cards. If they don't match, the player flips them face down, and the next person has a turn to find a match. Comparing involves identifying similarities and differences among objects. For example, talk about how my block is the same as, or different than, your block. Being able to compare objects and identify similarities and differences leads to the ability to classify objects. Classifying/sorting involves finding things that are the same, or alike, and grouping them by specific traits. For example, the bunch of animals in the picture to the right can be grouped based on their color or type of animal. You can have young children classify anything, including blocks, leaves, plates, or toy cars. Once they have classified items, children can compare items further to learn more specific similarities and differences between items, both within and between matched groups. Sets are simply a collection of things that have been classified together because they have something in common. In your child care program, you could find many sets, such as blocks, markers, food, people, and animals. Measuring is determining the extent or degree of something. For example, children can measure a block in many ways; height, weight, length, even temperature. If you don't have rulers or other measuring tools, help children practice measuring with everyday objects such as yarn or paper clips.

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Math in Child Care

Math is everywhere, and it's more than just learning numbers. When children sort crayons by color, put puzzles together, build with blocks, count their raisins during snack, and sing "Five Little Monkeys Jumping on the Bed," they are learning about math. These kinds of hands-on learning activities create a solid foundation for children to understand shapes, sizes, length, addition, and subtraction. Children who have the opportunity to learn math-related concepts in early childhood often do better in school and are more skilled at using math as an adult. High-quality child care programs provide young children with many opportunities to sort and classify, find similarities and differences, measure and estimate, and solve problems. For more information on how to support and nurture young children's developing math skills, see the following articles. If you are looking for specific math activities for your child care program, check out the Hands-On Activities for Child Care database.

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Breakfast and the Brain: How Eating Breakfast Impacts School Performance

The claim that breakfast is the most important meal of the day has an abundance of sound science behind it. A brief compiled by the Food Research and Action Center (FRAC) outlines the correlation between breakfast and school performance among children, based on numerous research findings. The findings include how eating, and not eating, breakfast affects academics, brain function, and overall wellness. Children who do not eat breakfast at home or at school were less able to learn. Hunger can lead to lower math scores, attention problems, and behavior, emotional, and academic problems. Furthermore, studies show that children who are consistently or often hungry are more likely to repeat a grade. It is these problems that have lead many schools to participate in school breakfast programs including the United States Department of Agriculture's (USDA) School Breakfast Program and the Breakfast in the Classroom program. Both programs make breakfast available to all students. While it is true that students can chose not to eat, children themselves have reported a belief that eating breakfast increases their energy and ability to pay attention in class. Providing breakfast at school can also ensure that children are getting enough to eat. Children who eat a complete breakfast have been shown to work faster and make fewer mistakes in math problems and to perform better on vocabulary tests than those who ate only a partial breakfast. They also show improved concentration, alertness, comprehension, memory and learning. Beyond academics, children who participate in school breakfast programs show decreased anxiety, depression, and hyperactivity. The breakfast offered can improve a child's overall nutrition by providing her/him with necessary vitamins and minerals and can actually reduce the risk of obesity! Numerous studies show how students will benefit from school lunch programs in the classroom and beyond. Visit the links below to discover how your school community can benefit from school breakfast.

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Play Helps Young Children Be Ready for School

With the increasing pressures of school readiness, many child care programs are actually cutting back on unstructured free play time. Pressured teachers believe that structured, teacher-led activities are the only way to help children be ready to read, do math, and understand science when they enter kindergarten. But what do we really know about young children and play? How does play help children learn? Many adults are mistaken about play. We view "playing" as a frivolous activity, meant to fill empty waiting periods between more important activities. But for young children, play is the centerpiece of learning. Playing is not an "extra" for young children. It's actually the single most important way they explore, learn about the world and practice and perfect new skills. When children play, they get to decide what materials to use, what to do and when to stop or change to a different activity. Children playing in a child care setting are testing out new materials, trying out roles, experimenting with cause and effect, making guesses and testing conclusions and practicing getting along with others. Researchers have shown that high-quality play experiences help improve children's memory, social skills, oral language abilities, pre-reading and pre-math skills and school adjustment. All of these will be crucially important learning skills when children get to kindergarten and beyond.

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How can I balance a checkbook that has not balanced for several months?

Balancing or reconciling a checkbook each month is a task many of us avoid. If you have tried balancing your checkbook but can find no agreement between the last number in your check register and the ending balance your financial institution has stated is in your account, you do have some alternatives: Even if you have done so before, try balancing your checkbook using the form provided by your financial institution. Simply subtracting or adding each entry in your checkbook entry does not allow for outstanding checks or deposits. The forms vary, but the basic steps are checking off checks, ATM withdrawals, automatic deposits and withdrawals, and other deposits that have cleared on your statement. Total all outstanding checks (the ones not found on the statement yet). Subtract this total from the ending balance your bank/credit union is showing. Total all outstanding deposits. Add this to the number you arrived at after subtracting the outstanding checks. By following the form provided, you are more likely to notice either deposits or withdrawals you previously overlooked and to find errors. Check the accuracy of your entries and the basic math in your checkbook register. Work your way through each transaction to see if you recorded it accurately and did the appropriate subtraction or addition correctly. Did you write a check for $54 but entered it in the checkbook register as $45? Did you subtract that $100 deposit instead of adding it? Do not look for outstanding checks or missed deposits. Concentrate only on the accuracy of the entries and the math associated with them. Allow all outstanding checks to clear before writing any more checks. In other words, stop using your checkbook. Pay with cash only, or use cash to purchase money orders to pay bills. If you have checks that have been outstanding for three or more months, contact the person or business the checks were written to and ask for the current status of the check. Has the individual/business lost or forgotten the check? Encourage them to cash it as soon as possible. If it has been cashed, review your monthly statement to confirm that it was deducted from your account. If there is another person on the same checking account? a spouse or a child? ask him or her for information on all transactions he or she may have made on the account. Were those transactions recorded on the checkbook register? Are there any double entries? Be certain that all deposits have been credited to your account, especially if you have more than one type of account with the same financial institution. Was a cash deposit erroneously credited to your savings account or to a loan instead of to your checking account? When making a deposit, always use a deposit slip, and keep your deposit receipt until the deposit is shown on your checking account statement. Use a computer program such as Quicken to manage your checkbook. Accurately enter all the information from your checkbook register and then run the reconciliation segment of the computer program. Set up an appointment with a financial consultant at your bank/credit union. Inform them in advance that you are having difficulties balancing your checkbook. Bring with you all current checkbook registers and statements. You may need to give them written permission to access your account information online so the two of you can compare information. View your account online and compare transactions. Many financial institutions now send monthly statements via e-mail, and some even allow daily access to your account information. Some sites have financial calculators that do the math for you after you enter your information. Balance your checkbook more often. When your checkbook is not balancing in the first place, that may sound contradictory, but by attempting to balance your checkbook more than once a month, you are more likely to find an error early and before it costs you overdraft fees. If you have direct deposit of your paycheck or other funds, consider balancing your checkbook every pay period, which is often every two weeks.

Which categories do you think the above article belongs to?

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How is your interest level in this article?

Not interested at all — Very interested

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What is a crush point?

A crush point exists at the point where two objects meet. The objects can be moving toward each other, or one object can be moving toward a stationary object. Crush points are hazardous because the objects coming together can easily crush body parts. The most common example of a crush-point hazard is the attachment to the drawbar of a tractor. Other examples of crush point hazards include three-point hitches and components moved by hydraulic cylinders.

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Three "Bs" in Child Care: Blocks, Balls, and Books

Some of the best toys for kids have been around for a long time. Blocks, balls, and books are simple, durable, and fun and can help children build skills. They can also be enjoyed by kids of all ages. These should be staples in every child care program.

About Blocks

Blocks are good toys, because children of different ages can use them in different ways. Infants like to carry them around and dump them into and out of containers. Toddlers like to build towers. As children get older they like to build more elaborate structures with blocks. Children use physical skills as they lift and move blocks to build things. Math skills are used as children count, match, sort, add, subtract, and notice the weight and length of blocks. Thinking and problem-solving skills are used in making a tower or other structure. A child can learn how to work with other children in the program and share ideas when building with blocks.

About Balls

Like blocks, balls are fun for children of all ages! Infants love to roll them. Toddlers enjoy rolling a ball back and forth to someone. This teaches them how to take turns – something toddlers need to learn because it leads to sharing. As children get older, they can learn how to throw and catch a ball. Children enjoy games with balls. Some children develop a love of sports and may play ball of one kind or another all their lives.

About Books

Children learn so much from books. Infants and toddlers like to look at picture books and to listen to short stories. Board books and cloth books are best for them to handle. Preschoolers enjoy stories and learning about new things. There are books about science and nature. There are books about magic and music. There are fairy tale and folk tale books. There are books about people or events, and others are fiction. Child care settings should have a variety of books available for children and a special reading time every day. Once children learn to read, child care providers can encourage children to take turns reading to one another. Consider taking children on a field trip to the library. Make books and reading times important for the children in your care.

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What is the Difference Between Physical Fitness, Exercise, and Physical Activity?

What is the Difference Between Physical Fitness, Exercise, and Physical Activity?
Health care professionals, the media and now the White House. Everywhere we turn today we hear how important exercise and physical activity are to long life and good health. But what exactly constitutes physical activity and exercise and what's the difference between the two? Let's take a closer look at how these terms relate to you and what you can do to improve your overall health no matter where you are on the fitness spectrum. Physical activity involves any bodily movement such as walking to and from work, taking the stairs instead of elevators and escalators, gardening, and doing household chores. For inactive people, there's no doubt that increasing this sort of activity can reduce risk for disease and improve health. Exercise, however, is a type of physical activity that requires planned, structured, and repetitive bodily movement with the intent of improving or maintaining your physical fitness level. Exercise can be accomplished through activities such as cycling, dancing, walking, swimming, yoga, working out at the gym, or running, just to name a few. Regular exercise, depending upon the kind, improves aerobic fitness, muscular strength, and flexibility. Aerobic fitness is the ability of the body's cardiovascular system to supply energy during continuous physical activities such as biking and running. Studies show that this type of exercise provides many health benefits such as decreasing risk for heart disease, stroke, high blood pressure, type II diabetes and some cancers. The 2008 Physical Activity Guidelines for Americans state that most health benefits occur with at least 150 minutes/week of moderate-intensity aerobic activity. Examples of aerobic activities that would meet this recommendation include walking at a brisk pace, swimming, jogging, dancing, etc. Muscular strength is the ability of the muscles to exert a force during an activity such as lifting weights. Muscle strengthening exercises involve using your muscles to work against a resistance such as your body weight, elastic bands or weights. The Physical Activity Guidelines recommend that adults participate in muscle strengthening exercises for all major muscles groups at least two days a week. Bone strengthening exercise, or any weight-bearing activity that produces a force on the bone, is also important to overall health for children and adults. This force is usually produced by impact with the ground and results in bone growth in children and healthy maintenance of bone density in adults. Examples of bone strengthening activities include jumping, walking, jogging, and weight lifting exercises. As you can see, some exercises such as walking or jogging serve a dual purpose of strengthening our bones and our aerobic system. Lastly, flexibility is the ability of the joints to move through a full range of motion. Stretching exercises can be an excellent way of increasing flexibility. While the 2008 Physical Activity Guidelines for Americans do not include specific recommendations for increasing flexibility, some individuals such as dancers and some athletes may need to include flexibility activities as part of their exercise regimen. The bottom line is that increasing your everyday physical activity and regularly participating in aerobic, muscle and bone strengthening exercises are all beneficial to your health and will improve your quality of life. So what are you waiting for? It's time to heed the advice and get active. You have nothing to lose and everything to gain. If you'd like to know more about the benefits of starting an exercise program or just increasing your everyday physical activities, visit the 2008 Physical Activity Guidelines for Americans.

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Jet Stream Activity in Climate Models

Jet streams high in the atmosphere direct where moisture lands on the surface. Global climate models (GCMs) generally do a good job at simulating jet stream activity, especially in the mid-latitudes – roughly 40 to 70 degrees north of the equator. Indeed, this is considered one of their strengths. Even so, potential problems include inadequacies where the mid-latitudes interact with the tropics (Bader et al. 2008) — namely, the subtropics, roughly centered around 30 degrees from the equator. Jet streams can be seen as meandering rivers of air, generally located about 30,000 to 40,000 feet above sea level. The polar jet stream occurs consistently along the polar front, where cold air meets warm air, fueling many mid-latitude storms. Occasionally, the polar jet stream dips down into the low mid-latitudes, influencing precipitation and temperature in the southwestern United States. A separate, and somewhat less consistent, subtropical jet stream occurs between 20 and 40 degrees latitude from the equator. As their names imply, the polar jet stream can help carry cold air southward, while the subtropical jet stream can help usher in warm, humid conditions. The subtropical jet stream in North America is more likely to get a boost during El Niño years, wielding a large effect on winter precipitation along the southern tier of U.S. states. Thus, recent improvements in modeling El Niño variability in the distant tropics have implications for modeling regional jet stream activity and its effect on winter precipitation. Still, only about a third of the 18 GCMs tested were identified as having a relatively realistic interpretation of El Niño fluctuations (Bader et al. 2008). The most skillful models tend to have relatively high resolution — with some as fine as 500 square miles — in the tropical Pacific, where El Niño has its greatest effect on sea surface temperature. In general, modelers have found it challenging to capture the historic year-to-year variability of the subtropcial jet stream in the northern hemisphere, including a recently observed shift toward the poles. Several research teams have shown a poleward shift of this jet stream, linked to the expansion of the Hadley cell circulation Seidel et al. 2007, Hu and Fu 2007). Researchers at the University of Arizona have linked the poleward shift of the jet stream to drier southwestern springs in the time frame they considered, from 1978 to 1998 (McAfee and Russell 2008). In addition, the poleward shift of the jet stream observed for the past several decades means that the regional impacts of El Niño could change along with global climate. This remains difficult to model at any scale. The modeling of tropical storms is also a challenge at the global scale. However, this challenge of modeling of tropical storms can potentially be resolved at the regional scale. The subtropical jet stream resides around the descending branch of the Hadley cell, shown in this idealized graphic at about 30 degrees in latitude. The polar jet stream resides along the polar front, where it tends to reinforce the temperature difference on either side of the front. In reality, both jet streams often meander widely north and south rather than following the straight (zonal) pattern shown here. Credit: Barbara Summey, NASA Goddard VisAnalysis Lab

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How to Encourage Your Children to Eat More Vegetables

Every parent knows the key to keeping children healthy is to get them to put down the junk food and eat more vegetables, but this is often more easily said than done. So how can you promote vegetables in your home? Try these simple tips to get your kids to love veggies! Smile. Studies have shown that if you smile while you eat vegetables, your children are more likely to want to eat them. Modeling healthy eating by not only eating vegetables around your kids, but also by clearly showing that you enjoy them, is incredibly important. Even if they've never liked that vegetable before, simply seeing you enjoy it will make them like it more. So be sure to set a good example by eating vegetables in front of your kids with a smile on your face2! Buy more vegetables than junk food. If your kitchen is filled with vegetables instead of unhealthy junk food, your kids will be more likely to reach for the carrots instead of the chips3. Try extending this to your child's school cafeteria by asking if the salad bar can be moved to a more prominent location and ask that the vending machines be moved to a less prominent location or even better removed completely. Make vegetables kid-sized. Children like to eat food they can eat easily, so cut up vegetables and keep them easily accessible in the fridge4. Try cutting them up into small, fun shapes and serving them with low-fat salad dressing or dip too! Be positive. Avoid forcing your kid to eat vegetables and punishing them when they don't. Instead, use positive reinforcement by praising them when they do finish their vegetables or when they ask for their snack to be their favorite vegetable4. Let them have a say. When kids can help decide what vegetable will be a part of dinner, they'll feel more involved and will be more excited to eat them4. See what your child likes helping with the most, from grocery shopping to meal planning to preparing the vegetables themselves. Eat together. Just eating together as a family can encourage your children to eat healthier. This has been shown to be one of the best ways to make sure your children are getting their recommended intake of vegetables1. Make vegetables fun. Giving fun names to vegetables will make them seem more fun and attractive to younger kids. It's also a great way to teach them about the benefits of vegetables by linking each food's name with how they make you healthier, like "X-ray Carrots" or "Power Punch Broccoli5." Don't be afraid of trial and error. There are some vegetables your kids might not like, and that's okay! Expose your child to a vegetable at least 10 times. If your children still don't like the taste of a certain vegetable, move forward by exploring new options and replacing the unwanted vegetable with one of their favorites4.

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Not interested at all — Very interested

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What is the difference between discipline and punishment?

Discipline is a positive method of teaching a child self-control, confidence, and responsibility. The key to positive discipline is teaching a child what behavior is okay and what behavior is not okay. The focus is on what children are expected and allowed to do. It includes catching kids being good and encouraging appropriate behavior. It also includes modeling appropriate behavior. Punishment is quite different from discipline. Punishment may be physical as in spanking, hitting, or causing pain. It may be psychological as in disapproval, isolation, or shaming. Punishment focuses on past misbehavior and offers little or nothing to help a child behave better in the future. When punishment is used, the person who punishes the child becomes responsible for the child's behavior. Children who are raised in a way that stresses positive discipline will understand their own behavior better, show independence, and respect themselves and others. Positive discipline is a process, not a single act. It teaches children how to get along with other people. Children are held responsible for misbehavior, but the consequences are meaningful and related to the behavior.

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School Gardens Engage Students: Traverse Heights Elementary School

The Traverse Heights Elementary School garden program in Traverse City, Michigan teaches students about the importance of healthy food and healthy eating. Partnerships with FoodCorps and Michigan State University (MSU) Extension make their garden-to-table program a success. The partnership staff work with students in all grades to engage and team them about growing food. Traverse Heights Elementary School has been conducting their gardening program for the past five years and through it they are not only able to teach children about nutrition, agriculture, and food systems, but also math, science, and language arts. Along with the gardening program, the partnerships also like to do taste tests with healthy items such as smoothies. The Policy Specialist at Groundwork Center, Megan McDermott, says that if children plant, care for, and grow their own fruit and vegetables, they are much more likely to eat those fruits and vegetables over students who don't grow their own.

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Not interested at all — Very interested

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Best Management Practices for Reducing Gas Emissions from Manure Application in Semi-Arid Regions

*Abstract
Gas emissions from animal feeding operations (AFOs) create adverse impacts ranging from short-term local effects on air quality, particularly odor, to the long-term effects from greenhouse gas generation. Best management practices (BMPs) have been designed and implemented to mitigate gas emissions from farm operations. Our study investigates emission control strategies widely used in AFOs including manure management and land application. The primary objectives were to evaluate the efficiency and identify improvement of the currently available BMPs. We simulated and monitored gaseous emissions from a range of manure application and incorporation methods. The gaseous emissions were monitored using the closed dynamic chamber (CDC) method with a Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer, which is capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. In this presentation, we will discuss the efficiency of the current manure management BMPs to reduce air emissions from dairy operations, based on the gaseous emission monitoring during the course of our experiment. Results from our study should enhance development and implementation of more flexible and more efficient air quality management approaches for dairy operations.
Why Study Gas Emissions from Manure Application Sites?
Evaluate gaseous emissions from manure application. Identify ways to improve manure management and land application BMPs.
What Did We Do?
Manure application and incorporation methods were simulated and evaluated in a greenhouse setting. Scraped dairy manure was applied at a rate of 50 tons/acre to a Millville silt loam soil. Incorporation versus no incorporation was compared. Gaseous emissions were monitored using a closed dynamic chamber with a Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer, which is capable of monitoring 15-pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. On Day 3, after emissions had subsided, the soil surface was rewetted. Emissions were monitored for 7 days.
What Have We Learned?
Emission rates for CO2 and NH3 peaked after 24 hours, with the majority of emissions occurring within the first 2 days. Rewetting had limited impact. Based on this data, it appears that rapid incorporation is needed to have a meaningful impact on reducing gaseous emissions.
Future Plans
Examine gaseous emissions from a range of manure application and incorporation methods in a field setting. The gaseous emissions will be monitored using the closed dynamic chamber method with a Fourier Transformed Infrared (FTiR) spectroscopy gas analyzer.

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Blood Pumping Mechanism of the Hoof

Blood is pumped from the heart through arteries to the hoof and is assisted in its return through a "pumping mechanism" in the hoof. This mechanism is necessary due to the position of the hoof in relation to the heart. There are no muscles in the lower leg or hoof to aid in the return of venous blood to the heart. Thus, the hoof has to pump venous blood back to the heart. An extensive network of veins called a venous plexus are located on both sides of each of the lateral cartilages and in the sensitive structures of the hoof. The compression of these veins by the plantar cushion against the lateral cartilages or the coffin bone against the hoof acts as a "pump" to force the blood up the leg and back to the heart. Blood is prevented from returning to the hoof by one-way valves in the veins of the leg. Compression of the plexuses also acts as a valve to contain blood in the vessels of the hoof below the plexuses. This produces a "hydraulic cushion" that further dissipates concussion and protects the fragile coffin bone. This valve action also creates a fluid pressure that, when the hoof is raised and the compressed veins are open, causes the blood to exit up the leg and the plexuses to fill. Each time the foot bears weight, the veins are compressed. Each time the foot is raised, the veins open, and blood is pushed in by the arterial pulse and gravity. The weight of the horse forces the blood back up the leg, which is commonly referred to as the second heart. How the coffin bone aids in pumping blood back up the horse's leg is integral for proper circulation in the horse.

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Drying and Rewetting Effects on Gas Emissions from Dairy Manure in Semi-arid Regions

Abstract
The major source of emissions in animal production sites is from animal waste (manure), which can be in solid, slurry, or liquid states, exhibiting varying physical properties. Once manure is excreted from an animal, processes of biological decomposition and formation of gaseous compounds continue, but diminish as the manure cools and dries. However, increases in gas emissions following rewetting, particularly from precipitation, have been observed in various agricultural lands. Our study investigates changes of gaseous emissions through manure drying and rewetting processes to identify the effects of climatic conditions and manure management on gaseous emissions. We carried out drying and rewetting processes of dairy manure in a greenhouse to maintain moderate wintertime temperatures (20 - 40 C) while monitoring gaseous emissions through these processes. Closed dynamic chambers (CDC) coupled with a multiplexed Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer provided gas flux estimates. The analyzer was capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. Magnitude of dairy manure gas emissions resulting from variations in moisture and temperature provide insight toward enhancing manure management decisions. Results from our study should further understanding of manure gas emission temporal dynamics that are largely dictated by heat and by drying and rewetting processes that impact the generation and delivery of gasses to the atmosphere. Our overall goal is to advance development of appropriate best management practices to reduce gas emissions for dairy operations in semi-arid regions.

Purpose
The objective of this project is to identify the effects of climatic conditions and manure management on gaseous emissions. The results from our study will be used to advance development of appropriate best management practices to reduce gas emissions for dairy operations in semi-arid regions.

What Did We Do?
We investigated changes in gaseous emissions by carrying out drying and rewetting processes of dairy manure in a greenhouse to maintain moderate summertime temperatures (20 - 40 oC) while monitoring gaseous emissions. Closed dynamic chambers (CDC) coupled with a multiplexed Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer provided gas flux estimates. The analyzer was capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. Gas emissions from two dairy manure samples were monitored to compare the magnitude of gas fluxes during 14 days of manure drying and rewetting processes.

What Have We Learned?
An increase in surface water content occurring after a rewetting event (e.g., simulated 5 mm of rain) represents an abrupt increase in manure moisture content, which can promote microbial activity and a commensurate increase in gas emissions from manure. In our study, we found gas fluxes were actually suppressed during and shortly after the rewetting process, mainly due to reduction in air-filled pore space causing reduced gas diffusivity in the manure crust layer. As the wet layer dried, gas emissions eventually increased to levels prior to wetting.

Future Plans
Future experiments include: (1) simulation of manure drying-rewetting with various amount of water and rewetting times, (2) considering the immediate response time and effective period of the pulse response of the gas fluxes after rewetting which might have been missed in our study, (3) Further investigation of the effect of the crust layer on water and gas transport from and into manure.

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Physical Development in Child Care

Physical development is an important area of child development that includes children's physical growth, as well as their increasing ability to control the muscles of their bodies. Children's physical development follows a predictable pattern, but each child grows at his or her own rate. Active play helps children develop their motor skills. Child care programs can support children's physical development by providing safe surroundings, good nutrition and plenty of time for active play and exploration.

Which categories do you think the above article belongs to?

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The Name Game: Sending the Right Message

Why do restaurants use appealing descriptive adjectives like “succulent” or “fresh” on their menus? Because it makes dishes sound more appealing and can even make us enjoy our meal more! This very same low- cost technique can also be used to make healthy foods in school meals more appealing to students. In this webinar, David Just, PhD, Behavioral Economist and Co-Director of the Cornell Center for Behavioral Economics in Child Nutrition Programs (BEN Center) and Smarter Lunchrooms Movement, shares the psychology behind why increasing appeal increases selection and consumption of healthy foods. He also shares some practical advice and best practices based on real-world challenges and successes.

Learning Objectives

Understanding of the psychology and evidence behind renaming and increasing the appeal of healthy dishes to increase selection and consumption Best practices for making healthy foods more appealing in the lunchroom

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Ways to Encourage Self-Help Skills in Children

Children have a drive to be independent and do things on their own. This is a healthy part of normal child development. As children grow, they learn to do more and more tasks. Child care providers can help young children become independent by allowing and encouraging them to take responsibility for themselves whenever possible. It can be faster and less messy to do things for children, but they learn so much from doing things for themselves. When children practice self-help skills such as feeding and dressing themselves, they practice their large and small motor skills, gain confidence in their ability to try new things and build their self-esteem and pride in their independence. There are four main types of self-help skills: Self-feeding. The best way to build independent feeding skills is to learn the normal developmental stages of self-feeding. Encourage children to practice feeding themselves from infancy on. Begin by offering older infants finger foods. Introduce a spoon and fork and give children plenty of time to practice. Let children be as independent as possible during mealtimes. Give them the tools they need to be successful. Consider bowls that attach to the table, child-sized utensils and small cups with handles and spouts (such as measuring cups) for pouring. Encourage children to try for themselves but provide help and encouragement when needed so they don't get frustrated. Independent dressing and grooming. Encourage children to dress and groom by themselves; just provide minimal assistance. Begin with older infants and toddlers by encouraging them to help pull socks on and off, pull up pants after diapering and help put their arms through sleeves. As children get older, encourage them to dress themselves but help with challenging steps such as zipping and buttoning. Hygiene and toileting . Look for signs of readiness for toileting. Encourage children learning to use the toilet to climb on and off the toilet seat, pull clothing up and down, and wash their hands independently. Also teach children how to brush their teeth after lunch and snacks. Be ready to provide support and help if they need it. You can find more suggestions at Keeping Children's Teeth Clean in Child Care and Hand Washing in Child Care. Encouraging children to take care of everyday hygiene routines and to use the toilet independently helps them learn how to become more independent and self-sufficient, and frees up your time to help children with other activities. Helping with daily chores like table setting and picking up toys. Encourage children to help with clean-up early on. Give toddlers responsibility for placing napkins or utensils on the table. Encourage children to begin clearing their own plates when they are old enough to carry them without dropping them. When children are involved in regular chores starting before the age of 4, they tend to be more independent in early adulthood than children without the experience of helping out. Self-help skills are worth the time and effort in a child care program. The secret to success is to give children age-appropriate experiences and provide the appropriate supports to help children be successful. Child care providers can offer opportunities for children to develop self-help skills and give them ample time to work on these important tasks. Remember that adults are important role models. We model self-help skills; children learn a great deal from watching us.

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What is the difference between power and authority in an organization?

Power and authority are separate but related concepts. A manager in an organization has authority if he or she has the right to direct the activities of others and expect them to respond with appropriate actions to attain organizational purposes. Authority most often comes from the duties and responsibilities delegated to a position holder in a bureaucratic structure. A company president can order a product design change, for instance, or a police officer has the authority to arrest an offender of the law. Power is the possession of authority, control, or influence by which a person influences the actions of others, either by direct authority or by some other, more intangible means. A prime source of power is the possession of knowledge. A person with knowledge is oftentimes able to use that knowledge to directly or indirectly influence the actions of others. The authority of knowledge is often independent of levels or positions. Power can reinforce authority, and authority is one of the primary sources of power.

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Not interested at all — Very interested

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What is a "process observer"?

A "process observer" is a position that some boards and committees choose to appoint. This individual's responsibility is exactly what the title suggests – to observe the process. Throughout the meeting, the process observer takes note of things that are handled well and those when the process did not work as well. In normal circumstances, the process observer has a few minutes at the end of the meeting to summarize the behavior of the group so that the group can learn and, if needed, improve its functioning. This is not a summary of the meeting itself, only the process. Some examples of what might be shared are: How well discussion flowed and the extent to which all participants were engaged and contributing. Any conflicts that were left unaddressed. Any side conversations or other distractions. The emotional tone of the meeting: Was it tense, supportive, etc.? Was the agenda followed? Were participants well prepared? Were comments appropriate and thoughtful? When summarizing the meeting process to the group, it can be useful for the comments to be appropriate for the general dynamics of the meeting, meeting design and management, and/or the group's developmental stage rather than targeting any one individual or group of individuals. The process observer should be selected at the beginning of the meeting, although it should not fall to the facilitator or the recorder (minute taker). It is a position that should be rotated among group members with a different observer at each meeting. The goal of having a process observer is to help keep the group's meetings functioning well and encourage group members to share responsibility for the tone and productivity of the meeting. It may be helpful for the group to have a handout or checklist for the process observer to use, particularly if this role is new to some group members. A sample template is available at New Directions Consulting.

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Cataloging and Evaluating Dairy Manure Treatment Technologies

Purpose

To provide a forum for the introduction and evaluation of technologies that can treat dairy manure to the dairy farming community and the vendors that provide these technologies.

What Did We Do?

Newtrient has developed an on-line catalog of technologies that includes information on over 150 technologies and the companies that produce them as well as the Newtrient 9-Point scoring system and specific comments on each technology by the Newtrient Technology Advancement Team.

What Have We Learned?

Our interaction with both dairy farmers and technology vendors has taught us that there is a need for accurate information on the technologies that exist, where they are used, where are they effective and how they can help the modern dairy farm address serious issues in an economical and environmentally sustainable way.

Future Plans

Future plans include expansion of the catalog to include the impact of the technology types on key environmental areas and expansion to make the application of the technologies on-farm easier to conceptualize.

Corresponding author name, title, affiliation

Mark Stoermann & Newtrient Technology Advancement Team

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What does vegetation index mean in remote sensing technology?

A vegetation index (also called a vegetative index) is a single number that quantifies vegetation biomass and/or plant vigor for each pixel in a remote sensing image. The index is computed using several spectral bands that are sensitive to plant biomass and vigor. The most common vegetation index is the normalized difference vegetation index (NDVI). NDVI compares the reflectance values of the red and near-infrared regions of the electromagnetic spectrum using the following formula: NDVI=NIR-RED/NIR+RED NIR is the pixel's reflectence value in the near-infrared band RED is the pixel's reflectence value in the red band The NDVI value, which ranges from -1.0 to 1.0 for each pixel in an image, helps identify areas of varying levels of plant biomass/vigor. Higher values indicate high biomass/high vigor.

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Nutrient Recovery Membrane Technology: Pilot-Scale Evaluation

Purpose

Animal manure contains nutrients and organic matter that are valuable to crop production. Applying manure to nearby fields can be a significant source of environmental contamination, however, if managed incorrectly. In many cases, concentrated animal production facilities are not close enough to sufficient cropland to fully utilize these resources and management of manure becomes more of a disposal issue rather than a utilization opportunity. One potential solution is to remove and concentrate manure nutrients so they can be cost effectively transported longer distances to cropland that is lacking in nutrients. The objective of this work was to design and test a pilot-scale system to implement a hydrophobic, gas-permeable, ePTFE (a synthetic fluoropolymer) membrane (U.S. patent held by USDA) to recover ammonia from swine wastewater in a solution of sulfuric acid. The pilot-scale system was designed to replicate the laboratory results and to determine critical operational controls that will assist in design of farm-scale systems.

What did we do?

Through a series of preliminary experiments, we established operational criteria and selected a membrane with an inside diameter of 0.16 in., wall thickness of 0.023 in., and a density of 0.016 lb in-3. A test system was developed with 19 membrane tubes within a 2.01-inch diameter, 24.7-inch-long reactor, giving a membrane density of 3.83 sq. in. per cubic inch of reactor volume. Wastewater first passed through a CO2 stripping column (4.016 in. diameter, 55 in. length) where a small air stream (0.0614 cfm) stripped CO2 from the wastewater and raised the pH one full unit, shifting the equilibrium to NH3 and enhancing transport across the membrane. Batch tests (0.706 ft3) were run for 9-12 days with wastewater recirculating at a rate of 0.16 gpm. The recovery fluid inside the tubular membranes was a 0.01 N sulfuric acid solution with the pH automatically maintained below 4.0 standard units and recirculating at a rate of 1/100th the wastewater flow rate. Freshly collected settled wastewater and anaerobic digester effluent were tested to determine the mass of ammonia collected, the acid required to maintain the low pH of the recovery solution, and potential ammonia losses to the atmosphere.

What have we learned?

The freshly collected wastewater had an initial mass of 35.6 g nitrogen but the NH3 was only 14.5 g, leading to a recovery of 11.8 g (33% of initial content) over 12 days. The anaerobic digester effluent had an initial mass of 33.2 g nitrogen with an NH3 mass of 31.3 g. The higher fraction of ammonia helped push the recovery to 25.7 g or 77% of the initial nitrogen content. Very little ammonia was lost with the exhaust air.

Future Plans

An optimized membrane reactor could be a viable tool in ammonia nitrogen recovery from a manure treatment system if used in conjunction with digestion. Higher economic value could be generated by further concentrating the ammonium sulfate product.

Corresponding author, title, and affiliation

John J. Classen, Associate Professor, Biological & Agricultural Engineering, NCSU

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What is technology?

Technology is a broad concept that refers to use and knowledge of tools and crafts, and how these tools and crafts affect our ability to control and adapt to the environment. In human society today, technology is a result of science and engineering. A specific definition for the word "technology" is difficult to determine, because "technology" can refer to material objects of use to humanity, such as machines, hardware or utensils, but can also encompass broader themes, including systems, methods of organization, and techniques. The term can also either be applied generally or to specific areas: examples include "construction technology", "medical technology", or "state-of-the-art technology".

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Treatment Technologies for Livestock and Poultry Manure

Historically animal manures have been handled as a solid and were either deposited directly to pasture by the animals or collected along with the bedding used in the animal shelter and applied to land as a crop nutrient. As the number of animals on farms has increased the need for more efficient methods of manure management has also developed. The emphasis of the resources on these web pages are to provide an overview of manure treatment technologies, research being done in this field, and highlight the considerations involved in selecting candidates for a particular farm.

Why Treat Manure?

Manure from animals is a very wet, bulky material, containing as much as 90% water. Of the 10% that is dry matter, much of it is carbon. The manure handling system can impact the characteristics of the animal waste stream. Water-based waste management systems may have a liquid stream with greater than 98% moisture while manure scraped from open lots can contain a very high percentage of soil. As a result, the plant nutrient content of the manure is a very small portion of the weight/volume. Hauling nutrients to cropland in the form of manure can get very expensive compared to hauling the same amount of nitrogen or phosphorus in the form of commercial fertilizer. Swine production facility with anaerobic lagoon, adjacent cropland is used for waste utilization. Correcting the imbalance in manure nutrient distribution will involve finding ways to economically move excess nutrients off the livestock or poultry farm. Many alternatives to land application of raw manure are being examined. Many of these "manure treatment technologies" have been used in one form or another for many years, while others are recent solutions. Often, technologies are used in combination to create a system that can be tailored to the species, management of the farm, climate, or other factors. Technology that may be very successful on one farm may not be appropriate for another.

Manure Treatment Technology is Not "One Size Fits All"

Treatment technologies are generally selected to meet specific treatment goals on the farm. These treatment goals include nutrient reduction (primarily nitrogen and phosphorus), odor reduction, volume reduction, energy recovery, and adding value to the manure. Manure treatment technologies are often linked together to address several challenges faced by animal producers such as excessive nutrient on farm, manure runoff and odor. There may be additional benefits to manure treatment technologies beyond the primary treatment goals such as the reduction of emissions of particulate matter or greenhouse gases.

Manure Treatment Goals and Potential Treatment Technologies

Nitrogen Reduction Phosphorus Reduction Odor Reduction Energy Recovery Adding Value to Manure Aerobic Treatment Vegetative Treatment Systems Manure Additives Vegetative Treatment Systems Solids Separation Manure Additives Aerobic Treatment Covers Anaerobic Digestion Anaerobic Digestion Thermal Technologies (Gasification, Combustion, Pyrolysis) Agronomic & Environmental Uses of Biochar (Part 1 | Part 2) Composting Vermicomposting

Recommended Reading About Manure Treatment Technologies

Livestock and Poultry Environmental Stewardship (LPES) Curriculum Lesson 25: Manure Treatment Options Heartland Regional Water Quality Initiative Alternative Technologies resources. The Heartland Region (EPA Region 7) consists of Iowa, Kansas, Missouri and Nebraska. This website includes many resources from this region as well as others from across the nation. Development of Environmentally Superior Technologies (Smithfield Agreement)

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What is mobile GIS?

Mobile GIS is taking Geographic Information Systems (GIS) out of the office and into the field. A mobile GIS allows folks out in the field to capture, store, update, manipulate, analyze, and display geospatial data and information. Mobile GIS integrates one or more of the following technologies: * mobile devices (such as a PDA, tablet, or laptop computer, and in some countries mobile phones) * Geographic Information System (GIS) software * the Global Positioning System (GPS) * wireless communications for Internet-based GIS access. For most applications, it is an extension of desktop GIS, although increasingly users are taking mobile GIS data and uploading it directly to powerful visualization tools online such as Google Earth. Mobile GIS can allow for edits and changes to be made in the field, increasing accuracy and saving time. Many mobile GIS systems are relatively inexpensive.

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Manure Management Technology Selection Guidance

Purpose

Manure is an inevitable by-product of livestock production. Traditionally, manure has been land applied for the nutrient value in crop production and improved soil quality.With livestock operations getting larger and, in many cases, concentrating in certain areas of the country, it is becoming more difficult to balance manure applications to plant uptake needs. In many places, this imbalance has led to over-application of nutrients with increased potential for surface water, ground water and air quality impairments. No two livestock operations are identical and manure management technologies are generally quite expensive, so it is important to choose the right technology for a specific livestock operation. Information is provided to assist planners and landowners in selecting the right technology to appropriately address the associated manure management concerns.

What did we do?

As with developing a good conservation plan, knowledge of manure management technologies can help landowners and operators best address resource concerns related to animal manure management. There are so many things to consider when looking at selecting various manure treatment technologies to make sure that it will function properly within an operation. From a technology standpoint, users must understand the different applications related to physical, chemical, and biological unit processes which can greatly assist an operator in choosing the most appropriate technology. By having a good understanding of the advantages and disadvantages of these technologies, better decisions can be made to address the manure-related resource concerns and help landowners: • Install conservation practices to address and avoid soil erosion, water and air quality issues. • In the use of innovative technologies that will reduce excess manure volume and nutrients and provide value-added products. • In the use of cover crops and rotational cropping systems to uptake nutrients at a rate more closely related to those from applied animal manures. • In the use of local manure to provide nutrients for locally grown crops and, when possible, discourage the importation of externally produced feed products. • When excess manure can no longer be applied to local land, to select options that make feasible the transport of manure nutrients to regions where nutrients are needed. • Better understand the benefits and limitations of the various manure management technologies. Complete-Mix Anaerobic Digester - option to reduce odors and pathogens; potential energy production Gasification (pyrolysis) system - for reduced odors; pathogen destruction; volume reduction; potential energy production. Windrow composting - reduce pathogens; volume reduction Centrifuge separation system - multiple material streams; potential nutrient partitioning.

What have we learned?

• There are several options for addressing manure distribution and application management issues. There is no silver bullet. • Each livestock operation will need to be evaluated separately, because there is no single alternative which will address all manure management issues and concerns. • Option selections are dependent on a number of factors such as: landowner objectives, manure consistency, land availability, nutrient loads, and available markets. • Several alternatives may need to be combined to meet the desired outcome. • Soil erosion, water and air quality concerns also need to be addressed when dealing with manure management issues. • Most options require significant financial investment.

Future Plans

Work with technology providers and others to further evaluate technologies and update information as necessary. Incorporate findings into NRCS handbooks and fact sheets for use by staff and landowners in selecting the best technology for particular livestock operations.

Corresponding author, title, and affiliation

Jeffrey P. Porter, P.E.; National Animal Manure and Nutrient Management Team Leader USDA-Natural Resources Conservation Service

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Assistive Technology Resources

Military Specific

Limb loss – An article in the Journal of Rehabilitation Research & Development provides examples of the resources available to service members including what each organization provides along with contact information. Computer/Electronic Accommodations Program (CAP) – Provides assistive technology and accommodations to individuals with disabilities and wounded service members so they can be employed in the federal government. Brainline Military – Provides military-specific information and assistive technology resources on traumatic brain injury (TBI) for service members. National Resource Directory – Provides a searchable database of government, national, and state assistive technologies and devices. In the box labeled "search for resources," type in assistive technology or the name of a specific technology, device, or disability, and a list of possible resources will be generated. Military In-Step – Detailed information for service members who have a military amputation on the unique characteristics of war injuries requiring an amputation, what to expect during surgery and rehabilitation, care after surgery, and the prosthesis.

National/State Specific

AbleData – A searchable database of over 40,000 assistive technology products including objective descriptions plus educational fact sheets on assistive technologies and products by state. Alliance for Technology Access (http://www.ataccess.org/) – A national and international network of technology resource centers, community-based organizations, agencies, individuals, and companies with a mission of increasing the use of technology by children and adults with disabilities and functional limitations so they can participate fully in their communities. Assistive Technology Industry Association (ATIA) – A professional organization of agencies that provide assistive technologies. It provides links to resources and partners that can provide specific information on different types of technology or devices. Brain Injury Association of America – A national organization that promotes awareness, education, treatment, research, and advocacy for individuals and their families who have some type of brain injury. DisabilityInfo.gov – A government website that links to federal, state, and local government agencies; academic institutions; and nonprofit organizations with disability programs and services in communities nationwide. National AgrAbility Project – Provides direct support to farmers and ranchers with disabilities or long-term health conditions that make it difficult to work in production agriculture. The project also has a searchable database of assistive technology solution for producers with disabilities. Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) – A professional organization dedicated to promoting the health and well-being of people with disabilities through increasing access to technology solutions. The organization provides a listing of state contacts at http://www.findatnow.org. Technology for Long-Term Care – A helpful site to explore and compare various adaptive products. It was designed for older adults but has helpful information regardless of the individual's age.

Educational

LiveAbility House – A demonstration home in the Second Life® environment that shows individuals with disabilities how different design principles and assistive technology devices can enable them to live independently in their own homes. eXtension – A website with many educational resources designed for family caregivers; provides a link to a military-specific caregiver page. Assistive Technology and You – An article that provides a brief discussion of what assistive technologies are, where to find them, and how to pay for them. Assistive Technology fact sheet by the Family Caregiver Alliance – Written for older adults but provides ideas on low cost assistive devices that can be helpful for everyday tasks.

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Introduction to School IPM

Providing safe and healthy school environments is a high-priority for communities everywhere. Schools are considered to be sensitive environments, in which effective pest management is an essential and critically important responsibility. Students spend a major part of their day at school and the environmental standards set, have profound impacts on their health and academic success. As with any high-traffic, built environment, schools face pest and pest management challenges that impact their proper functioning. Integrated Pest Management or IPM is a strategy that ensures safe, cost-effective and sustainable pest management, reducing risks associated with pests and their management. Everyone in a school community plays a role in IPM because common human habits may create pest-conducive conditions. This IPM introductory module explains the most important simple IPM concepts and helps to increase awareness of how our everyday choices affect pest populations around us. This module will help learners to gain a basic understanding of IPM principles, which will be essential as they progress to more role-specific modules. On successful completion of this course, you will be eligible for a Certificate of Completion. This 90-minute module covers: IPM as a concept, the key elements of IPM and how IPM reduces risk. Learners will also understand the benefits of practicing IPM and how members of the school community all have IPM roles and responsibilities. Learners will understand how to perform the basic steps in an IPM program, such as pest monitoring, inspection, reporting, identifying conducive conditions and avenues of pest entry. Key pest groups and the signs of infestation will also be covered in this lesson. Presentations to Help You Teach Is this a topic that you would like to teach in a classroom setting? These presentations provide talking points in the slide notes and keep the slides concise. You can customize the PowerPoint versions to fit your needs.

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Tips for Teens: How to Contribute to Family Needs During Tough Times

If your family is going through tough times financially, consider ways you can contribute. Asking your parent(s) to talk with you the family budget and being willing to take some action to help is the first step to gaining respect and to demonstrate responsibility as a family member.

Cost? savings things that you can do to help with family expenditures are: • Turn off lights, televisions, or other electronics when not in use. • Take shorter showers to cut down on water and electric bills. • Don't stand with the refrigerator door open while deciding what to eat. • Investigate cost of cable/phone/computer usage and newspaper delivery. Help figure out your family's real needs versus wants for these services, then talk about ways to meet them. For example, could you use the public library online services for homework? Do you need a daily newspaper deliverd to the house? • Hang up your clothes after wearing so they wear longer and need less frequent washing and care. • Volunteer to help with family chores in lieu of paying for services like cleaning, lawn care, take?out food, or childcare. If you have a job, you might offer or be expected to help cover some of your expenses, especially for "wants." This could include a new pair of shoes or a night at the movies with friends.

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Cooking with Kids: Opportunities for Partnerships

From learning lifelong skills to improving diet to fostering a sense of responsibility and accomplishment, the benefits of cooking with children are well-established. While parents are encouraged to find ways to involve their children in meal preparation at home, many schools are incorporating cooking activities into their health, science and math curricula as a way to promote healthy eating. There are several resources available to schools interested in incorporating cooking into school days or afterschool programming. Cooperative Extension and Cooking Matters may be great places to start. Cooking Matters is a Share Our Strength program founded in 1993 and is part of the No Kid Hungry campaign, which is working to end childhood hunger in America. Through cooking classes and interactive grocery store tours, Cooking Matters partners teach families how to make the most of the food budget so that families prepare affordable, nutritious meals. Cooking Matters uses a collaborative model designed to enhance the effectiveness and sustainability of the cooking classes. Educational materials, training, evaluation, and national leadership are provided by Share Our Strength. Local partners, such as Cooperative Extension, deliver the program to meet the needs of their communities. Cooking Matters partners may already exist in your area! Cooperative Extension agencies in many states across the nation have thriving partnerships with Cooking Matters. Likewise, Cooperative Extension is an excellent resource and is well positioned to help bridge the gap between home and school and increase the impact of nutrition education by providing the same messages to children at school as is given to the parents and adults. Cooperative Extension educators may be able to come directly to classrooms and/or afterschool programs to provide nutrition lessons, food demonstrations, cooking opportunities, and tasting experiences. Cooperative Extension programs like SNAP-Education, Expanded Food Nutrition Education, and 4-H use research-based curricula for different age groups and grade levels. The lessons are interactive, connected to many of the common core and state standards, and fun!

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How should child care providers handle toileting accidents in young children?

In general, toileting accidents in the child care setting should be handled casually. Children who have learned to use the toilet may feel embarrassed if they wet their pants. Shaming or scolding the child will only make him more uncomfortable. Here are some quick tips for handling toileting accidents in the child care setting: Help the child change clothes. If the child is old enough to dress himself independently, have him take responsibility for changing his own clothes. Seal the soiled clothes in a plastic bag, and send them home with parents to wash. Remind the child that he is not wearing a diaper and needs to use the toilet. Encourage the child to tell you when he needs to go. Toilet learning is challenging for young children because it requires both the motor skills to control the bladder and bowels and the cognitive skills to understand and act on the urge to go. Help the child avoid accidents by reminding him to use the toilet every few hours. Many young children just learning to use the toilet may not recognize the need to go until it's too late. If a child who was once using the toilet regularly begins having frequent accidents, talk with the parents to find out if something unusual is happening in the child's life. Loss of bowel and bladder control is sometimes a sign of stress in young children. Work with the parents to find ways to help the child cope with the stress.

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Benefits of Growing Your Own Fruits and Vegetables

Benefits for you and your family:

Fresh and nutritious fruits and vegetables. Fruits and vegetables from your own garden are higher in nutrients than the ones that have traveled several thousands miles to get to your grocery store. Having your children assist you in the garden can increase the chance that they will eat more of the fruits and vegetables they have helped to grow. Growing your own fruits and vegetables can offer you the opportunity to reduce the amount of pesticides that you use in your garden, making them healthier. Growing your own fruits and vegetables will save your money at the grocery store. Gardening increases physical activity. It is a great way to engage the whole family in physical activity and lets them help to take responsibility for the garden. The fruits and vegetables grown in your garden will promote health because they are rich in nutrients, especially in phytochemicals, anti-oxidants, vitamin C, vitamin A and folate. Gardening gives you're a real sense of appreciation when you can see the bounty of your efforts. Growing a garden gives you a new appreciation for nature, when you can have the opportunity to see how things grow. Gardening may stimulate many new interests. You may want to learn more about botany, landscape architecture, photography, nutrition, and farmer's markets. Gardening gives you the opportunity to give back. If you have an abundant garden, you might give some of your produce to the local soup kitchen or food bank. This can be a great time to create memories with your children, memories that can last a lifetime. Your garden can lead to new skills, and knowledge for you and your family, your child may have a new found interest to become a chef!

Society and Community

Gardens can foster a great sense of community through parent to parent connections, teacher to student or student to student. Schools and community may decide to build a community or school garden. This is a tremendous learning tool for all involved as well a providing a source of nutritious fruits and vegetables. A community/school garden can help to foster and motivate future leaders (e.g., 4-H afterschool programs). Neighborhood Community Gardens beautify landscape, support local farmers, can create a food secure community where residents do not need to rely on vendors to supply fresh produce.

Environment

Tall fruit trees provide shade. You can use less pesticides or use natural pesticides and this will be less contamination to the environment. Produce peels and waste can create a lot of green waste and takes up a lot of space in the garbage can. Recycle them to make your own compost. It is less expensive than buying fertilizers. Turn unsightly lands into attractive landscapes. Get creative. There is a potential to grow an innovative gardens like futuristic horticulture gardens that are very cost-effective and require substantially less space. Start exploring today!!!

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Why is confidentiality so important in child care programs?

Child care programs routinely handle confidential information about enrolled children, families, and staff. Child care programs maintain confidentiality on a "need to know" basis. This information is shared only when it is necessary. This is important especially when there are specific health and safety concerns. Maintaining confidentiality also builds trust in child care programs. Fostering relationships with staff, children, and families is built on trust. When managing sensitive information, there is an ethical and legal responsibility to protect the privacy of individuals and families.

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Consumer Preferences for Car Loan Features

Brief Description: This work studied consumer preferences for car loan features. The results revealed preferences that conflicted with traditional financial rationality. For example, participants avoided choosing long term (six- or seven-year) loans even when the interest rate was zero. In addition, the consumers, particularly those with less education, appeared to focus predominately on the first digit of monthly payments. A $395 car payment, for example, would be viewed as much better than a $400 payment, but a $390 payment would not be viewed as much better than a $395 payment.

Implications: Policies, programs and personal efforts to increase financial education are warranted, and consumers should be encouraged to compare interest rates on their sources and uses of funds. Some irrational preferences, however, may reflect psychological phenomena that are impervious to education. Availability of alternative means of self-control is important to the extent that aversion to long-term loans is a method of restraining personal spending.

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Caring for Those with Severe Burns

Did you know that, according to Journal of Critical Care Medicine, burn injuries account for 5 percent to 10 percent of combat casualties? During military operations, burn injuries are usually caused by explosive device detonations or refueling operations. Such burn injuries can be accompanied by severe complications, including shock, infection, electrolyte imbalance, and respiratory distress. As a caregiver to a wounded warrior, you need to understand the recovery process and steps to take in the immediate aftermath of military burn injuries.

The recovery process

During the recovery process, a team of burn professionals, consisting of plastic surgeons, burn team nurses, counselors, social workers, and psychologists, helps your wounded warrior, you, and other family members. According to British Medical Journal, the recovery of burn patients is a continual process that comprises three stages—the resuscitative or critical stage, the acute stage, and long-term rehabilitation. Resuscitative or critical stage In this beginning stage of recovery, physical survival is the primary goal. Your wounded warrior may experience challenges, such as sleep disturbance, confusion, disorientation, and pain. Treatment may involve pain medication, suggestions for coping strategies, education, and support services. Acute stage Your wounded warrior may become more aware and alert and have greater awareness of his or her physical appearance and the psychological impact of the injuries. During this stage, symptoms of depression and anxiety may take effect. Options for treatment may include drug management (for example, depression and sleep medications), counseling, and relaxation techniques. Long-term rehabilitation: Reintegration is key during long-term rehabilitation. This stage begins when your wounded warrior is discharged from the hospital. He or she may experience the hassles and reality of daily activities, changes in body image, and the constant role of rehabilitation in his or her life. Treatment may consist of social skills training, peer counseling, vocational counseling, and support group participation. T

ypes of burns

Burns are categorized by degree of severity. First degree This type of burn is rarely serious and may heal by itself within days. These burns usually occur as a result of exposure to sun (sunburn) or hot liquids. Second degree Second degree burns require longer periods to heal and may result in permanent scarring. They can result from exposure to hot or scalding fluids or from flash or flame injuries. Third degree This type of burn may require skin grafting, a surgical procedure in which a partial segment of noninjured skin from the patient's body (referred to as the "donor site") is grafted to the burn area. Fourth degree Fourth degree burns can affect all layers of the skin as well as structures below the skin. They may result in permanent disability and require extensive rehabilitation.

Strategies for helping and coping

It's important to learn how to help your wounded warrior and yourself respond to your situation. Always check with your wounded warrior's doctors to learn about individualized treatment plans. Learn how to minimize and prevent negative effects of prolonged bed rest, including debilitation and loss of muscle tone, strength, and condition. Learn how to help your wounded warrior adapt to the environment and/or to equipment for enhanced independence. Anticipate the need to apply skin lotion to prevent your wounded warrior from becoming too dry. Control and prevent the formation of scars by applying pressure garments (garments worn after a burn to control scarring). Maximize wounded warrior and family education. Join a support group for caregivers who are experiencing similar wounded warrior situations. Locate such groups by contacting your local Army installation's Soldier and Family Assistance Center (SFAC).

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Production Agriculture and Stress

Farming and ranching can be stressful occupations, and that stress can have a multifaceted effect on a person. There are numerous uncontrollable factors, such as unpredictable weather, untimely equipment breakdowns, time constraints, and financial markets, that cause stress in the lives of farm families. Stress is a physical response to perceived life-threatening events. In an evolutionary sense, it allows us to determine whether we should stop and fight or flee from an external threat. Our brains do not recognize the difference between psychological or physical threats, and therefore our bodies respond in the same fashion to something we perceive as negative, overwhelming, or threatening, irrespective of the real risk to physical well-being. Each person reacts differently to stress, but some common symptoms of chronic stress include changes in a person's sleep patterns, fluctuation in a person's weight, fatigue, restlessness, and physical health conditions such as headaches, ulcers, or high blood pressure. Besides the physical effects, stress can also hinder interpersonal relationships at work and home. Chronic and uncontrolled stress can be detrimental to your health and interpersonal relationships. It might not be possible to get rid of the things causing stress in your life, but there are things you can do to help manage the stress. The following are some simple ways that a person can decrease stress: Exercise: Many farmers feel that the physical labor that they do on the farm is enough, but having a regular exercise or stretching program provides a break in your daily routine, benefits your overall health, and provides a constructive way to relieve excess energy. Strive to exercise three times per week for a minimum of 30 minutes. Caffeine: Reduce or eliminate caffeine from your diet. By eliminating this stimulant, a person may have reduced headaches, increased relaxation, improved sleep, a calmer mood—and, counterintuitively, more energy. Humor: The old adage "laughter is the best medicine" isn't inaccurate—laughter might help to reduce your stress, so explore ways (social groups, books, and so on) to add some laughter to your life. Talking: Having a strong network of friends and family can help provide necessary support during stressful times. Make sure that you have a couple of people to whom you can vent your problems to help reduce built up stress. Relaxation Techniques: There are simple relaxation techniques that can help you clear your mind and reduce tension. Techniques include deep breathing and taking mini-breaks during the day. Sleep: If you are not getting enough sleep at night to be refreshed in the morning and energetic enough for the day, then you may need to consider a midday power nap. Nutrition: Make sure that you are eating balanced meals throughout the day. Breaks: Take some time from the stressful situation by going for a walk, spending some time alone, working on a hobby, meditating, and so on.

Getting Help

There are times when things get too difficult, and you might need professional help. Professional help can include your family physician or health care provider, a mental health professional, or a support group. Listed below are some signs that indicate that you should seek professional help: Depression Changed sleeping patterns Abusive behavior Suicidal thoughts Hallucinations Consideration of changes in your marital status Inability to express positive feelings Excessive alcohol intake Feelings of guilt, isolation, panic, or being overwhelmed

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Tell Me When! How Bowl Size Impacts the Amount Children Request and Eat

The effect of plate and bowl sizes on portion size and calorie consumption by adults and children is well documented in literature. Larger the dish the more food you or the server is likely to put on it. But how much of a difference are we really talking about?

What we know about portion size from previous studies:

Adults and children serve themselves portions that are relative to the size of the plate partially because of the Delboeuf illusion that makes a standard portion size look smaller on a large plate and bigger on a small plate. People tend to scoop more food onto bigger plates without realizing it (4,5,6). Larger serving dishes and utensils also influence us to take more food (3). Even food and nutrition experts who are aware of proper portion sizes are susceptible to big bowl illusions (1)! A 2013 study from the Cornell Food and Brand Lab helps to give perspective on the extent to which size of a cereal bowl impacts how much cereal children request and how much they consume. The study sought to answer two questions: Does bowl size affect the amount of cereal requested among children and does larger portion size translate into higher consumption and waste?

What this study found:

To determine the effect of bowl size on amount of cereal requested, consumed, and wasted by children two studies were conducted. In the first study, 69 preschool aged children were randomly given either an 8 or 16 ounce bowl and asked to tell servers when the bowl contained the amount of cereal that they wanted for a morning snack. The bowls were measured and researchers found that in alignment with previous findings that children: Requested about twice as much cereal in the larger bowls than smaller bowls. The second two day study looked at consumption and waste. Eighteen school-aged children were randomly given either a small (8oz) or large (16 oz) bowl at breakfast one day and the opposite size the following day. As in the other study, participants were asked to notify servers when they received the amount of cereal that they desired. These slightly older children also requested over twice as much cereal in the larger bowls. Regardless of gender or BMI these children: Consumed 42% more cereal from the large bowl vs. the small bowl Wasted 26% more cereal when give the large bowl vs. the small bowl Children in this study were also asked to indicate what size bowl they used at home from a selection of various sized bowls to determine the average bowl size that they normally eat from at home. The average bowl size that children reported using at home held 19.2 ounces (2)! According to the Academy of Nutrition and Dietetics one serving of cereal, before adding milk should be about 1 ounce.

What we can take away from this study:

Children unintentionally request more cereal in larger bowls indicating that they use the bowl as a reference for how much food they want. To combat this bowl size trickery: Purchase smaller bowls! An eight ounce bowl will hold a full serving size of most cereals. If new bowls are not an option, measure out the cereal before putting it into the bowl to maintain portion size despite the size of the bowl. Follow these easy tips and your children may consume fewer unneeded calories and your cereal may even go farther!

Which categories do you think the above article belongs to?

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☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Connecting Farm to School, SNAP-Ed Nutrition Education, and Smarter Lunchrooms

Cornell Cooperative Extension (CCE) of Jefferson County, Eat Smart New York (ESNY) and Watertown City School District partnered to provide monthly nutrition lessons, food demonstrations and food tastings based on the farm to school monthly harvest produce item to nearly 2,000 students in the district. The Farm to School movement enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools. However, more than just where the food is purchased needs to be addressed in a school to make an impact on the health and nutrition of students. Constant engagement – inside and outside the cafeteria – is key to students' willingness to change their eating habits. SNAP-Ed Nutrition Education provides interactive lessons that lead to behavior change such as increased consumption of vegetables and fruits. These lessons are important to promote optimal childhood health, growth and intellectual development, which is needed for children to reach their full academic potential. The Smarter Lunchrooms Movement is dedicated to providing schools with the knowledge, motivation, and resources needed to build a lunchroom environment that makes healthy food choices the easy choice. The Movement brings evidence from the fields of economics, marketing, and psychology into the school cafeteria. Smarter Lunchrooms strategies are free or low-cost solutions that nudge students to voluntarily select the healthiest food in the lunchroom. Smarter Lunchrooms can help school nutrition services see less waste, higher participation, more satisfied students, and increased consumption of important nutrient-rich foods.[1] Combining all three programs to maximize resources and impact is a win win for all involved. In the Watertown City School District, Cornell Cooperative Extension and Eat Smart New York educators developed a schedule to provide monthly education in each of the six elementary buildings in the district. They worked with school administrators and teachers to ensure there was enough time to provide a lesson in addition to a food tasting. The lessons are fast paced, interactive and engaging. Students are learning about the how's and the why's of nutrition. The food demonstration and tasting provide an opportunity to experience foods and recipes students likely have never tried before, and allow them to decide what they like and don't like. They are encouraged to try the recipes at home with their families (and many report doing so) as well as choosing the produce items when they are available in the school cafeteria. The district's new food service director is working to incorporate the harvest of the month produce item into the school menus. Over 75% of the students indicate through surveys that they intend to increase the amount of vegetables and fruits they consume at school. To help with this, the cafeteria is implementing Smarter Lunchroom strategies such as serving both hot and cold vegetables, having vegetables at many places on the serving line, and incorporating vegetables into entrees. Additional schools in the area are recognizing the positive impacts of these program partnerships and are beginning the planning and implementation process in their own school. Contributor Amanda Root, Cornell Cooperative Extension in Jefferson County [1] Smarter Lunchrooms Movement

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

What is mechanical pest control?

Mechanical control is the management of pests by physical means such as the use of a barrier (e.g., screens or row covers), trapping, weeding or removal of the pest by hand. It may also involve changing the physical conditions in a given area, for example, changing the temperature to make an area unfavorable for pests.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Ventilation in Housing for Small and Backyard Poultry Flocks

Ventilation is the exchange of air between the inside and outside of a poultry house. The main function of a ventilation system is to maintain adequate oxygen levels while removing carbon dioxide, moisture, dust, and odors. During summer, ventilation also is important for removing heat. To achieve an effective ventilation system for your poultry house, consider both house placement and house design.

House Placement

The location of a poultry house can have an impact on the effectiveness of its ventilation system. In northern areas where it is very cold much of the year, the house should be positioned to reduce the amount of north wind exposure. In southern areas where heat is an issue, the house should be positioned to take advantage of maximum southern prevailing winds to help provide as much natural ventilation as possible.

House Design

An effective natural ventilation system in a poultry house relies on the laws of physics to generate air movement. In particular, two important concepts are the facts that warm air rises and that warm air holds more moisture than cold air. In summer, the chimney effect causes natural ventilation to occur in a poultry house that has a ridge or eave opening in the ceiling. A constant flow of air exists if the outside temperature is cooler than the temperature at bird level inside the building. During winter, the amount of fresh air brought in should be just sufficient to allow for adequate air exchange. The incoming air enters through the roof of the building and warms as it drops toward the floor. Because the warmed air picks up moisture, the ventilation system must include a method for removing this air from the building to allow the air flow cycle to continue.

Which categories do you think the above article belongs to?

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☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Geospatial Technology for Youth

Want to go on real treasure hunt? Want to know more about how maps are used to help you find where you are and where you're going? Ever get frustrated if the GPS in your phone takes you to the wrong place?
Geospatial technology is all about using maps and technological devices to design maps and locate specific points on Earth. Click below to learn how this technology works. Once you've mastered the basics, you might want to try your hand at geocaching, a treasure hunting game using satellite signals and GPS units to find the millions of hidden treasures around the world!

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Basic Math Skills in Child Care: Creating Patterns and Arranging Objects in Order

Ordering, sequencing, and patterning are important foundational skills for mathematics. Child care providers can build young children's early math skills by help them learn sequencing, seriation, and patterning. Sequencing is the ability to create and identify patterns. For example, children may stack blocks in a pattern of red, blue, red, blue, and so on. As adults, using calendars is one way we use sequencing skills. We look at a calendar and look for the pattern that helps us predict what day or month comes next. For preschoolers, sequencing means knowing which number comes next. Seriation is arranging objects in order by size, location or position. Have you ever asked children to arrange objects from smallest to largest, largest to smallest, shortest to tallest or thinnest to thickest? You've been teaching seriation. Young children who understand seriation can put numbers in order from lowest to highest, smallest to largest. Eventually, they will come to understand that 6 is higher than 5 or 20 is higher than 10. Creating Patterns Having children copy patterns or create patterns of their own (such as red, blue, red, blue, red, blue) may seem simple, but it is a great way to help children recognize order in the world and prepare for later math skills, such as multiplication. Child care providers can begin exposing young children to patterns -- long before they are ready to learn multiplication facts -- by having them make groups and count the total number of objects. For example, four groups of three objects each make a total of 12 objects (4 X 3 = 12).

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

iW2K-Android-v4.1 Pre-Survey

1. What is your gender?

- ◯ Female
- ◯ Male

2. Which category below includes your age?

- ◯ 18-24
- ◯ 25-34
- ◯ 35+

3. What is your classification?

- ◯ School Student
- ◯ Undergraduate Student
- ◯ Graduate Student
- ◯ Professional

4. What do you normally use a mobile for? (Select all that apply)

- ☐ Email
- ☐ Surfing the Internet
- ☐ Homework
- ☐ Blogging
- ☐ Maintaining social network like Facebook, Instagram, Twitter, etc.
- ☐ Work
- ☐ Entertainment
- ☐ Online learning

Other (please specify)

5. What type of mobile telephone do you PRIMARILY use?

- ◯ Regular cell/mobile phone (not a smartphone)
- ◯ Android
- ◯ iPhone
- ◯ Blackberry/RIM
- ◯ Windows Mobile
- ◯ I don't have a mobile phone

6. How often do you use a mobile phone for fun/work?

- ◯ More than 8 hours per day
- ◯ 3-7 hours per day
- ◯ 1-3 hours per day
- ◯ Less than 1 hour per day
- ◯ Less than 1 hour per week

7. Do you prefer to access a product through its application or through a browser in mobile device?

- ◯ Application
- ◯ Mobile browsers

8. Do you have prior experience working in an online learning environment?

- ◯ Yes
- ◯ No

9. Have you taken any course over the Internet?

- ◯ Yes
- ◯ No

If Yes, Please specify the name of the course.

10. Choose all the subject you like below:

- ☐ Science
- ☐ Health
- ☐ Responsibly
- ☐ Serve

11. Do you wish to share the interesting articles you read to others?

- ◯ Yes
- ◯ No

12. Do you have any social media connection? If so, please specify

- [ ] Twitter
- [ ] Snapchat
- [ ] Facebook
- [ ] Tumblr
- [ ] Instagram
- [ ] Linkedin
- [ ] Pinterest
- [ ] What's App

Other (please specify)

13. Do you have previous experience working with extension website?

- ( ) Yes
- ( ) No

14. Using mobile, what is your most frequently used educational app/website?

15. Would you like the Internet products to product you with advice based on your interest?

- ( ) Yes
- ( ) No

16. Do you accept suggestions of recommendation systems?

17. What would cause you to uninstall an application?

iW2K-Android-v4.1 Post-Survey

Usability & Comparison

1. What is the overall reaction to iW2K v4.3?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The application is attractive.	◯	◯	◯	◯	◯
The application is easy to use.	◯	◯	◯	◯	◯
The application is simple to navigate.	◯	◯	◯	◯	◯
Helps me get key information quickly.	◯	◯	◯	◯	◯
Based on this experience, I will use the application again.	◯	◯	◯	◯	◯

2. Please rate iW2K v4.3 with respect to the following aspects.

	Very High	High	Moderate	Low	Very Low
Flexibility	◯	◯	◯	◯	◯
User experience	◯	◯	◯	◯	◯
Learnability	◯	◯	◯	◯	◯
Visual look of the system	◯	◯	◯	◯	◯
Interactive feel of the system	◯	◯	◯	◯	◯

3. I will learn more knowledge from reading the recommended articles.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

4. Overall, I would recommend iW2K v4.3 to others.

- ◯ Yes
- ◯ No

5. Please rate ***The articles listed in "For you" tab match my interest*** for the four iW2K versions.

	1	2	3	4	5	6	7	8	9	10
v4.0	○	○	○	○	○	○	○	○	○	○
v4.1	○	○	○	○	○	○	○	○	○	○
v4.2	○	○	○	○	○	○	○	○	○	○
v4.3	○	○	○	○	○	○	○	○	○	○

6. Please rank ***The most attractive articles as the version that returns the most relevant results*** for the four iW2K.

	1	2	3	4
v4.0	○	○	○	○
v4.1	○	○	○	○
v4.2	○	○	○	○
v4.3	○	○	○	○

7. Please rate ***The articles from "you may like" at the end of the article I just read are more attractive*** for the two iW2K versions.

	1	2	3	4	5	6	7	8	9	10
v4.0	○	○	○	○	○	○	○	○	○	○
v4.3	○	○	○	○	○	○	○	○	○	○

8. I feel iW2K v4.3 runs slower than v4.0.

- ○ No
- ○ Yes

If yes, please specify which steps you feel slower

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

REQUEST for MODIFICATION

For help, contact: **THE OFFICE OF RESEARCH COMPLIANCE (ORC)**, 115 Ramsay Hall, Auburn University
Phone: 334-844-5966 **e-mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs

Revised 2.1.2014 **Submit completed form to IRBsubmit@auburn.edu or 115 Ramsay Hall, Auburn University 36849.**

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

1. **Protocol Number:** 19-048 EX 1902
2. **Current IRB Approval Dates: From:** 02/19/2019 **To:** ----------
3. **Project Title:** Framework for user sentiment analysis to improve usability of applications for generation z and young adults

4.

Yang Cao	PhD Candidat	CSSE	3343323678	yangcao@auburn.edu
Principal Investigator	**Title**	**Department**	**Phone**	**AU E-Mail** (primary)
Yang Cao	2306 Shelby Center, Auburn AL			
PI Signature	**Mailing Address**			**Alternate E-Mail**
Cheryl D. Seals	Cheryl Seals	CSSE	3348446319	sealscd@auburn.edu
Faculty Advisor	**FA Signature**	**Department**	**Phone**	**AU E-Mail**

Name of Current Department Head: Hari Narayanan **AU E-Mail:** naraynh@auburn.edu

5. **Current External Funding Agency and Grant number:** N/A

6. **a. List any contractors, sub-contractors, other entities associated with this project:**

N/A

b. List any other IRBs associated with this project: N/A

7. **Nature of change in protocol: (Mark all that apply)**

- ☐ **Change in Key Personnel** (attach CITI forms for new personnel)
- ☐ **Change in Sites** (attach permission forms for new sites)
- ☐ **Change in methods for data storage/protection or location of data/consent documents**
- ☐ **Change in project purpose or questions**
- ☐ **Change in population or recruitment** (attach new or revised recruitment materials as needed)
- ☐ **Change in consent procedures** (attach new or revised consent documents as needed)
- ☐ **Change in data collection methods or procedures** (attach new data collection forms as needed)
- ☑ **Other (explain):** All 100 articles that will be used for information design are attached (compared to the approved 5-article-sample)

FOR ORC OFFICE USE ONLY

DATE RECEIVED IN ORC: _____ by _____
DATE OF IRB REVIEW: _____ by _____
DATE OF IRB APPROVAL: _____ by _____

MODIFICATION # _____
PROTOCOL APPROVAL CATEGORY: _____
MODIFICATION APPROVAL CATEGORY: _____
INTERVAL FOR CONTINUING REVIEW: _____

The Auburn University Institutional Review Board has approved this Document for use from 03/05/2019 to ---------- Protocol # 19-048 EX 1902

COMMENTS:

8. **Briefly list** *(numbered or bulleted)* **the activities that have occurred up to this point, particularly those that involved participants.**

The study hasn't started yet.

9. **For each item marked in Question #7, describe the requested changes to your research protocol, with an explanation and/or rationale for each.** (*Additional pages may be attached if needed to provide a complete response.)*

N/A

10. **Identify any changes in the anticipated risks and / or benefits to the participants.**

N/A

11. **Identify any changes in the safeguards or precautions that will be used to address anticipated risks.**

N/A

12. Attach a copy of all "stamped" IRB-approved documents you are currently using. *(information letters, consents, flyers, etc.)*

Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **The OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to irbsubmit@auburn.edu.

1. PROJECT IDENTIFICATION

Date 01/30/2019

a. Project Title Framework for user sentiment analysis to improve usability of applications for generation z and young adults

b. Principal Investigator Yang Cao Degree(s) PhD

Rank/Title PhD Candidate Department/School CSSE

Phone Number 3343323678 AU Email yangcao@auburn.edu

Faculty Principal Investigator (required if PI is a student) Cheryl D. Seals

Title Associate Professor Department/School CSSE

Phone Number 3348446319 AU Email sealscd@auburn.edu

Dept Head Hari Narayanan Department/School CSSE

Phone Number 3348446312 AU Email naraynh@auburn.edu

c. Project Personnel (other than PI) - Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting). Attach a table if needed for additional personnel.

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

d. Training - Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? ■ YES ☐ NO

e. Funding Source- Is this project funded by the investigator(s)? ☐ YES ■ NO
Is this project funded by AU? ☐ YES ■ NO If YES, identify source _____
Is this project funded by an external sponsor? ☐ YES ■ NO If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for the award.
Name _____ Type _____ Grant # _____

f. List other IRBs associated with this research and submit a copy of their approval and/or protocol.

2. Mark the category or categories below that describe the proposed research:

■ 1**.** Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

■ (i) Recorded information cannot readily identify the participant (directly or indirectly/linked); **OR**

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include children when investigators do not participate in activities being observed.

■ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3**.** Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions) **Mark the applicable sub-category below (I, ii, or iii).** 104(d)(3)(i)

☐ (A) Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ (B) Any disclosure of responses outside of the research would not reasonably place subject at risk; **OR**

☐ (C) Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by the IRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one of the following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information and must be publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directly or indirectly/linked; investigator does not contact subjects and will not re-identify the subjects; **OR**

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); **OR**

☐ (iv) Research information collected by or on behalf of federal government using government generated or collected information obtained for non-research activities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. **(**Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

***Limited IRB review* – the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

****Category 3 – Benign Behavioral Interventions (BBI)* must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark all applicable)

Minors (under 19)	☐ YES ■ NO
Pregnant women, fetuses, or any products of conception	☐ YES ■ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ■ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ■ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ■ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ■ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ■ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ■ NO
Deception of participants	☐ YES ■ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this research is to create a web crawling system that will be enhanced through machine learning strategies. The study participants will provide us with data that will help us to learn their preferences to model in the proposed system. This study is to investigate the effect that our proposed framework has on software usability with a system enhanced with this method. The main objective is to create framework that can be used to design usable applications and the proposed framework will be evaluated through empirical experiments.

The participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. Informed consent will be granted using the recruitment script (see attached script). Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

Phase one -- Information Design
Participants will be asked about their interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology. Then 5 - 10 articles from extension.org will be provided to participants to ask which category do they think each article belongs to, and participants' interest level (ranges 1 - 10) in this article.
Those users' preference data and articles themselves will be used to train a machine learning model, which will be applied to our experimental application.
Phase two -- Usability evaluation
Participants will be provided two Andriod applications (one benchmark, one experimental) to read articles. To collect unbiased data, the order of the application review will be assigned to survey participants in random order. Usability and satisfaction data will be collected with the Usability Evaluation Questionnaire.

The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

5. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

Participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. For this experiment, we invite participates of all genders. We will also utilize opportunistic sampling to choose participants. It will be advertised in classes to seek volunteers and we will use personal recruitment and email recruitment based on recruitment script.

6. **Does the research involve deception? ☐ YES ■ NO If YES, please provide the rationale for deception and describe the debriefing process.**

7. **Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the person would experience in daily life.**

   Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

   No this experiment will not cause any harm to the participants and they will be given the opportunity to withdraw at any time.

8. **Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.**

   Hard copy paper documents will be stored in a locked file cabinet after being entered into an Excel Spreadsheet or SQLite Database. Confidential data will not be coded in the database. Only Yang Cao (PI) and Dr. Cheryl Seals (FA) have access to participants' data.

9. **Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).**

   Data will be collected without a link of participant s data to any identifying information, recorded and analyzed as "anonymous . Participants' name won't be published.

10. Will the research involve interacting (communication or direct involvement) with participants? ☐ YES ■ NO **If YES, describe the consent process and information to be presented to subjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.**

During Phase I, the informant design, the experiment facilitators will give the participants the informed consent. There are two options to the experiment. The user can complete the survey remotely and in this case we will have no contact with the participant.

In case two, we will consent the participants and situate them in a study area were they will complete the survey. We will also perform the experiment and collect the experimental data from the experiment.

We will also use this same procedure for the Phase II systems experiment.

11. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Appendix A Recruitment Script
Yang Cao Citi training
Cheryl Seals Citi training
Phase One information design survey sample
Phase Two Usability Evaluation Pre-survey and Post-survey

Principal Investigator's Signature Yang Cao **Date** 01/30/2019

If PI is a student,
Faculty Principal Investigator's Signature Cheryl Seals **Date** 01/31/2019

Department Head's Signature N. Hari Narayanan **Date** 01/31/2019

The Auburn University Institutional Review Board has approved this document for use from 01/29/2019 to 01/28/2020. Protocol #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults

RECRUITMENT SCRIPT (verbal, in person)

You are invited to participate in a research study because you are generation z students and aged above 18. The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering. Only individuals who are at least 18 years old may participate in this study.

As a participant, you will be asked to choose your interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology, and provide opinions about articles in those categories. Your time commitment will be approximately half an hour.

There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. You will not directly benefit from being in this study. There are no costs associated with participating.

If you would like to participate in this research study, email me at yangcao@auburn.edu. If you have questions, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** History and Ethical Principles - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720860
- **Completion Date:** 06/06/2016
- **Expiration Date:** 06/06/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
History and Ethical Principles - SBE (ID: 490)	06/06/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** History and Ethical Principles - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720860
- **Report Date:** 06/06/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
History and Ethical Principles - SBE (ID: 490)	06/06/16	5/5 (100%)

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COURSEWORK REQUIREMENTS REPORT*

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 19720852
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/06/2020
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
CITI Conflict of Interest Course - Introduction (COI-Basic) (ID: 15177)	06/06/16	No Quiz
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	06/06/16	5/5 (100%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	06/07/16	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	06/07/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 19720852
- **Report Date:** 06/07/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
CITI Conflict of Interest Course - Introduction (COI-Basic) (ID: 15177)	06/06/16	No Quiz
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	06/06/16	5/5 (100%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	06/07/16	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	06/07/16	5/5 (100%)

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research with Children - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720850
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/07/2019
- **Minimum Passing:** 80
- **Reported Score*:** 80

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Research with Children - SBE (ID: 507)	06/07/16	4/5 (80%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research with Children - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720850
- **Report Date:** 06/07/2016
- **Current Score**:** 80

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research with Children - SBE (ID: 507)	06/07/16	4/5 (80%)

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COURSEWORK REQUIREMENTS REPORT*

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- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research in Public Elementary and Secondary Schools - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720849
- **Completion Date:** 06/07/2016
- **Expiration Date:** 06/07/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	06/07/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Research in Public Elementary and Secondary Schools - SBE
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720849
- **Report Date:** 06/07/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	06/07/16	5/5 (100%)

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COURSEWORK REQUIREMENTS REPORT*

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Cultural Competence in Research
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720859
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Cultural Competence in Research (ID: 15166)	06/08/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Course Learner Group:** Cultural Competence in Research
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720859
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Cultural Competence in Research (ID: 15166)	06/08/16	5/5 (100%)

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COURSEWORK REQUIREMENTS REPORT*

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- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720858
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	06/08/16	5/5 (100%)

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COURSEWORK TRANSCRIPT REPORT**

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- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19720858
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	06/08/16	5/5 (100%)

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- **Phone:** 3343323678

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher
- **Course Learner Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Key Personnel (including AU Faculty, Staff and Students) and Faculty Advisors involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 19720854
- **Completion Date:** 06/08/2016
- **Expiration Date:** 06/08/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID: 1127)	06/08/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	06/08/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	06/08/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	06/08/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	06/08/16	5/5 (100%)
Students in Research (ID: 1321)	06/08/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher
- **Course Learner Group:** IRB # 2 Social and Behavioral Emphasis - AU Personnel
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Key Personnel (including AU Faculty, Staff and Students) and Faculty Advisors involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 19720854
- **Report Date:** 06/08/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Students in Research (ID: 1321)	06/08/16	5/5 (100%)
Belmont Report and CITI Course Introduction (ID: 1127)	06/08/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	06/08/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	06/08/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	06/08/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	06/08/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	06/08/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** CSSE
- **Phone:** 3343323678

- **Curriculum Group:** Responsible Conduct of Research for Social and Behavioral
- **Course Learner Group:** Social, Behavioral and Education Sciences RCR
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

- **Report ID:** 19720851
- **Completion Date:** 06/14/2016
- **Expiration Date:** 06/13/2021
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Authorship (RCR-Basic) (ID: 16597)	06/13/16	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	06/13/16	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	06/13/16	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	06/13/16	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	06/13/16	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	06/13/16	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	06/14/16	5/5 (100%)
Plagiarism (RCR-Basic) (ID: 15156)	06/14/16	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	06/14/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Yang Cao (ID: 5590169)
- **Email:** yzc0020@auburn.edu
- **Institution Affiliation:** Auburn University (ID: 964)
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- **Curriculum Group:** Responsible Conduct of Research for Social and Behavioral
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- **Stage:** Stage 1 - RCR
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- **Report ID:** 19720851
- **Report Date:** 06/14/2016
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	06/14/16	5/5 (100%)
Plagiarism (RCR-Basic) (ID: 15156)	06/14/16	5/5 (100%)
Authorship (RCR-Basic) (ID: 16597)	06/13/16	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	06/13/16	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	06/13/16	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	06/13/16	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	06/13/16	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	06/13/16	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	06/14/16	5/5 (100%)

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418458
- **Completion Date:** 14-Jul-2015
- **Expiration Date:** 14-Jul-2018
- **Minimum Passing:** 80
- **Reported Score*:** 80

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	14-Jul-2015	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k137ccdc4-e1db-414a-983b-f97d5bcc9ee3-16418458

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Conflicts of Interest in Research Involving Human Subjects
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418458
- **Report Date:** 03-Apr-2018
- **Current Score**:** 80

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	14-Jul-2015	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k137ccdc4-e1db-414a-983b-f97d5bcc9ee3-16418458

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

CITI PROGRAM

Completion Date 14-Jul-2015
Expiration Date 14-Jul-2018
Record ID 16418458

This is to certify that:

Cheryl Seals

Has completed the following CITI Program course:

IRB Additional Modules (Curriculum Group)
Conflicts of Interest in Research Involving Human Subjects (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wbcc96680-7f48-42fd-9118-ce5a6116aecf-16418458

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Defining Research with Human Subjects - SBE
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418460
- **Completion Date:** 15-Jul-2015
- **Expiration Date:** 15-Jul-2018
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Defining Research with Human Subjects - SBE (ID: 491)	15-Jul-2015	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k515b2fe2-ed52-49e4-b942-d49e89c661ae-16418460

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Phone: 888-529-5929
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2
COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Cheryl Seals (ID: 1030941)
- **Institution Affiliation:** Auburn University (ID: 964)
- **Institution Unit:** Computer Science & Software Engineering
- **Phone:** 334 844 6319

- **Curriculum Group:** IRB Additional Modules
- **Course Learner Group:** Defining Research with Human Subjects - SBE
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 16418460
- **Report Date:** 03-Apr-2018
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Defining Research with Human Subjects - SBE (ID: 491)	15-Jul-2015	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k515b2fe2-ed52-49e4-b942-d49e89c661ae-16418460

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

CITI PROGRAM

Completion Date 15-Jul-2015
Expiration Date 15-Jul-2018
Record ID 16418460

This is to certify that:

Cheryl Seals

Has completed the following CITI Program course:

IRB Additional Modules (Curriculum Group)
Defining Research with Human Subjects - SBE (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w3383570e-edf0-405a-a5f3-dfd84f803efb-16418460

IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic Course

You completed the mandatory elements of this course on **15-Jul-2015** with a final reported average score of **84%**.

This is the date and score recorded in the Completion Report sent to your institution.

- You may review any of the course content and retake quizzes, including those for supplemental optional modules, but your reported quiz scores and dates will not change.
- You do not receive any extra credit for this course if you retake quizzes or complete additional quizzes on supplemental materials.
- In some cases, completion of additional modules may be required for eligibility for CEU credits.
- Additional completions and new quiz scores may transfer to other CITI Program courses, if you register for courses that include those modules. You must login using the same account, and the other institution must allow transfer credit.

Required Modules	Already Taken?	Score
Belmont Report and CITI Course Introduction (ID: 1127)	14-Jul-2015	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	14-Jul-2015	5/5 (100%)

Required Modules	Already Taken?	Score
Assessing Risk - SBE (ID: 503)	14-Jul-2015	4/5 (80%)
Informed Consent - SBE (ID: 504)	14-Jul-2015	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	15-Jul-2015	5/5 (100%)
Students in Research (ID: 1321)	15-Jul-2015	9/10 (90%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	15-Jul-2015	5/5 (100%)

The following six pages will be an information design survey sample.

Interest question (Page 1) will always be the same. Articles (Page 2 – 6) will, but questions in these pages will be the same. All of the articles are from extension.org, in 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology.

Please choose your interest (Mark all the categories that you are interested in):

- ○ Art
- ○ Biology
- ○ Chemistry
- ○ Education
- ○ Geography
- ○ History
- ○ Math
- ○ Physics
- ○ Psychology
- ○ Responsibility
- ○ Technology

Please read the articles in the following five pages and answer the correlated questions.

Creative Art Helps Children Develop across Many Domains

Creative art activities can help children in all areas of development. Child care providers should plan creative activities with the child's overall development in mind. Here are some ways that art activities can support young children's development. Physical Development When child care providers offer art activities, they are supporting children's large and small muscle development, as well as their eye-hand coordination. Using crayons, markers, and paintbrushes helps children practice the fine motor control they will need for writing later on. Social Development When children work together in the art area, they learn to share, to interact with others, to be responsible for cleanup, and to put materials away. These are positive and important changes for social learning. Cognitive Development Young children can learn the names of colors and shapes through creative art activities. They find out what happens when they mix two primary colors together and get a secondary color. Sending older children outside to carefully examine a tree, feel its bark, and study the shape and color of its leaves, and then asking them to draw or paint trees helps them develop observational skills needed for science. Emotional Development Through creative art, children may be able to represent experiences that they cannot verbalize. They may draw pictures out of proportion, exaggerating things that are important to them. When we value children's creativity, we help them feel valued as people, raising their self-esteem. Imagination and Experimentation Children's active imaginations can take form through art. For example, Gene wonders what will happen if he uses three paintbrushes at one time. He asks his teacher to help him tie a rubber band around three paintbrushes. Through active experimentation, he invents a new way to paint. Although tying three paintbrushes together may not be earthshaking, Gene is learning skills that could help him invent something new, like a car that runs on solar power or a cure for cancer, when he grows up.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Using Learning Centers in Child Care

Learning centers are a purposeful way of dividing up your classroom into different subject/learning areas. The location of each learning center, placement of any furnishings or equipment, and easily available materials give a clear message to the child about what is to take place in that area. Planning for Learning Centers Establishing the centers requires some initial planning, work, and possible expense, but once they are established they save time and money. For example, you don't want to place the reading area (quiet and comfy) near the block, music, or dramatic play areas (loud and active). You also probably want the art center on hard, easy-to-clean floors and near a sink, but the science center near a window or other source of natural sunlight. Learning centers capitalize on children's natural need to explore because they are given the chance to gain experience by trying out their own ideas in a hands-on way. Once established, you can write your lesson plans according to each learning center to make sure you're offering something to enhance each subject. Then you can easily set up your planned activities for the morning/afternoon in each corresponding center, and children can play in whatever center interests them. Advantages of Learning Centers Discipline problems are reduced because groups are limited to a number which can reasonably function in each area. Classroom management is easier since children are in the area of their choice and interest. Children are engaged in hands-on activities as they explore and experiment. Caregivers can support children by supplying the resources as they learn by themselves. Caregivers can determine, by observation, the progress of the children. Caregivers can easily determine what items need to be added to each area that will encourage children in further discovery. Children understand classroom rules more easily when they apply to specific areas. Each area contains only the essentials that allow children to control and create. The purpose of the area is clear and understandable to children.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Introduction to Biomass Combustion

Combustion of biomass used to heat greenhouses. Fire, or combustion of biomass, is arguably the oldest known and most widely used controllable energy source on earth. In recent years, rising costs of fossil fuels and the development of advanced equipment have made biomass combustion an economical, efficient, and practical energy source. Principles of Combustion Combustion is familiar to all of us, but many do not realize that it is essentially a chemical reaction. In the process of combustion, two ingredients (biomass and oxygen) are combined in a high temperature environment to form carbon dioxide, water vapor, and heat. $CH_{1.44}O_{0.66} + 1.03\ O_2 = 0.72\ H_2O + CO_2$ (+Heat) Note: $CH_{1.44}O_{0.66}$ is the approximate chemical equation for the combustible portion of biomass. The amount of heat that is produced varies depending on species, climate, and other factors, but it is generally about 20 Megajoules of energy per dry kilogram of biomass. In order for combustion to be efficient and clean, the ingredients must be well mixed at the right temperatures for the right amount of time. Practically speaking, this means that you need the right amount of fuel, the right amount of air, and the right conditions. Water content in biomass is an important factor when it comes to combustion. The best burning fuels are dry. However, biomass almost always includes some amount of moisture. For example, green wood chips are usually about 50% water and 50% dry matter. Fresh leaves from a plant can be as high as 95% moisture and 5% dry matter. Ideally, biomass should be no more than 20% moisture. Feedstocks for Biomass Combustion A feedstock is merely the fuel that will be burned for energy. While wood is the most common feedstock for biomass combustion, almost any plant material can be used as a combustion feedstock. Processing Biomass for Combustion Biomass can often benefit from a certain amount of processing to make it more suitable as a combustion fuel. This includes sizing, drying, and/or densification. Utilizing Biomass as an Energy Source The smoky fireplace of past generations is a far cry from the combustion equipment that is available today. While those old fireplaces are still used in some homes, high-efficiency biomass combustion requires carefully designed and operated equipment that works well with the available fuel. Depending on your needs, biomass combustion systems can produce hot air, hot water, steam, electricity, or a combination. To find out more about equipment, efficiency, and air quality from biomass combustion, see Using Combustion Heat for Energy.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

How Teachers Can Include School Gardens in the Classroom Curriculum

School gardens are cropping up around the country as multi-faceted experiential learning labs. With the increased emphasis these days on high-stakes testing and data collection, many educators are looking for more innovative ways to present subject matter that balances academic achievement with fostering a love of learning. Research and common sense agree that the best learning environments include a variety of verbal, written, and hands-on activities for each lesson. Although new technology is playing a vital and growing role in modern education, many professionals are also seeking ways to connect students back to their environment, and instill greater life skills and a sense of community in their classrooms. Many of these skills, once taught at home, seem to be left more and more to schools. What can you teach in a school garden? What can't you teach? Most obviously, school gardens are perfectly suited to science curricula. Units such as: seed germination, plant parts, life cycles/metamorphosis, the water cycle, habitat, temperature, weather/climate, and environmental science can all be explored. Students can practice scientific inquiry and higher-order thinking in a live setting. What's more, if they bring their harvest back to the classroom to cook, they can explore the wonders of kitchen science. Math is another natural fit for school gardens. Designing, prepping, and planting garden beds affords a lot of measurement practice; as does weighing the harvest. Cooking from the garden lends itself to lessons of capacity, volume, and an exploration of fractions through measurement. Since much of all culture is centered around food, deciding what to plant, how to plant it, and how to prepare the bounty can open up infinite possibilities for social studies and multi-cultural exploration. Lesson on native foods, natural resources, early agriculture, cultural celebrations, spice trade, and traditional methods of preparing and preserving foods can all be taught in school gardens. For older students, discussions on food policy and food justice unfold as students develop a deeper understanding of where food comes from and how it makes its way to our plate. Although Language Arts may seem like a less-obvious fit for the garden, the natural world has always been a source of inspiration for poetry and creative writing. It can also be a soothing environment for reflection or for read-aloud time. In fact, there is no end to the supply of books of every genre about gardening, food, and cooking to inspire readers of all ages. Alongside lessons in core academics, gardening teaches vital life skills. One of the most exciting things about engaging youth in school gardens is the way it develops an appreciation of the natural world and a sense of interconnectedness that children may not experience in other areas of education. Planting a garden requires teamwork, patience, and perseverance. Caring for a living thing, watching it grow and thrive, and reaping the harvest teaches respect, pride, and commitment. Although these skills are rarely tested, or recorded, these are the lessons that will stick with students throughout their lifetime.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

What does it mean to foster distinctive, attractive communities with a strong sense of place?

What does it mean to foster distinctive, attractive communities with a strong sense of place? The Smart Growth Tenet: Foster distinctive, attractive communities with a strong sense of place that reflect the values, culture and vision of residents through the growth and history of their community. Why is fostering distinctive, attractive communities with a strong sense of place important? Communities with a strong sense of place build on their unique history, identity and assets to foster community pride, increase social interaction and market their community to potential businesses and residents. The results can improve economic stability, increase property values and greatly impact the lives and memories of residents. Urban sprawl is creating a new image for growing communities that is commonly referred to as "Anywhere USA." The monotony of this sprawling development pattern moves people farther away from our town centers and from each other. The results have led to the loss of millions of acres of farmland and open space, disinvestment in our cities and decreases in social interaction, diversity and civic pride. To create a distinct image and maintain a sense of place, many communities are investing in their history as the foundation for new growth. How do you apply this tenet to your community? Investing in your community's unique assets and history can create a situation where residents will become your greatest ally in guiding growth that benefits the entire community. Involving the public in planning decisions and community improvement projects is the first step in building a sense of place. While the greater public should be intimately involved in creating a vision for the community, it is the role of government officials to use the zoning ordinance, site plan review, capital improvement planning and state and federal assistance to make this vision a reality. Communities that are effective in implementing this tenet have consistent policies and regulations in place that create synergy between preservation efforts and new development and are always looking for ways to improve by building sense of place. source: Best Practices for Planning and Zoning

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Memo

Protocol title and number: #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults"

Thank you very much for your time reviewing our IRB application. We appreciate your comments, and have outlined the changes made in italics below.

IRB comments:" 1. Expand item 4 to describe the "process" recruit and consent participants; that is who (PI?), how (email or in person?), if email, what is the PI's access to email addresses, when and where (during which classes and where), etc.3. Expand item 4 to describe the process to access and complete the survey."

The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

IRB comments:" 2. Revise item 2 to describe which internet and electronic platforms (AU email? qualtrics?) will be used for the study."

Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

IRB comments:" 4. In item 5, address gender, if applicable."

For this experiment, we invite participates of all genders

IRB comments:" 5. It is important to note that the IRB is an organization responsible for protection participants in human subjects research, not a form. Revise item 7 to describe use of a consent document."

Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

IRB comments:" 6. Add as the 2nd sentence in the first paragraph that you are the PI under your faculty advisor and provide your faculty advisor's name/title. 7. Revise the 2nd sentence in the first paragraph to read something like, "You are invited to participate in a research study because you are a ..... 8. Revise the 2nd sentence in the first paragraph to be correctly written -, "...to help understand if a ..." 9. Reread the last part of the 2nd sentence in the first paragraph, for clarity. 10. Combine the last two sentences in the first paragraph to read something like, "Only individuals who are at least 18 years of old may participate in this study."

You are invited to participate in a research study because you are generation z students and aged above 18. The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better

recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering (6). Only individuals who are at least 18 years old may participate in this study.

IRB comments:" 11. Revise the 3rd sentence in the 3rd paragraph to read, "You will not directly benefit from being in this study."

You will not directly benefit from being in this study

IRB comments:" 12. Delete the last paragraph; instead add contact information for the AU IRB (see the online sample consent form)."

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

- 1-5 are in Exemption Review Application form, 6 -12 are in recruitment script. Both "to be changed" and "change" are marked.
- Phase One survey sample added as another attachment.
- The previous approved IRB removed from the attachment.
- Revised files come first then the clean ones.

Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **The OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to irbsubmit@auburn.edu.

1. PROJECT IDENTIFICATION

Date 01/30/2019

a. Project Title Framework for user sentiment analysis to improve usability of applications for generation z and young adults

b. Principal Investigator Yang Cao Degree(s) PhD

Rank/Title PhD Candidate Department/School CSSE

Phone Number 3343323678 AU Email yangcao@auburn.edu

Faculty Principal Investigator (required if PI is a student) Cheryl D. Seals

Title Associate Professor Department/School CSSE

Phone Number 3348446319 AU Email sealscd@auburn.edu

Dept Head Hari Narayanan Department/School CSSE

Phone Number 3348446312 AU Email naraynh@auburn.edu

c. Project Personnel (other than PI) - Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting). Attach a table if needed for additional personnel.

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

Personnel Name _____ Degree(s) _____
Rank/Title _____ Department/School _____
Role _____
AU affiliated? ☐ YES ☐ NO If no, name of home institution _____
Plan for IRB approval for non-AU affiliated personnel? _____

d. Training - Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? ■ YES ☐ NO

e. Funding Source- Is this project funded by the investigator(s)? ☐ YES ■ NO
Is this project funded by AU? ☐ YES ■ NO If YES, identify source _____
Is this project funded by an external sponsor? ☐ YES ■ NO If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for the award.
Name _____ Type _____ Grant # _____

f. List other IRBs associated with this research and submit a copy of their approval and/or protocol.
(Remove)Improving Learning Outcomes in Phonetic Transcription using automated software tools:#1

2. Mark the category or categories below that describe the proposed research:

■ 1**.** Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

■ (i) Recorded information cannot readily identify the participant (directly or indirectly/linked); **OR**

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include children when investigators do not participate in activities being observed.

■ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3**.** Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions) **Mark the applicable sub-category below (I, ii, or iii).** 104(d)(3)(i)

☐ (A) Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ (B) Any disclosure of responses outside of the research would not reasonably place subject at risk; **OR**

☐ (C) Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by the IRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one of the following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information and must be publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directly or indirectly/linked; investigator does not contact subjects and will not re-identify the subjects; **OR**

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); **OR**

☐ (iv) Research information collected by or on behalf of federal government using government generated or collected information obtained for non-research activities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. **(**Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

***Limited IRB review* – the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

****Category 3 – Benign Behavioral Interventions (BBI)* must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark all applicable)

Minors (under 19)	☐ YES ■ NO
Pregnant women, fetuses, or any products of conception	☐ YES ■ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ■ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ■ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ■ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ■ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ■ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ■ NO
Deception of participants	☐ YES ■ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this research is to create a web crawling system that will be enhanced through machine learning strategies. The study participants will provide us with data that will help us to learn their preferences to model in the proposed system. This study is to investigate the effect that our proposed framework has on software usability with a system enhanced with this method. The main objective is to create framework that can be used to design usable applications and the proposed framework will be evaluated through empirical experiments.
(2 revised -- platform specification added)
The participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. Informed consent will be granted using the recruitment script (see attached script). Data will be collected through survey/questionnaires, via Internet/Electronic & paper. We will utilize SurveyMonkey to collect survey data and when then Internet is not available we will collect a hard copy of survey data that will be stored in a secure location (i.e. see item 8).

Phase one -- Information Design
Participants will be asked about their interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology. Then 5 - 10 articles from extension.org will be provided to participants to ask which category do they think each article belongs to, and participants' interest level (ranges 1 - 10) in this article.
Those users' preference data and articles themselves will be used to train a machine learning model, which will be applied to our experimental application.
Phase two -- Usability evaluation
Participants will be provided two Andriod applications (one benchmark, one experimental) to read articles. To collect unbiased data, the order of the application review will be assigned to survey participants in random order. Usability and satisfaction data will be collected with the Usability Evaluation Questionnaire.
(1,3 revised -- one paragraph added to clarify)
The PIs (Cao and Seals) will recruit participants, they will meet participants to review information letter with them. Participants will be involved with Phase One to gather information to help with the design. We will utilize this information to improve our project development. After improvement we will conduct Phase Two evaluation to assess experimental improvement.

5. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

(4 revised -- one sentence added)

Participants will be undergraduate or graduate students from Auburn University with ages above 18 year old. For this experiment, we invite participates of all genders (4). We will also utilize opportunistic sampling to choose participants. It will be advertised in classes to seek volunteers and we will use personal recruitment and email recruitment based on recruitment script.

6. **Does the research involve deception? ☐ YES ■ NO If YES, please provide the rationale for deception and describe the debriefing process.**

7. **Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the person would experience in daily life.**

   (5 original) Before taking part in the study, participants will be provided an IRB form to inform them of their rights. The IRB also consents that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.
   (5 revised) Before taking part in the study, participants will be provided an information letter to inform them of their rights. The information letter will advise that their participation is purely voluntary and that they can withdraw from the study at any time without any giving any reason.

   No this experiment will not cause any harm to the participants and they will be given the opportunity to withdraw at any time.

8. **Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.**

   Hard copy paper documents will be stored in a locked file cabinet after being entered into an Excel Spreadsheet or SQLite Database. Confidential data will not be coded in the database. Only Yang Cao (PI) and Dr. Cheryl Seals (FA) have access to participants' data.

9. **Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).**

   Data will be collected without a link of participant s data to any identifying information, recorded and analyzed as "anonymous . Participants' name won't be published.

10. Will the research involve interacting (communication or direct involvement) with participants? ☐ YES ■ NO **If YES, describe the consent process and information to be presented to subjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.**

During Phase I, the informant design, the experiment facilitators will give the participants the informed consent. There are two options to the experiment. The user can complete the survey remotely and in this case we will have no contact with the participant.

In case two, we will consent the participants and situate them in a study area were they will complete the survey. We will also perform the experiment and collect the experimental data from the experiment.

We will also use this same procedure for the Phase II systems experiment.

11. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Appendix A Recruitment Script
(Remove previous IRB attachment)Improving Learning Outcomes in Phonetic Transcription using automated software tools: #17-040 EP1705
Yang Cao Citi training
Cheryl Seals Citi training
(added attachment)
Phase One information design survey sample

Principal Investigator's Signature Yang Cao **Date** 01/30/2019

If PI is a student,
Faculty Principal Investigator's Signature Cheryl Seals **Date** 01/31/2019

Department Head's Signature N. Hari Narayanan **Date** 01/31/2019

Description added
The Auburn University Institutional Review Board has approved this document for use from 01/29/2019 to 01/28/2020. Protocol #19-048 EX 1902, Cao , "Framework for User Sentiment Analysis to Improve Usability of Applications for Generation Z and Young Adults

RECRUITMENT SCRIPT (verbal, in person)

6,7,8,9,10 original
I am Yang Cao a graduate student in the Department of Computer Science and Software Engineering at Auburn University. I would like to invite you to participate in my research study to help us understand can a framework created with the addition of a machine learning model to support the learning for generation z students provide better user engagement, user experience. You may participate if you are above 18 years old when you participate in the study. Please do not participate if you are under 18 years old when you participate in the study.
6,7,8,9,10 revised
You are invited to participate in a research study because you are generation z students and aged above 18 (7). The study is aimed to help us to develop a framework to support learning and search for generation z students. We are improving an existing search-based system and need user input to create an automatic computing structure to provide better recommendations (i.e. we will use the date collected to train an artificial intelligence and machine learning search system) (8,9). The study is being conducted by Yang Cao, PhD Candidate at Auburn University, under the direction of Dr. Cheryl Seals, Associate Professor in the Auburn University Department of Computer Science and Software Engineering (6). Only individuals who are at least 18 years old may participate in this study (10).

As a participant, you will be asked to choose your interest among 11 categories: art, biology, chemistry, education, geography, history, math, physics, psychology, responsibility, technology, and provide opinions about articles in those categories. Your time commitment will be approximately half an hour.

11 original
There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. We cannot promise you that you will receive any or all of the benefits described. There are no costs associated with participating.
11 revised
There are no anticipated risks associated with participating in this study. If you participate in this study, you can expect to have improved understanding of categories listed above and motivation to access those categories information for informal learning. You will not directly benefit from being in this study (11). There are no costs associated with participating.

If you would like to participate in this research study, email me at yangcao@auburn.edu. If you have questions, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.

12 original
Do you have any questions now? If you have questions later, please email me or contact me at (334) 332-3678 or you may contact my advisor, Dr. Cheryl Seals, at (334) 332-8282.
12 revised
If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

Creative Art Helps Children Develop across Many Domains

Creative art activities can help children in all areas of development. Child care providers should plan creative activities with the child's overall development in mind. Here are some ways that art activities can support young children's development.

Physical Development

When child care providers offer art activities, they are supporting children's large and small muscle development, as well as their eye-hand coordination. Using crayons, markers, and paintbrushes helps children practice the fine motor control they will need for writing later on.

Social Development

When children work together in the art area, they learn to share, to interact with others, to be responsible for cleanup, and to put materials away. These are positive and important changes for social learning.

Cognitive Development

Young children can learn the names of colors and shapes through creative art activities. They find out what happens when they mix two primary colors together and get a secondary color. Sending older children outside to carefully examine a tree, feel its bark, and study the shape and color of its leaves, and then asking them to draw or paint trees helps them develop observational skills needed for science.

Emotional Development

Through creative art, children may be able to represent experiences that they cannot verbalize. They may draw pictures out of proportion, exaggerating things that are important to them. When we value children's creativity, we help them feel valued as people, raising their self-esteem.

Imagination and Experimentation

Children's active imaginations can take form through art. For example, Gene wonders what will happen if he uses three paintbrushes at one time. He asks his teacher to help him tie a rubber band around three paintbrushes. Through active experimentation, he invents a new way to paint. Although tying three paintbrushes together may not be earthshaking, Gene is learning skills that could help him invent something new, like a car that runs on solar power or a cure for cancer, when he grows up.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

The Development of Creative Art Abilities in 3- to 5-Year-Olds

During the preschool years, many children show tremendous growth in their creative art abilities. Child care providers can support children's artistic development by planning art activities that encourage preschoolers' developing art skills. Here are some basic milestones in preschoolers' art development: Art for 3 and 4 Year Olds
By age 3, many children are learning to better control their hand and wrist movements. They are making forms and objects that are almost, but not quite, recognizable to adults. Circles, lines and crosses are always popular forms. Some 3 and 4 year olds may begin naming their drawings. In the middle of drawing, a child may look and say something like, "This is a truck," or, "This is Mommy." Naming artwork is a big step that shows the child has begun to think in terms of mental pictures. It doesn't matter that the drawing has little or no resemblance to Mommy. What matters is that the child has discovered that drawing is more than just something physically fun to do. It is also a way to communicate ideas.
Art for 4 and 5 Year Olds
By age 4, some of these forms have taken shape and adults can identify them as people, houses, cars or whatever the young artist intended to draw. Typical drawings at this age are pictures of people consisting of large heads that appear to have arms and legs growing out of them. There is usually little evidence of relative size in these drawings. Tiny legs sprout out of huge heads. A drawing of a butterfly may be twice as big as a dog. Whatever is most important to the child at the time gets the biggest play on the page; what is not important may simply be left out. That's why youngsters may leave out fingers, necks or other body parts. It's not that children don't notice that people have fingers; it's just that fingers are not important to them at the time they are drawing. During this stage, children may find colors very exciting. Children are not concerned with realistic color representations. They just like to use color. One child may make everything on the page red. Another may use every color in the box on one drawing. Child care providers should not require children to use certain colors or try to read any deep psychological meanings into a child's choice of colors.
Art for 5 and 6 Year Olds Five-year-olds begin including more real-life elements into their pictures, and between the ages of 5 and 6, children become much more concerned with their creations and want to keep them. Before this time, most children are interested in the sheer fun of doing an art activity, rather than the quality of their products.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Art Is a Valuable Learning Experience for Young Children in Child Care

Art activities might appear to be "just messy," but creating art is a valuable part of a child care curriculum. Art opens up new worlds for children and gives them a variety of important experiences. Crayons, markers, paint, clay and many other art materials are the tools that can help children: build strength in the arms, hands and fingers practice hand and finger control, which helps improve writing skills practice coordination of the hands and eyes explore textures, colors and tastes plan a creation and make decisions about how to create it explore and express their feelings expand their creativity Art Experiences for Babies and Toddlers

Art experiences can begin as soon as babies can hold and move a crayon. Early art usually focuses on using the senses to explore, rather than creating a picture or object to keep. The process of squishing finger paint in their hands, tearing paper or scribbling with crayons is interesting and fun for most babies. As they explore, they learn what happens when they move their hands and arms, and they feel pride and joy in their creations. Babies' and toddlers' art creations do not usually look like real objects. They are simply enjoying the pleasure of creating and exploring the materials.

Art Experiences for Preschoolers

Preschoolers may be more interested in creating art that represents a real or imaginary object or scene. Being able to think about something they can't see and then create it in a drawing or painting is a big accomplishment for a preschooler. But even in preschool, the process of creating is usually more important than the finished project. Don't be surprised if a child who worked hard to paint a picture or build a clay sculpture does not want to save it.

Supporting Children's Creative Art

Child care providers can support children's interest in art by giving them new experiences and by helping them feel their work is valued. Encourage children to explore different art media Hang some sticky paper on the wall and have children stick items to it to make collages Give children the chance to paint with their bare feet Post the children's creations on walls or surfaces for everyone to enjoy These experiences let children explore real materials with their senses. Remember to display children's artwork where they can see it easily.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Creative Art Activities for Children with Special Needs

Child care providers often have children with special needs included in their programs. Art activities can be a valuable learning experience for many children with special needs, but the art activities given in a child care setting may need to be modified or adapted so that all children may participate in them. Child care providers should also be aware that they may need to guide children with special needs when helping them with their art activities. Here are some ideas for modifying or adapting materials and activities to children with special needs. Encourage children with special needs to participate in art activities. Use appropriate ways to let children know what art materials are available. For example, you may need to use sign language and demonstrate the materials for children with limited hearing, or you may encourage children with limited vision to touch materials while you explain what they are. Make sure materials are accessible to all children, including children with special needs. Pay attention to where materials are stored and whether children with motor challenges can get to them. Adapt art materials to the child's ability. For example, instead of using scissors that a child may not be able to grasp very well, give children with fine motor challenges pre-cut pieces of paper. Consider giving children adaptive scissors that open easily, or allow the child to tear his or her own pieces of paper. Applaud the artistic efforts of all children. Saying "You worked on that painting for 20 minutes!" or "I bet you feel proud of what you created!" will help build self-confidence and creativity. Be creative. Activities that are pre-made or that have specific directions do not help children be creative and may be too challenging for those with certain special needs. Provide children with open-ended art materials that can be used in many ways and encourage all children to use their abilities to create their own art.

Should I Physically Help a Child with Motor Challenges Create Art?

Children with severe motor challenges may need physical help to create artwork. When helping a child in the art center be sure to let her take the lead. Give only the help necessary. Encourage children to try to do it themselves first. Ask a child what she wants to do, what materials she wants to use and what kind of help she needs. Check in as you help to make sure that you are helping her create what she wants. Modifying and adapting your art center is an important way to include children with special needs in child care programs. Creating art is a worthwhile experience for all children and should be available to children with special needs as well as typically developing children. With simple modifications, you can ensure that all children can use their senses and creativity in the art center. For More Information To learn more about working with children with special needs, check out the eXtension Alliance for Better Child Care section on Child Care for Children with Special Needs. Read more about making your art program successful in the Art in Child Care section. If you are looking for specific art activity ideas to use in your child care program, take a look at the Hands-on Activities Database.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

The Development of Creative Art Abilities in 0- to 3-Year-Olds

During the first three years, young children develop their artistic skills by having fun experimenting and learning all the wonderful things they can do. Child care providers need to understand how children's art abilities develop in order to plan effective art experiences for the child care program.

Art for 0 and 1 Year Olds

When babies engage in creative art, it is a whole body experience. They often are as interested in grasping, chewing, pounding and squishing as they are in trying to actually create something. Child care providers sometimes do not provide infants with art experiences. But even at this age, the sheer exploration is worthwhile for children's development. Safety is an important concern at this age, and adult supervision is critical. We don't want babies swallowing things or hurting themselves or others. Infants enjoy sensory experiences such as water play, texture books or toys.

Art for 1 and 2 Year Olds

Children of this age are in a scribbling stage. At first, between the ages of 1 and 2, their scribbles are usually disordered and uncontrolled. Scribbles are more a product of physical activity, made by the pumping of the shoulders because children can't yet control their elbows or wrists. These young scribblers will typically try holding their crayon a variety of ways and don't often associate their movements with lines appearing on paper. Their attention spans are short, and they only scribble for one or two minutes at a time.

Art for 2 and 3 Year Olds

Gradually these scribbles become more controlled as children gain greater control of their arms, hands, and fingers, and their eye-hand coordination improves. As a result, their efforts show up as repeated motions, such as a series of oval shapes or a series of horizontal and vertical lines. By age 3, children are also putting more concentration and time into their art, sometimes spending as much as 15 minutes drawing. As children leave this age range, a very important change takes place. Even though they are still scribbling, children begin to name the scribbles. Naming artwork is a big step that shows the child has begun to think in terms of mental pictures. During the first three years, children's fine motor skills and coordination are becoming more refined. This is also a time when children come to understand that pictures represent something in real life known as representational thinking.

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

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Balancing Process and Product in Creative Art Activities

Well-planned art experiences are a valuable part of the child care curriculum. Early childhood art activities need to balance process and product. Process is doing, product is the result. Young children are process-oriented. For infants and toddlers, the joy of art is in the doing and making. They usually want lots of finger paint, really squish it around, and then pay no attention to what happens to their picture afterward. Preschoolers love to experiment with color and design. They do not worry that their entire page is covered in yellow, or their grass is red, or their play dough snake doesn't really look like a snake. Preschoolers may choose to keep their finished product or forget about it once it is completed. School-age children may become very product-oriented. They want to make sure their names are on their projects and may get very upset when papers tear or structures crumble. When planning art activities, be sure to allow enough time for children to get fully involved in the process. Even though we want children to develop longer attention spans, we may actually prevent them from working for longer periods of time when we focus on the product and don't let them enjoy the process of creation. Keep your schedule flexible and allow extra time for art activities that are involved or really capture children's interest. With more flexible planning, art activities can actually help children increase their attention spans.

Which categories do you think the above article belongs to?

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The Art Center in Child Care

Art Supports Children's Development

Painting, coloring, sculpting, drawing, and other forms of creative art are an important part of the child care curriculum. Creating art supports young children's development across several different domains. Using art tools helps children develop small muscle coordination and control. Children can practice thinking skills by experimenting with color, texture, and design. Art gives children an opportunity to express their ideas and feelings, relieves tension, and provides limits for self-discipline. Art allows children to achieve and expand their creativity.

Setting Up the Art Center

Because art can be such an important learning experience, it's important for child care programs to include a well-designed art center. The specific set-up of the art center depends on the ages of the children in the group. An infant room probably will not have a permanent art center. Child care providers can begin introducing infants to a few art materials when the infants can sit up and begin controlling their hand movements. Art materials for infants should be brought out when needed, and put away when the activity is over. Art materials should be stored out of the infants' reach when not in use. A toddler room may have an art center with some materials available to children throughout the day. A toddler art center might include fat crayons and paper that children can select and use independently (with adult supervision, of course). Messier materials, such as paint and glue, or materials that need more supervision, such as preschool scissors, should still be stored out of children's reach and brought out only when needed. A preschool room often has a larger and more complex art center, such as the one pictured on this page. The preschool art center may contain many more materials, such as markers, glue sticks, preschool scissors, tissue paper, and chalk. In addition, many preschool art centers include an easel where painting, drawing, and other large-motor art activities can occur. Child care providers should rotate materials periodically to expand children's creative process.

Setting and Enforcing Rules for the Art Center

To keep children safe and to encourage creativity, child care providers should set and enforce certain guidelines for preschool-age children using the art center. Some common rules include: Wearing smocks when using messy materials such as paint Painting or drawing only on the paper or object, not other surfaces Working only on your own creation, unless invited to share Putting away materials after completing project Washing hands before going to another activity

The Teacher's Role in the Art Center

Child care providers should give instruction and assistance to children in the art center while still allowing room for the creativity of the child. Some of your main roles in facilitating children's creative art include: Maintaining a supply of materials, and rotating them regularly to keep children interested Demonstrating the use of new tools and materials (e.g., how to manipulate clay or play dough, how to manipulate a paint roller) Assisting children in their creation only when asked Using open-ended questions to talk with children while they are creating Observing children's skills, especially fine motor skills, and planning new art activities to support children's development Putting children's names on their creations if they request help Adding explanations or stories to creations if requested Instructing or assisting in the drying of creations Assisting children with clean-up Displaying some of the children's art creations in the child care space

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Planning a Successful Art Center in Child Care

In order for children to create art, they need an inspiring space. The art center should look like an artist's studio, filled with children's art as well as that of well-known artists. The art center should allow children to feel creative as they explore materials to express themselves. The art center also allows children to make their own discoveries, either independently or together, and to feel confident in the choices they make.

Setting Up an Art Center in Your Classroom or Family Child Care Home

The location of your art center will depend on the space available in your classroom or home. The following are several different possibilities: Near a window: The natural light through the window is pleasant, and children will be able to look outside for inspiration. Near a sink: Placing the art center near a sink allows for easy clean-up. On a floor that is easily cleaned: Art supplies will inevitably end up on the floor, so a tile floor that can be kept clean or wiped easily is key. Outdoors: Most materials used inside can be easily taken outside to continue art activities, and clean-up is often much easier outdoors.

What an Art Center Should Look Like

Neat and organized: Children should be able to easily locate the materials. Also, if the center is organized, the expectation is that the children will help keep it that way. This way, there is already a limit in place so they know that part of their responsibility is to clean up after themselves. Well stocked with a variety of materials: Children can easily become bored with using the same materials over and over again. To maintain their interest, the art center should be stocked with many types of materials, varied by size, color, texture, etc. Limitless: With a well-stocked art center and encouragement to be creative, children should have minimal boundaries. Although rules are necessary, children should feel that they can create the art they want with the materials provided. Easy-to-clean furniture: To maintain the life of the furniture, you should plan on having smooth tabletops that are easily wiped clean. If you are unable to use an easy-to-clean table, an alternative is to use a plastic tablecloth that can be wiped clean. Appropriate seating: Both children and adults should feel comfortable in the space. Children also should have the option of standing, so art easels and large painting surfaces should be provided as well. It also is important that adults interact and join in on the creativity, so adult-sized furniture should be available. Art easels: Art is a great way for children to develop their motor skills. While at the table, they are primarily working on fine motor movements, but art easels provide a large area where they can move their arms up and down, working on their gross motor skills. Art easels are also great because they allow children to have a change of scenery so they are not always doing art at the table. Also, art easels can easily be moved outdoors so art can take place in different areas of the classroom. Storage: Some space should be available to children all of the time, while other materials should be kept out of reach.

Choosing Materials for the Art Center

The art center should have many different options for children to choose from. Some examples include: paper (manila, construction, newsprint, computer, wallpaper books, magazines, catalogs, used greeting cards, etc.) molding materials (modeling compound such as Play-Doh, clay, rolling pins, plastic knives, cookie cutters, shaving cream, etc.) paints (tempera, watercolors, finger paints, etc.) crayons, markers, pencils, chalk, and erasers colored tape children's scissors (left- and right-handed), hole punch paste, glue, tape paint brushes, sponges rubber stamps and ink pads collage materials (scraps of fabric, yarn, ribbon, feathers, glitter, buttons, macaroni, any small "beautiful junk" items) seasonal leaves, nuts, cones recycled materials (yogurt cups, fabric, yarn, tissue paper, foil, bottles) miscellaneous items for creativity

Keep in mind that most of these suggestions would be appropriate for a group of preschool-age or school-age children. An art area in a toddler classroom will look very different, because toddlers' fine motor and cognitive skills are still developing. Be especially cautious about offering materials that are choking hazards to very young children, who may still be likely to place objects in their mouths. Supervise children of all ages when they are using art materials.

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I've heard the phrase "process over product" to describe art activities. What does this phrase mean, and how can child care providers tell whether an art activity is process-focused or product-focused?

Young children love to create art, but they tend to focus much more on the process of creating and are not as interested in the finished product. It's important for child care providers to realize that many young children may not want to keep their artwork once it's finished or may not even be able to identify which piece they created. This doesn't mean the activity was a failure; it simply means that the child focused on the process but did not care about the final product. The focus in art activities should generally be on how the child is creating, the feelings of the movements she's making with her arm, what the paint looks like on the paper, how the colors combine, and other "process" activities. Art activities that focus on creating a specific product by copying a model or activities in which everyone is expected to create things exactly the same way are more product-focused. The challenge with product-focused activities is that they limit children's creativity. When children are expected to copy a model, especially if it's made by an adult, they may become frustrated because their product does not look like the model and may decide that they are "not good at art." Young children grow as artists and develop creativity when they have open-ended art activities that allow them to explore and create whatever their imaginations suggest. Be sure your art program includes an appropriate balance of process and product focus.

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Fire Ant Art

Literature

In literature, one of the best known and often illustrated ant stories for children is The Ant and the Grasshopper, a fable by Aesop, retold and illustrated by Amy Lowry Poole, a Holiday House Book, Ages 4 - 8, New York, 2000. 29 pp.: The Ant and the Grasshopper A long time ago, in the old Summer Palace at the edge of the Emperor's courtyard, there lived a grasshopper and a family of ants. The ants awoke every day before dawn and began their endless tasks of rebuilding their house of sand, which had been washed down by the evening rains, and searching for food, which they would store beneath the ground. They carried their loads grain by grain, back and forth, all day long. The grasshopper liked to sleep late into the morning, rising as the sun stretched toward noon. "Silly ants," he would say. "You work too hard. Come follow me into the courtyard, where I will sing and dance for the great Emperor." The ants kept working. "Silly ants," the grasshopper would say. "See the new moon. Feel the summer breeze. Let us go together and watch the Empress and her ladies as they prepare for midsummer's eve." But the ants ignored the grasshopper and kept working. Soon the days grew shorter and the wind brought cooler air from the north. The ants, mindful of the winter to come, worked even harder to secure their home against the impending cold and snow. They foraged for food and brought it back to their nest, saving it for those cold winter months. "Silly ants," said the grasshopper. "Don't you ever rest? Today is the harvest festival. The Emperor will feast on mooncakes and sweet greens from the fields. I will play my music for him until the moon disappears into the smooth lake water. Come and dance with me." "You will do well to do as we do," said one of the ants. "Winter is coming soon and food will be hard to find. Snow will cover your house and you will freeze without shelter." But the grasshopper ignored the ant's advice and continued to play and dance until the small hours of the morning. Winter arrived a week later and brought whirls of snow and ice. The Emperor and his court left the Summer Palace for their winter home in the great Forbidden City. The ants closed their door against the ice and snow, safe and warm, resting at last after their long days of preparation. And the grasshopper huddled beneath the palace eaves and rubbed his hands together in a mournful chirp, wishing he had heeded the ant's advice.

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Avoid Activities Masquerading as Creative Art in Child Care Settings

Creative art is an important part of the child care curriculum because it allows children to practice self-expression, fine motor skills, thinking and many other skills. Unfortunately, many activities that look like creative art do not actually encourage creativity. These activities are sometimes used in art programs and may help develop fine muscle control or eye-hand coordination, but they don't provide artistic and creative opportunities. It's important to avoid activities masquerading as creative art. Activities that masquerade as creative share three characteristics: The responsibility for making art is shifted from the child to the teacher. The activities have a high degree of structure. The product is specified, and often a model is provided to copy.

Problems with Highly Structured Craft Activities

People who have studied how creativity develops warn against the use of ditto sheets, coloring books, tracing patterns, dot-to-dot sheets, craft projects and holiday gifts with specific outcomes in creative art programs for preschoolers. These projects may be enjoyable, but they can actually discourage children from being creative.

An Example

Researchers Lowenfeld and Brittan looked at the use of models in art programs. Young children were asked to draw birds, and they did. They drew wonderful birds of all colors, with funny long legs and pointy beaks, lovely wings and beady eyes. Then the researchers gave these children a picture of birds to color and said, "Try to stay in the lines." The picture looked like a bunch of "V's" flying around the sky, and the children colored ever so carefully. A few weeks later, they gave these same kids big pieces of paper again and suggested that they draw some birds. Do you know what the children drew? No funny long legs; no pointy beaks; no lovely wings or beady eyes — just plain old "V's" in the sky. No creativity.

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Fire Ant Biology

Fire Ant Habitat

Imported fire ants, Solenopsis invicta and Solenopsis richteri (Hymenoptera: Formicidae), are social insects that usually produce hills or mounds in open areas where the colonies reside. These fire ants build mounds in almost any type of soil, but prefer open, sunny areas such as meadows, pastures, parks, playgrounds, lawns, and golf courses, as well as agricultural land and wilderness areas.

What Do Fire Ants Eat? Imported fire ants are omnivores. They eat both plants and animals to satisfy their nutritional requirements. Their menu includes carbohydrates(sugars), lipids (fats) and protein. Worker ants cannot ingest solid food particles (greater than 2 microns, 1 micron = 0.000039 of an inch), so they primarily feed on liquids.

Fire Ant Morphology, Reproduction, and Development If it weren't for the painful experiences associated with fire ants, most people might find these creatures fascinating. Their life cycle and social behavior are surprisingly complex. This article explores how a fire ant colony becomes a colony, the different types of fire ants in a colony and the roles they play within the colony, as well as their communal feeding system.

Identifying Fire Ants Properly identifying ant species is the first step in determining the need and approach for control. Accurate identification can be especially important in states where native fire ant species are common and red imported fire ants are rare. Although native fire ants are common urban pests, if they are controlled unnecessarily, especially in very dry climates, imported fire ants are more likely to invade these areas. This article explores the characteristics and aggressive nature of fire ants.

Natural Enemies of Fire Ants Biological control is the use of imported natural enemies to suppress pests and can be an effective and environmentally safe way to permanently control pests over wide areas. As such, it is the basis for many integrated pest management programs. In South America, the native habitat for imported fire ants, populations are much lower than populations in areas where imported fire ants have been accidentally introduced, such as the southern U.S. This situation is thought to arise because natural enemies (predators, parasites and pathogens) that keep populations low in South America were not imported along with this ant. Efforts have been made to introduce natural enemies to the invasive ant populations in order to provide sustainable suppression.

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What is agriculture?

Agriculture is the basis of all civilization. It is part of everything from the food we eat to the clothing we wear. Agriculture shapes many of the traditions and values that this country was built on. Agriculture is the science, art, and occupation of producing crops, raising livestock, and cultivating the soil.

Agriculture also includes: processing, financing, marketing, and distribution of agricultural products; farm production supply and service industries; the use and conservation of land and water resources; health, nutrition, and food consumption; development and maintenance of recreational resources; and related economic, sociological, political, environmental, and cultural characteristics of the food and fiber system.

Specific types of agriculture Include: Agricultural economics Agricultural engineering Agronomy Aquaculture Beef Cattle Crops Dairy Cattle Entomology Food technology Forestry Goats Horticulture Plant breeding and genetics Plant pathology Poultry Sheep Swine

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Goat Reproduction Reproductive Biology

Introduction

The increased demand for goat meat, especially in the United States, could possibly be met in part through improving reproductive efficiency in our herds. Reproduction efficiency is one of the most important economic traits in terms of livestock production. Maintaining good reproductive functions in the herd is pivotal to the success of any livestock production system. Productivity and profitability is measured by ovulation rate, conception rate, the number of kids born, the number of kids weaned and the frequency in which they are produced. Reproduction is the propagation and continuation of a species through a sequence of events. This process involves the production of hormones (i.e., estrogen, testosterone) and the development of the reproductive system to carry out germ cell development, fertilization, pregnancy and eventually parturition which is the act of giving birth(McKenzie-Jakes, 2007). Understanding the estrous (breeding) cycle and how hormones work during the cycle can help us to change those patterns and behavior to improve efficiency of reproduction to eventually benefit the goat industry.

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Bee Brood (Basic Bee Biology for Beekeepers)

There are three development stages in bees which collectively are known as brood. Bees begin their life in the tiny white egg stage. A queen will deposit one egg in each worker or drone cell. The eggs are about the diameter of a pin and stand on end in their cells. They are very difficult to see. The eggs that will develop into workers are fertilized, while the eggs that will yield drones are not. We cannot tell the difference between fertilized and unfertilized eggs but the bees can. If the queen makes a mistake, the egg is removed and destroyed by worker bees. The egg stage lasts three days. When an egg hatches it becomes a larva. The bee larva (plural: larvae) is a legless and featureless white grub. It is specialized to eat and never leaves the individual wax cell. Larvae grow at a rapid rate in a five-step development called metamorphosis, increasing 1500 times the original size. The larvae are visited 10,000 or so times during their development by adult nurse bees for inspection, feeding and eventually capping of the cells. Worker bees bring food place it in the cell. They do not directly feed the larva. The last stage, sometimes termed the prepupa, engorges on extra food before the cell is sealed with a wax capping. The pupal development stage for drones is 6.5 days, workers 6 days, and queens 5.5 days. If brood nest temperature drops, development takes longer. When fully grown and filling the cell the larva changes to a pupa (plural: pupae). The pupal stage, frequently termed capped stage, is one of change . the grub-like larva rapidly takes on the features of the adult. It does so still in the same cell that has now been capped with wax by the workers. In addition to containment in a capped cell, the last larval stage also spins a thin silk cocoon within each cell to enclose the pupa. The pupa does not eat or move. All bee larvae (female and male) receive royal jelly after the egg hatches. Royal jelly is a protein-rich food made in the glands of worker bees and placed in cells just before the egg hatches. Initially the cell with a young larva is mass provisioned. A pool of royal jelly is kept replenished in the bottom of the cell and the C-shaped larvae simply lie in a pool of its food. After 2.5 to 3 days, however, the diet of the worker and drone larva changes to a mixture of pollen and nectar and food is not so generously supplied. This is called progressive-provisioning. The queen larva remains on a diet of royal jelly, continued in generous supply, her entire larval life.

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Fire Ant Treatment: Natural and Biological Control

Natural and Biological Control

Currently, the best biological control method for fire ants is to preserve other ant species that compete with them for food and nesting sites, attack small fire ant colonies, or kill newly mated queen ants. In some areas outbreaks of other exotic ant species, such as Argentine ants and tawny crazy ants, have displaced imported fire ants. Even imported fire ants from single-queen or polygyne colonies will prey upon newly mated fire ant queens and eliminate small, neighboring colonies. Ants, in general, are considered beneficial insects because they prey upon many other arthropods and collectively till more earth than earthworms, thereby reducing soil compaction. Ways to preserve native ants include preserving their habitat and using insecticides judiciously. Introducing or conserving the natural enemies (diseases, parasites and predators) of imported fire ants can help control them. These natural enemies kill fire ants or make them less able to compete with other ant species. The most effective biological control organisms for large-scale programs are those that spread by themselves from mound to mound and persist from year to year. A number of species of parasitic "phorid" flies (Diptera: Phoridae), including Pseudacteon tricuspis, P. curvatus, P. obtusus and P. litoralis, have been released and established in parts of most southeastern states. A disease of fire ants, Kneallhazia (=Thelohania) solenopsae, is also widespread in some states. Although natural enemies will not eliminate fire ants and it may be several years before their effect is known, it is hoped that introducing natural enemies of fire ants in the U.S. will reduce their populations indefinitely. In South America, where imported fire ants and their natural enemies originate, fire ant species are not usually considered pests but rather just another ant species. See Natural Enemies of Fire Ants. Several other parasites and pathogens have been marketed for fire ant control. The predatory straw-itch mite, Pyemotes tritici (Lagreze-Fossat & Montane), feeds on and paralyzes developing fire ants but has not been effective when applied as directed and is potentially hazardous to the user. Parasitic nematodes such as Steinernema spp. are roundworms that enter insects, paralyzing them and developing in their bodies. Species and strains vary in their effectiveness. Strains tested to date caused ants to temporarily move away from the treated mound, but few colonies were actually eliminated. Parasitic fungi, such as Beauveria bassiana strains and formulations, also have been evaluated as individual mound and broadcast bait treatments. However, these agents have not been shown to persist or spread in the environment. Newly mated fire ant queens, which can start new colonies, are killed by a number of organisms. These include birds, lizards, spiders, toads, dragonflies, robber flies, other ant species, and ants from surrounding colonies. Animals that eat ants, such as armadillos, may disturb mounds and eat some workers, but they are not really useful in control.

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Queen Replacement (Basic Bee Biology for Beekeepers)

Since there is only a single female reproductive in a bee colony, there is a special procedure to replace her when it becomes necessary to do so. Replacement of a queen by another queen is a process termed supersedure. Replacement of the queen and production of another colony is another behavior which is called swarming. A third means of replacing a queen, emergency queen rearing, is necessary if the queen dies suddenly, is removed by a beekeeper, or is somehow injured or lost from her colony. Queen failure may lead to reduced egg laying but workers more readily respond to reduced pheromone production. Each worker bee needs to receive a certain level of queen substance daily. This pheromone is distributed through food transmission among workers. If a queen is taken away, the level of this pheromone drops rapidly, though it is persistent. In the case of a failing queen, the queen produces insufficient amounts of queen substance, and therefore is fed back less of the pheromone by the bees of her retinue. This feedback system of queen pheromone distribution is vital for communication. The first behavior change observable in queen replacement is the laying of a fertilized egg in a queen cup. Queen cups are special cup-like precursors of queen cells. They are always present in a bee colony, though their numbers are greatest in the spring months. They are built at the lower margin of beeswax comb (lower margins of frames in a beekeeper.s hive) and in spaces where the comb is damaged or left open as a walkway to the opposite side of the comb. The queen herself places the fertilized egg in a queen cup. Worker bees can remove eggs (from queen cups or regular cells) but they are not known to transfer them. The same queen may return to the developing queen cell. (Arbitrarily, a cell occupied by an egg or developing queen is called a queen cell - it is a queen cup when empty.) By chewing on the side of the cell, the queen causes the workers to remove and kill the occupant (egg, larva or pupa) inside. It is possible to observe queen rearing repeatedly aborted in a bee colony. The original mated queen (who started the process of queen replacement by laying eggs in queen cups) may be killed before or after emergence of a virgin queen in supersedure or she may depart with a proportion of the adult workers in a swarm before a virgin queen emerges. The workers always begin to rear several new queens rather than a single one. Emergency queen cells can be distinguished from the queen cells of swarming or supersedure because they originate from a worker cell. The horizontal orientation of the worker cells selected to be converted to queen cells is quickly changed to the vertical by enlarging the base of the cell and drawing the opening outward and downward. This usually means destroying the cell walls and removing the larvae of three to four cells adjacent to the modified cell. Capped emergency cells often seem smaller than capped queen cells started from queen cups.

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Feral Hog Reproductive Biology

Feral hogs (also called wild hogs; Sus scrofa) are characterized by high reproductive potential, with a young age at puberty, large litters, and frequent breeding. The recent expanding range of this non-native species provides evidence of its high reproductive capacity. In general, the various aspects of the reproductive biology of feral hogs in the United States are intermediate between that of domestic swine and the Eurasian wild boar. However, these various reproductive parameters can vary widely between populations of these non-native animals due to both genetic and environmental factors. Female feral hogs can reach sexual maturity as young as 3-4 months of age; however, most wild sows reach puberty by the time they are one year old. Females of this species are polyestrous, being able to come into estrus every 18-24 days if they are not successfully bred. The ovulation rate typically averages 7-8 shed ova but can range from 3-15. Uterine implantation is biased toward left horn but is typically not significant. The feral hog's gestation period averages 112-120 days and can vary from 100-140 days. Fetal litters in feral hogs average 5-6 embryos/fetuses and range from 1-14. The observed intrauterine mortality in this species is approximately 30%. In general, fetal litters are often male-biased, but this sex composition is normally not significant. There is also an observed shift from male-biased to female-biased composition as the litter size increases. The ovulation rates, litter sizes, and pregnancy rates all increase with the sow's age. Both the nutritional input and reproductive output levels in feral sows are also positively correlated. Sows build a farrowing nest within 24 hours prior to giving birth to provide protection for their offspring. The newborn or neonatal litters in feral hogs average 4-6 piglets and can range from 1-12. Similar to the newborn litter size, the number of lactating teats per sow averages 4-6 and varies from 1-12. As such, the number of lactating teats is highly correlated with the number of piglets in the sow's litter. The litter size in feral sows reportedly decreases after about the 5th-7th litter or 4-5 years of age. The oldest known feral sow, which was documented to still be capable of breeding, was 14 years of age. Similar to the females, male feral hogs are sexually mature as young as 4-5 months of age, and most boars reach puberty within the first year of life. In general, most boars participate in breeding by 12-18 months of age. The testicular weight in feral hogs increases until 3 years of age, and then decreases after 5 years of age. Boars compete in male-male fighting for breeding opportunities with females. Mature boars develop shoulder shields of thickened subcutaneous tissue that protects these animals during male-male fighting. Such fights can be intense, with either or both combatants getting injured, or possibly even killed. Because success in these fights is related to size, most breeding done in feral hog populations is by the larger and older males. Multiple paternity of feral hog litters does occur but is reported to be very uncommon. Reproductive activity can also affect the weights in these animals during certain times of the year. For example, the body mass of mature boars has been reported to drop during the breeding season, with some individuals losing up to 20-25% of their body weight. This is due to a combination of increased testosterone production and the resulting reduced foraging done by these boars at that time. Reproduction in feral hog populations can occur during any month, with both sows and boars being capable of breeding year-round (Fig. 2). Typically there are 1-2 seasonal peaks in breeding. However, annual patterns with one or two seasonal peaks can occur within the same population, varying from year to year. Regional photo-period, rainfall and nutrition all influence the breeding season in a feral hog population. Feral sows are capable of producing more than one litter per year. The production of a second litter was observed to be common when sows lost the entire first litters; however, sows have been breeding while still nursing a litter of piglets. Normally, sows do not conceive when still nursing a litter of piglets. In eastern Tennessee, numerous wild sows were observed to have bred within a month of farrowing, however, very seldom did these females conceive. In addition, when these sows did conceive, only very small litters were produced. Production of multiple litters is more common when food resources are abundant. It is also more common among adult wild sows than younger sows.

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Reproductive Biology Goat Reproductive Physiology

Goat Reproductive Physiology Female with newborn kids.
Due to the temperature conditions in the United States, most goats are seasonal breeders, with more active breeding happening during the seasons with shorter day lengths and a period of little to no breeding during long day lengths. In females, reproduction is controlled by the estrous cycle. This represents the time from one standing heat (estrus) to the next. This cycle is usually 21 days, with the actual time for standing heat being one to three days. This cycle continues throughout the life of the female and is interrupted only by season, pregnancy and lactation (milking). The events of the estrous cycle are controlled by the relationships of the hypothalamic releasing hormones, gonadotropins, and ovarian hormones. Gonadotropin releasing hormone (GnRH) comes from the hypothalamus of the brain and causes the pituitary gland to release follicle stimulating hormone (FSH) and luteinizing hormone (LH). The hormone FSH stimulates the production of estradiol, or estrogen, and inhibin and also promotes follicular growth. Estrogen is responsible for the demonstration of estrus behavior, duct development in the mammary glands and the development of secondary sexual characteristics. Inhibin acts as a negative feedback to inhibit the release of FSH from the anterior pituitary. Luteinizing hormone stimulates ovulation and also promotes the formation and function of the corpus luteum (CL). The CL is the structure that is formed on the mammalian ovary following ovulation. It is responsible for the secretion of progesterone following ovulation. A high concentration of this hormone inhibits the release of GnRH, FSH and LH. It also functions in preparing the uterus for a possible pregnancy and suppressing estrus behavior. Failure to establish pregnancy results in the secretion of the hormone prostaglandin 2-alpha from the uterus that causes regression of the corpus luteum and allows a new estrous cycle to begin. If pregnancy is established, then progesterone will continue to be secreted. Its secretion will maintain pregnancy by decreasing uterine contractions, increasing gland development in the endometrium and promoting the development of the mammary gland. It is the interaction of these hormones and their individual functions that makes it possible to regulate and manipulate the reproductive function of the females. This interaction is the basis of hormonal treatments used in the control of goat reproduction. As previously mentioned, goats experience seasonal anestrus due to the effect of temperature and day length on their reproductive cycle. This condition might prevent the female from conceiving during months when survival of the developing fetus would be low. Pre-attached embryo survival is reduced when the humidity and temperatures are high during the months of summer. Temperature and photoperiod are two main factors that affect the commencement of the breeding season. GnRH secretion is integral to seasonal anestrus. Before the breeding season begins, the hypothalamus must be able to secrete GnRH to elicit the release of FSH and LH in sufficient amounts to maintain follicular development and initiate ovulation in females as well as stimulate testosterone production and sertoli cell function in males. Melatonin secretion is required to stimulate GnRH secretion in order to promote cycling. This hormone is synthesized and secreted during the night hours when it is converted from serotonin through circuitous neural paths. Therefore, light entering the eyes inhibits pineal gland conversion of serotonin to melatonin. The pineal gland acts as a regulator of reproductive activity since it can either stimulate or inhibit gonadal function. During short photoperiods, such as in the fall, the long duration of high melatonin secretion switches on short-day breeders, such as sheep and goats, and switches off long-day breeders likd the hamster. This explains why increased light would cause anestrus in goats, since it inhibits the conversion of serotonin. Goats are therefore considered to be short-day breeders because they begin to cycle during the shorter days of fall. The normal breeding season of goats is during September, October and November, varying for different breeds and areas of the country. It is therefore necessary for treatment strategies aimed at breeding goats outside of their normal breeding season to somehow override the light and pineal control of the hypothalamic-pituitary-gonadal axis in order to induce estrus and ovulation. Previous research has been successful in inducing estrus and subsequent ovulations by not only manipulating the light-dark cycle, but also by the administration of exogenous hormones such as melatonin and gonadotropin-releasing hormone. Reference: P.L. Senger. Pathways to Pregnancy and Parturition

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What are flying ants?

Most ant species, including fire ants, produce flying ants. Often called winged ants or alates, flying ants are fertile male or female ants that can mate. Most of the ants in a fire ant colony are sterile, wingless female workers that cannot mate. All males can fly. They are smaller than the winged females, and they have smaller heads, larger eyes, and a larger thorax. A colony produces several hundred flying ants at a given time. Flying ants leave the colony together in a swarm, often during warm weather after a rain. Mating occurs in the air, usually with ants from other mounds. After mating, males drop to the ground and die, and mated females lose their wings, start new colonies, and become queens.

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Why Pest Inspection is Important to Pest Management

Accurate identification of pests is essential to having an effective pest management program. Knowing the biology of the pest will give you valuable information on how to approach pest management. For example, if you put out mouse traps and have rat, you will have failure in your program. If not noticed in time, the initial failure may increase your problem if reproduction occurs. Identifying your pest will lead you to information about its life cycle, food sources, habitat preferences and natural enemies. Each piece of information you know about your pest will help you to devise a management program that successfully targets your particular problem. To help you identify your pest, you must inspect. Inspection will help you find out what pests you are dealing with, and locations where these pests should be targeted. Some common pests in school environments include cockroaches, ants, rodents, termites, flies, weeds, silverfish, and spiders. Each pest requires a different strategy for management.

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Botrytis Blight of Blueberry

Gray sporulation of Botrytis cinerea.

If there is a late freeze or even cold weather during bloom time, check the flowers and young fruit for the presence of Botrytis blight. If Botrytis is present, there will be a gray-green fuzzy growth on the plant tissues. Botrytis will usually cause losses early in the growing season, but a lot of rainy weather during the spring may also lead to Botrytis problems. It is not recommended to treat preventatively for this disease. Treat only if there is a frost that damages blooms or if there has been a significant cold spell. There are two options for good Botrytis blight control. One is to use a fungicide with the active ingredient fenhexamid and is in the chemistry group hydroxyanilides (FRAC code 17). Another option is to use a fungicide in the multi-site mode of action chemistry group (FRAC code M). This fungicide will be most effective if applied as a preventative spray. Consult your local Cooperative Extension Service office for current fungicide recommendations. Information also can be found in the Southeast Regional Blueberry Integrated Management Guide.

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Saponification in Biodiesel Production

Introduction to Saponification

Saponification is a chemical reaction that involves the production of a metal salt or soap. The reaction involves the attack on a methyl ester, free fatty acid, triglyceride, or other glyceride by a hydroxide ion, -OH. The hydroxide ion implies the presence of water in the system. If water could be eliminated, then there would be no soap formation. However, this is a practical impossibility. There is always some water present, and there will always be some soap formed when biodiesel is made. The exception to this is when a solid (heterogeneous) catalyst is used which does not provide the free metal ions needed to form soap. These catalysts should provide biodiesel and glycerin that are free of soap. In reality, many of these supposed heterogeneous catalysts leach metals ions into the liquid and thus require some clean-up of the reaction products. Soap must be removed from biodiesel after the reaction, and this can be done by either water washing, using a solid adsorbent mixed with the liquid, or by passing the liquid through a packed bed of ion exchange resin. Soap is not formed when biodiesel is manufactured using a supercritical technology that does not require a catalyst.

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What causes dark, firm and dry (DFD) pork?

The causes of this condition in pork muscle is linked to chemical and physicalchanges in muscle before, during and after harvest of the animal. Similar to that of PSE pork, the DFD condition is also related to acid production in pork muscle after slaughter, but the nature of the chemical change is different. PSE develops because of an accelerated rate of acid production while muscle temperature is still high. Conversely, DFD results from a lack of acid production in the muscle.Muscles destined for DFD pork have low levels of glycogen that restricts the amount of acid that can be produced, and limits pH fall. While both normal and PSE muscle end up with similar "ultimate" (final) pH values of about 5.5, DFDmuscle usually has an ultimate pH above 6.0. This reduced acidity provides increased water-holding ability in the lean, tightly binding water to muscle proteins, and contributing to a firm texture. Muscle cells swollen with retained water and tightly packed together absorb more light (darker color), and also restrict how deeply oxygen can penetrate into the tissue to "brighten" muscle pigment. A period of extended stress on the pig, caused by factors such as severe weather, long transport or unfavorable holding conditions, can deplete muscle glycogen and cause the DFD condition in pork muscle.

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How do invasive species cause harm?

Invasive species can cause harm in so many different ways that it isn't practical to cover them all here. So, below is just a sample to give you an idea of how pervasive this problem is. Many of these changes are things you can see happening around you. When a non-native species is introduced into a new environment it is freed from the natural predators, parasites, or competitors from its native habitat. This gives an advantage to non-native species competing with the native species that evolved in the ecosystem. These advantages allow the non-native species to outcompete native species for the available food, water, light, and space. Wherever an invasive plant is growing is where a native plant should be. Invasive species also have the potential to disrupt vital ecosystem functions, such as water flow, nutrient cycling, fire systems, or soil composition. An example of this is the Tamarix species. It not only uses large amounts of water, it changes the soil chemistry, making it more saline. This can adversely affect and prevent the growth of many native plant species. Tamarix has significantly changed the hydrology, soil composition, and plant communities of many habitats in the western United States. An invasive plant may add significantly to the fuel load of an area, either in mass or because it contains volatile compounds. This can mean that fires burn hotter and faster than the native plants in that habitat have evolved for. After such a fire, the invasive plant quickly germinates or resprouts while the native plants are either killed or perhaps recover much more slowly. Changes that damage native plant communities also affect the wildlife communities that depend on them for food and shelter. A wide range of effects have been seen in wildlife communities in these situations. Some animal species populations are reduced while others are increased. Someare even pushed to the point of extinction. Butthe overall trend seems to be a reduction in diversity. Even in cases where the same number of species are actually present, the balance between the species has been changed. We do not yet know what many of these changes herald for the future. Invasive species can damage or contaminate crops from soybeans to pine plantations, greatly increasing costs to the agricultural industry and, in turn, to the American public for both food and other products. Industries such as the cattle industry can be affected when invasive plants that are basically inedible by cattle, infest ranges or contaminate forage. Other services such as electricity have cost increases resulting from the management and control of invasive species. A great deal of money is spent by power companies to keep invasive plants from growing in right of ways, up poles, onto buildings, and along power lines under control. Natural areas used for recreation can be affected by invasive species. For example, Chinese privet and other invasive shrubs, trees, and vines can take over both clearings and the understories of forests making hunting, hiking, biking, and camping difficult or impossible. Any body of water, river, or stream is especially vulnerable to invasive species. Water by its nature allows for much easier movement for invading organisms. The news has many examples of aquatic-invasive species that can and have spread very quickly causing significant changes in a very short period of time. From water hyacinth to lion fish or Asian carp, aquatic species are causing damage to these ecosystems and the organisms that inhabit them. It is often difficult, and sometimes impossible, to fish, boat, or swim on a lake covered by invasive plants. People have been hospitalized due to injuries received while boating on rivers infested by the Asian carp, which can easily leap over a boat.

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How is agroterrorism different from bioterrorism?

Agroterrorism is an actual or threatened attack against any segment of the agricultural or food system designed to cause economic injury, disruption of the production system, human disease or political change. It may include, but is not restricted to, use of chemical, biological, or radiological agents Bioterrorism is the actual or threatened use of biological agents against individuals, business, government, or a population.The terms are closely related. Biological agents are one of the most probable agents used in agroterrorism. However, chemical or other agents can also be used in agroterrorism, and chemical agents are not defined as bioterrorism.

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Nutrient Imbalance and How to Correct It

Soils in urban areas may have a nutrient imbalance. If there are inadequate nutrients, tree growth and development will be affected. Nutrient imbalances are often caused by high pH levels, low soil fertility, or high salt content.

High or Low Soil pH

Urban soils may have a high or alkaline pH because construction materials, such as mortar and concrete, are often spilled or left on the soil. The addition of this calcium-based material, which is alkaline, raises the soil pH. Some species of trees need an alkaline soil, but other species can not tolerate a high pH level. A high pH may also cause chemical reactions with nutrients in the soil that render the nutrients unavailable to the tree. Iron, for example, becomes unavailable for a tree's growth processes when soil pH is alkaline. Sulfur may be added to soil to lower the pH. Tolerance to the local soil conditions needs to be considered when selecting a tree to plant in an urban area.

Low Soil Fertility

Soil fertility can be low in urban environments. Common causes are: Topsoil and organic matter are often removed from a site during construction. Leaves are removed from the soil surface and not allowed to decompose. This reduces the amount of nitrogen, phosphorus, and other nutrients in the soil. Biological components and organisms are not as common in urban soils. This limits soil aeration and the addition of organic matter to the soil. Changes in soil chemistry may influence the availability of soil nutrients, interrupting the nutrient cycling process.

High Salt Content

The salt level in soils may be elevated because of de-icing salts, excess fertilizer, or irrigation water high in soluble salts. This can be a problem, particularly in areas with low rainfall and extensive use of irrigation and fertilizer (Harris 1992). A soil that is high in salts has less water available to the roots. Sometimes salts can even draw moisture out of the roots. High salt levels can sometimes be reduced by leaching the salts with proper watering techniques. A symptom of high salt content in the soil is browning of leaf edges. If the soil does have a high salt content, select a species that is tolerant to high salts.

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Rangeland Resources For Teachers and Students

K-12 Teaching Resources

Science education in K-12 classrooms integrates concepts from a variety of disciplines, offering excellent teaching opportunities for enhancing young learner's awareness of natural ecosystems. No matter if you are a teacher from a rural or urban community, you can actively engage youth in classroom and outdoor activities focused on rangeland science. For example, subject areas include botany, ecology, soils, watersheds, wildlife, herbivory and grazing management, and human dimensions. Below are a few examples of rangeland teaching resources, including curricula and programs. Just like land ownership and vegetation patterns vary from west to east and geographic region, keep in mind that rangeland ecological concerns also vary by region. Teacher Resource Guide for Rangeland Principles - a 6-module curriculum related to western rangelands. It includes clear learning objectives with powerpoint presentations, activities, background materials and reading guides. This resource is targeted at grades 9-12. Developed by the University of Idaho and the Idaho Rangeland Resource Commission. Prairie Project - an educational tool related to the prairie ecosystem with a variety of lesson plans including sections on animals, energy, fire, grazing, and plants. These tools are separated into grades K-4, 5-8, and 9-12. Developed by Oklahoma State University Extension and Department of Natural Resource Ecology and Management. Rangelands Curriculum for Texas - a comprehensive curriculum with 27 lessons that include field and classroom activities, games, and community resources. Developed for grades K-6. Developed by the Welder Wildlife Foundation. Idaho Rangeland Lessons and Activities - a virtual grab bag of lessons and activities that include rangeland plants, animals, and ecoregions. These materials for grades K-12. Developed by the Idaho Rangeland Resource Commission. BLM Teaching Resources - a variety of lessons that cover topics related to public lands management, including energy, native plants, recreation, wildfire, and weeds. Materials are for ages K-12. Developed by the Bureau of Land Management.

Teacher Continuing Education

Simply getting teaching resources into the hands of professional K-12 educators does not always lead to classroom implementation. We experience that teachers are much more comfortable teaching about rangeland science concepts when they have received training. Some universities offer summer continuing education opportunities and workshops focused on rangeland topics. If you are a teacher, you should check with your local university members of the Range Science Education Council, state and national teacher associations, state Rangeland Extension Specialists, or state agricultural program leaders.

Higher Education Resources

Range at a Distance: Catalog of Distance Format Rangeland Resources - a searchable database for students or working professionals who are interested in finding information about rangeland courses offered either online or in distance-format. Developed by the Range Science Education Council. Rangeland Careers - learn about what kinds of job opportunities are available by meeting some of the people who have graduated from a university offering rangeland degrees. Developed by the Range Science Education Council.

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Hands-On Nutrition Education: No Field Trip Required!

Extending the learning environment beyond the classroom is a great way to engage students with hands-on activities and fresh perspectives and you don't have to leave the school grounds to provide students with valuable hands-on nutrition education! The food service professionals at your school play a daily role in students' nutrition. They are a key resource as they incorporate national nutrition guidelines as well as students' preferences when planning menus. Nutrition education is about more than reading labels, and food service professionals can offer students insights into selecting, preparing, and enjoying healthy foods. Furthermore, students can learn to see the lunchroom as a place to practice healthy eating rather than a place to indulge between classes. Let's Go!, a program designed to combat childhood obesity, offers some ideas of educational activities that involve the lunchroom and food service staff. Lessons geared towards young children, like "Eat Your Way Though the Rainbow," aim to provide a connection between the classroom and the lunchroom. Activities for middle school students include learning about portion sizes and basic nutrition lessons. For more nutrition lesson ideas, check out the following worksheets from Let's Go!: Cafeteria to Classroom Connection Cafeteria as Learning Lab Also consider inviting the school nurse, health teacher, physical education teacher, or PTO/PTA members to guest teach in your classroom to give students more insights about the importance of good nutrition. The more areas of the school that embrace and teach healthy eating, the better students will understand how good nutrition impacts their whole life.

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Farm to School Resources- Colorado Department of Education

The term "Farm to School" often suggests images of freshly picked produce waiting to be shipped to your local school district, but how these products actually get from field to cafeteria is another story. Districts must not only consider cost and convenience, but food safety and procurement regulations as well. That being said, Farm to School can seem a bit overwhelming. The Colorado Department of Education Office of School Nutrition (CDE OSN), has compiled some resources to assist districts in implementing a successful Farm to School program. If it's program operations information you're looking for, the Colorado Farm to School Task Force has you covered. Started in 2010 through a grant funded by the Colorado Department of Agriculture, the task force provides webinars, evaluation and marketing tools, food safety information and maps of surrounding schools participating in Farm to School. . They hold quarterly meetings open to all who are interested. Get inspired by checking out their Farm to School Champions webpage where you can read success stories from a variety of districts. Do procurement regulations have you worried? Don't fret. The USDA's Procuring Local Foods for Child Nutrition Programs guide contains ready-to-use information about menu planning and buying local. Speaking of buying local, Colorado Proud's, Colorado Produce Calendar indicates what produce is in season during each month (an easy way to help decrease the cost of local produce). . Moreover, creating a bid for procuring local foods has been made simple with the Farm to School Bid Template. Whether you are looking to revamp your school meals program with Farm to School or simply add more local options to your menu, we probably have the resource you're looking for. If you call someplace other than Colorado home, be sure to check with your local state agency for any specific Farm to School regulations in your state. Additionally, The USDA Farm to School website contains great resources as well.

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Introduction to Biomass Combustion

Combustion of biomass used to heat greenhouses.

Fire, or combustion of biomass, is arguably the oldest known and most widely used controllable energy source on earth. In recent years, rising costs of fossil fuels and the development of advanced equipment have made biomass combustion an economical, efficient, and practical energy source.

Principles of Combustion

Combustion is familiar to all of us, but many do not realize that it is essentially a chemical reaction. In the process of combustion, two ingredients (biomass and oxygen) are combined in a high temperature environment to form carbon dioxide, water vapor, and heat. $CH_{1.44}O_{0.66} + 1.03\ O_2 = 0.72\ H_2O + CO_2$ (+Heat) Note: $CH_{1.44}O_{0.66}$ is the approximate chemical equation for the combustible portion of biomass. The amount of heat that is produced varies depending on species, climate, and other factors, but it is generally about 20 Megajoules of energy per dry kilogram of biomass. In order for combustion to be efficient and clean, the ingredients must be well mixed at the right temperatures for the right amount of time. Practically speaking, this means that you need the right amount of fuel, the right amount of air, and the right conditions. Water content in biomass is an important factor when it comes to combustion. The best burning fuels are dry. However, biomass almost always includes some amount of moisture. For example, green wood chips are usually about 50% water and 50% dry matter. Fresh leaves from a plant can be as high as 95% moisture and 5% dry matter. Ideally, biomass should be no more than 20% moisture.

Feedstocks for Biomass Combustion

A feedstock is merely the fuel that will be burned for energy. While wood is the most common feedstock for biomass combustion, almost any plant material can be used as a combustion feedstock.

Processing Biomass for Combustion

Biomass can often benefit from a certain amount of processing to make it more suitable as a combustion fuel. This includes sizing, drying, and/or densification.

Utilizing Biomass as an Energy Source

The smoky fireplace of past generations is a far cry from the combustion equipment that is available today. While those old fireplaces are still used in some homes, high-efficiency biomass combustion requires carefully designed and operated equipment that works well with the available fuel. Depending on your needs, biomass combustion systems can produce hot air, hot water, steam, electricity, or a combination. To find out more about equipment, efficiency, and air quality from biomass combustion, see Using Combustion Heat for Energy.

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Safe Chemical Handling in Biodiesel Production

Introduction

Biodiesel is a relatively safe product. It is considered nonflammable and biodegradable. However, the components to make biodiesel can be hazardous in some situations. Biodiesel is made by reacting vegetable oil or animal fat with an alcohol (methanol or ethanol) and a catalyst (sodium hydroxide or potassium hydroxide). Sulfuric and hydrochloric acids are also used in biodiesel production. Methanol, the catalysts, and the acids are toxic chemicals. Methanol is colorless and tasteless and can cause blindness or death if it enters the body through the nose, mouth, or skin. It is a cumulative poison: repeated, brief exposures can cause a toxic reaction. Methanol is also very flammable and burns with an almost invisible flame, making the fire difficult to see. Methanol vapors are heavy, and can travel along the ground to a source of ignition. See Handling Alcohols in Biodiesel Production for more information on safely handling methanol. Sodium hydroxide and potassium hydroxide are strong bases which can burn unprotected skin and kill nerve cells before pain can be felt. When sodium hydroxide or potassium hydroxide is mixed with alcohol and stirred, a fine mist can be produced which can cause irritation to the respiratory tract. See Handling Strong Bases in Biodiesel Production for information on safely handling these chemicals. Sulfuric and hydrochloric acids can cause chemical burns; eye, nose, and throat irritation; and shortness of breath, in addition to more serious injuries. See Handling Strong Acids in Biodiesel Production for information on safely handling these acids.

Government Help and Resources

The Occupational Safety and Health Administration (OSHA) requires that material safety data sheets (MSDS) be provided by chemical suppliers. It is imperative to have these sheets prominently displayed and within easy reach of personnel who come into contact with these materials. These sheets should cover the range of all products used in the plant. They provide the key to treatment in case of an accidental exposure and/or spill as well as some preventative measures. The National Research Council has developed a 448-page lab safety publication: Prudent Practices in the Laboratory: Handling and Disposing of Chemicals. This publication can be purchased or read online for free at the above link. It recommends that a chemical hygiene plan be instituted in every lab, including adequate ventilation and clearly stated guidelines for minimum exposure to hazardous chemicals. The plan should also include an employee training plan, adequate record keeping, signs and labels indicating potential hazards and safety procedures, and procedures for spills and accidents. The Emergency Planning and Community Right to Know Act (EPCRA) was passed to allow governments and communities to know about hazardous chemicals in their area. This law requires facilities to appoint an emergency response coordinator and to notify the State Emergency Response Commission and Local Emergency Planning Commission of the presence of any "extremely hazardous substance" if it has such a substance in excess of the substance's threshold planning quantity.

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Biodiesel Production Principles and Processes

Introduction

The process to make biodiesel involves a chemical reaction. This means that the biodiesel industry is a chemical industry. Those involved in making biodiesel must have a good understanding of the underlying chemistry to ensure they are making quality fuel in a safe manner. Find these topics and many other related Farm Energy media resources at the Farm Energy Media archive. Biodiesel is an alternative fuel for diesel engines that is produced by chemically reacting a vegetable oil or animal fat with an alcohol such as methanol or ethanol. In words, the reaction is: Oil + alcohol ? biodiesel + glycerin The photo shows a bottle of biodiesel and glycerin (also called glycerol). The biodiesel is the lighter-colored layer at the top. The darker-colored crude glycerin has settled to the bottom. It is important to realize that unmodified vegetable oil, sometimes called straight vegetable oil (SVO) or waste vegetable oil (WVO), is not biodiesel. Some people have used SVO or WVO in diesel engines with varying degrees of success. The primary problem is the high viscosity and low volatility of the unmodified vegetable oils. Without exception, U.S. engine manufacturers have recommended against the use of SVO and WVO. More discussion of SVO and WVO can be found here. Biodiesel is usually preferred over SVO and WVO because the chemical reaction converts the oil or fat into compounds that are closer to the hydrocarbons found in regular diesel fuel. The chemical reaction that converts a vegetable oil or animal fat to biodiesel is called "transesterification." This is a long name for a simple process of combining a chemical compound called an "ester" and an alcohol to make another ester and another alcohol. Oils and fats are included in the ester family. When they react with methanol or ethanol, they make methyl or ethyl esters and a new alcohol called glycerol or, more commonly, glycerin. The vegetable oils and animal fats used to make biodiesel can come from virtually any source. All of these products consist of chemicals called triglycerides, so biodiesel can be made from soybean oil, canola oil, beef tallow, and pork lard, and even from such exotic oils as walnut oil or avocado oil. Even used cooking oil or waste oil can be used to make biodiesel. However, these oils present special challenges for biodiesel production because they contain contaminants such as water, meat scraps, and breading that must be filtered out before the oil is converted to biodiesel. Methanol is the most common alcohol used for making biodiesel. It is sometimes called methyl alcohol or wood alcohol. It is very toxic, and swallowing as little as a spoonful can cause blindness or even death. Dangerous exposure can also occur from breathing methanol vapors or absorbing methanol through skin contact. In the United States, ethanol is usually more expensive than methanol, so it is used less frequently to make biodiesel. It is the alcohol that is found in alcoholic drinks, so it is not toxic in small amounts. However, it is subject to very challenging government regulations because of the tax requirements associated with alcoholic beverages. The chemical reaction used to make biodiesel requires a catalyst. A catalyst is usually a chemical added to the reaction mixture to speed up the reaction. Since the catalyst is not consumed in the reaction, it will be left over at the end in some form. In biodiesel production, the actual compound that catalyzes the reaction is called methoxide. One common way to make methoxide is to dissolve sodium hydroxide or potassium hydroxide in methanol. Large producers buy a solution of sodium methoxide in methanol that is much safer to work with. High-quality biodiesel is defined by compliance with the American Society for Testing and Materials (ASTM) specification D6751. Fuel testing to verify compliance can be expensive, especially for small producers, but it is the most reliable way to ensure that fuel consumers will have access to high-quality fuel.

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How to Obtain Continuing Education Units for Military Families Personal Finance Webinars

The Military Families Learning Network Personal Finance team offers 1.5 continuing education units to AFC-credentialed participants for live and recorded personal finance webinars.

Procedures for obtaining CEUs via live webinars

AFC-credentialed participants can earn 1.5 CEUs by attending 90-minute online Personal Finance webinars that are presented online with a live speaker. A link to an online evaluation is shown at the end of the webinar. Visit this link and complete the evaluation. At the conclusion of the evaluation, a second link to the post-test quiz is shown. Click on this link and complete the post-test quiz. Successfully pass the quiz with a score of 80% or higher. Participants scoring 80% or higher will receive a Certificate of Completion via email. Participants will use this Certificate to obtain their CEUs from AFCPE (up to the maximum limit allowed) by following the instructions available on their website here.

Procedures for obtaining CEUs via recorded webinars

AFC-credentialed participants can earn 1.5 CEUs by watching a recording of our live webinars and taking a short quiz on the material covered. A score of 80% or higher is required to earn a Certificate of Completion. For webinars presented prior to March 2015, participants must create an account on campus.extension.org. For webinars presented in or after March 2015, use the post-test link provided on the learn.extension.org page for that webinar. Participants must watch the desired recorded webinar. Complete the evaluation, followed by the quiz. Participants must complete the quiz associated with the webinar and score 80% correct or higher. Participants who score 80% or higher will receive a Certificate of Completion immediately if using campus.extension.org and via email if taking quiz from Qualtrics link. Participants will use this Certificate to obtain their CEUs from AFCPE by following the instructions on their website here.

The award of all CEUs are subject to AFCPE's requirements and are contingent on AFCPE's guidelines. Participants must also agree to the Military Families Learning Network's Code of Ethics.

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Food, Fun, and Education: How to Include Healthy Foods in Classroom Games

Education is getting more complex for the teachers, yet the need for healthy lifestyle choices is constantly growing. Everyone loves a good game, whether it's a board game, simulation game, or a gaming device. Games can also be educational tools; Ed Dieterle, a Senior Program Officer for Research, Measurement and Evaluation for the Bill and Melinda Gates Foundation, said that "for a student sitting in the median who doesn't have a game, his or her learning achievement would have increased by 12% if he or she had that game." Shapiro's study also found that "play is useful because it stimulates real life experience – physical, emotional and/or intellectual – in a safe, iterative and social environment, not because it has winners and losers. The achievement lies in the act of learning and understanding itself." Many teachers have already realized using beneficial game-based learning strategies can be quite effective, others are still hesitant or overwhelmed at finding good ways to engage the students in learning and games. Incorporating games into healthy lifestyle choices is a way to make eating and choosing healthier options less intimidating, including games in school curriculum is also a good way to make learning fun and memorable. A few tips for including games in the classroom are listed below, Use Competition – students love to compete as long as they aren't losing too much. Having relays, using timed-answer games, including an educational version of games like Jeopardy, Family Feud and others are great ways to get kids excited about educational and nutritional information. Keep Education – mix in fun activities with the existing educational materials. If you're having a pre-test study, or review, turn it into a game by seeing which group of students can get the most answers. Simple things like dividing the classroom and giving a small reward to the winning team will motivate, but be sure to mix the student groups up so everyone gets a chance to be recognized. Have a jingle-contest to see which student can make the most creative song with the material you're covering. Review the Game– at the end of each game, give the students time to think out loud about their answers, what they learned or what questions they may have. As the teacher, be sure to ask questions to facilitate educational input. Go over educational information as well as why it's important to eat healthy. If you can tie facts with something they enjoy, odds of memorization is greatly improved. You can also find games explained in greater detail here. The use of tablets is also quite popular in some school districts, using educational based games on forms of technology allows students to learn through technology. Check with local Extension Offices or school boards to find education based nutrition aps and games that can be used to teach in the classrooms. Many games are already employed in the classrooms, adapting them to have healthy rewards or adding some nutritious information is often quite simple. Many times, having subtle changes will bring healthy choices to the forefront of a student's mind. Making small adaptations to the current curriculum is easy. Below are some simple ways to include healthy food into discussions: When working on math word problems, use healthy foods or exercises in examples. To study ratios, get the classroom out of their chairs and move them around. In social studies classes, look at what different peoples eat and their dining practices and even how differing diets affect health. In younger classrooms, have the students get moving by acting out historical events. In science, when talking about plants or working on science projects grow something healthy and let the kids try it once it's ripe. Talk about the ways foods effect growth. A great active game would be to have the youth demonstrate the cycle of growth – a small seed (curl up as small as you can), growth (have them stretch upwards), have winds, rain, intense sunlight or an earthquake (students sway, wither, shake or stretch higher). Incorporating games in the classroom can enhance learning, increase fun, and get the students interacting on a positive level with their fellow classmates.

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Impact of Financial Literacy Education

Brief Description: This study examined the impact of a personal finance course on a sample of high school graduates who were followed for five years after graduation. Students who took the course were compared to those who had not and were not found to be any more financially literate. In addition, students who took the course did not evaluate themselves to be more savings-oriented and did not appear to have better financial behaviors than those who had not taken the course. Being a full-time college student or graduate, however, did positively and significantly impact financial behavior.

Implications: Findings of this study raise questions about the long-term effectiveness of high school financial literacy courses and their ability to improve students' financial decision-making in later life. This finding is consistent with several previous studies. Current content and/or methods used to teach personal finance may need to be reconsidered (e.g., increased use of methods with interactivity). This recommendation is consistent with studies by the Jump$tart Coalition which found that high school students who play a stock market game are significantly more financially literate than those

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Regional Centers of Excellence in Nutrition Education and Obesity Prevention – National Coordination Center located at the University of Kentucky

In fiscal year 2014, the USDA established the Regional Nutrition Education and Obesity Prevention Centers of Excellence (RNECE) to demonstrate the effectiveness of the SNAP-Ed and EFNEP programs and to identify changes to improve both programs. The RNECE will supplement and enhance ongoing program monitoring efforts and evaluation activities to strengthen the evidence-base of SNAP-Ed and EFNEP programs by assuring their effectiveness, innovation, replicability, sustainability and cost-effectiveness. The collaboration between NIFA and FNS has provided funding for one National Coordination Center and four Regional Centers. National Coordination Center: University of Kentucky North Central Region: Purdue University Northeastern Region: Cornell University Southern Region: University of North Carolina at Chapel Hill Western Region: Colorado State University AFRI recently released a request for funding that plans to support an additional Regional Center and one Signature Research Project. The overarching goal of the RNECE is to improve the health of low-income Americans by fostering a culture of health through multiple strategies, including nutrition education and complementary public health approaches implemented at each level of the socio-ecological framework through policy, systems and environmental changes. The work of the RNECE will build the evidence-base for nutrition education and obesity prevention strategies and interventions that produce measurable improvements in health, obesity, nutrition, and physical activity-related outcomes; and develop effective education, extension, environmental, systems and policy translational activities that promote health and prevent/reduce obesity in disadvantaged low-income families and children. Findings from RNECE will be communicated to all EFNEP and SNAP-Ed implementing agencies, the scientific community and the general public. Please visit our website to learn more about the work of the Centers of Excellence: www.rnece-ncc.org.

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National Feed Management Education Project

The National Feed Management Education Project was started in 2005 with the goal to increase the understanding of agricultural professionals about the area of Feed Management, with an emphasis on Environmental and Financial Sustainability of Livestock and Poultry Operations. The education project has been funded by the USDA-Natural Resources Conservation Service (NRCS) Conservation Innovation grant program. A primary outcome of the project has been a process for the implementation of the Natural Resources Conservation Service's Feed Management 592 Practice Standard for beef, dairy, poultry, and swine. The primary audiences for the education program are: Animal Nutritionists, NRCS staff Conservation District staff private nutrient management planners Meet the National Feed Management Education Team Access the Products From the National Feed Management Education Project

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What is slope, and why is it important?

Slope can be defined as the angle, inclination, steepness, or gradient of a straight line. Slope often is used to describe the steepness of the ground's surface. Slope can be measured as the rise (the increase in elevation in some unit of measure) over the run (the horizontal distance measured in the same units as the rise). Many geographic information systems (GIS) can analyze digital elevation data (elevation points, contour lines, digital elevation models, etc.) and derive both slope and aspect data sets. Slope is an important landscape metric. Some examples of its applications include:- to help describe landforms,- to model surface runoff, - to characterize habitat, - to classify soils, - to assess the potential for development, and - to model wildfire risk.

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Composting and the Benefits: Achieving Practice Change through Education to Reduce Nutrient Loads and Increase Adoption of Best Management Practices

Purpose

Florida houses roughly 500,000 horses and is also home to 700 freshwater springs; Marion County is, "Horse Capital of the World" and houses two first magnitude springs and each is currently in a restoration plan with the Florida Department Environmental Protection Agency (FDEP). The Florida Department of Agriculture and Consumer Services (FDACS) equine Best Management Practices (BMP) Manual recommends composting as an excellent manure management option. Composting is a controlled biological process that decomposes and heats up organic material to produce a biologically stable humus, which can then be used as a rich soil amendment. Composting provides protection to the ground and surface waters by preventing excess nutrients from being leached out and running-off into the waters. It destroys up to 90% of weed seeds contained in manure and kills parasite eggs and pathogens. Additionally, the organic matter/compost helps prevent and control soil erosion and can improve both soil quality and productivity.

What did we do?

Individual and group programming has been developed to educate farm owners and managers about the benefits derived from composting horse manure/spent bedding. Since 2007, Over 800 farms have been seen in the county. In 2013 alone, 132 participants were involved in individual farm consultations or farm revisits, group presentations and composting workshops. Education was provided and supplemental materials were developed for clientele about composting manure, compost bin construction and composting's soil-improvement capabilities.

What have we learned?

Pre and post-test results showed a 62% (82 of 132 total participants) knowledge gain from information taught. A total of 71% (n=12 of 17 farm revisit consultations) of farms revisited improved and adopted recommended manure handling practices after receiving education. Additionally, seven farms and facilities have begun cost-share planning with Southwest Florida Water Management District (SWFWMD) for compost bin construction. Results/impacts show improved management practices and a greater understanding of BMPs, allowing for a decrease in nutrient levels to the ground and surface waters. Pictures show sample bins which were constructed as a result of individual and group programming.

Future Plans

Continued group and individual programming needs to be continued, in partnership with trade journal articles being written about manure management, protection of the ground and surface waters and the benefits derived from composting manure/bedding. Cost-share dollars, coming from state organizations, will further incentivize farms to construct and use compost facilities as part of a regular manure management plan.

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Not interested at all — Very interested

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What is the difference between raster and vector data?

Raster and vector are two very different but common data formats used to store geospatial data. Vector data use X and Y coordinates to define the locations of points, lines, and areas (polygons) that correspond to map features such as fire hydrants, trails, and parcels. As such, vector data tend to define centers and edges of features. Raster data, on the other hand, use a matrix of square areas to define where features are located. These squares, also called pixels, cells, and grids, typically are of uniform size, and their size determines the detail that can be maintained in the dataset. Because raster data represent square areas, they describe interiors rather than boundaries as is the case with vector data. Vector data are excellent for capturing and storing spatial details, while raster data are well suited for capturing, storing, and analyzing data such as elevation, temperature, soil pH, etc. that vary continuously from location to location. Raster data formats also are used to store aerial and satellite imagery.

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How Teachers Can Include School Gardens in the Classroom Curriculum

School gardens are cropping up around the country as multi-faceted experiential learning labs. With the increased emphasis these days on high-stakes testing and data collection, many educators are looking for more innovative ways to present subject matter that balances academic achievement with fostering a love of learning. Research and common sense agree that the best learning environments include a variety of verbal, written, and hands-on activities for each lesson. Although new technology is playing a vital and growing role in modern education, many professionals are also seeking ways to connect students back to their environment, and instill greater life skills and a sense of community in their classrooms. Many of these skills, once taught at home, seem to be left more and more to schools. What can you teach in a school garden? What can't you teach? Most obviously, school gardens are perfectly suited to science curricula. Units such as: seed germination, plant parts, life cycles/metamorphosis, the water cycle, habitat, temperature, weather/climate, and environmental science can all be explored. Students can practice scientific inquiry and higher-order thinking in a live setting. What's more, if they bring their harvest back to the classroom to cook, they can explore the wonders of kitchen science. Math is another natural fit for school gardens. Designing, prepping, and planting garden beds affords a lot of measurement practice; as does weighing the harvest. Cooking from the garden lends itself to lessons of capacity, volume, and an exploration of fractions through measurement. Since much of all culture is centered around food, deciding what to plant, how to plant it, and how to prepare the bounty can open up infinite possibilities for social studies and multi-cultural exploration. Lesson on native foods, natural resources, early agriculture, cultural celebrations, spice trade, and traditional methods of preparing and preserving foods can all be taught in school gardens. For older students, discussions on food policy and food justice unfold as students develop a deeper understanding of where food comes from and how it makes its way to our plate. Although Language Arts may seem like a less-obvious fit for the garden, the natural world has always been a source of inspiration for poetry and creative writing. It can also be a soothing environment for reflection or for read-aloud time. In fact, there is no end to the supply of books of every genre about gardening, food, and cooking to inspire readers of all ages. Alongside lessons in core academics, gardening teaches vital life skills. One of the most exciting things about engaging youth in school gardens is the way it develops an appreciation of the natural world and a sense of interconnectedness that children may not experience in other areas of education. Planting a garden requires teamwork, patience, and perseverance. Caring for a living thing, watching it grow and thrive, and reaping the harvest teaches respect, pride, and commitment. Although these skills are rarely tested, or recorded, these are the lessons that will stick with students throughout their lifetime.

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What's the difference between a supervised and unsupervised image classification?

Two major categories of image classification techniques include unsupervised (calculated by software) and supervised (human-guided) classification. Unsupervised classification is where the outcomes (groupings of pixels with common characteristics) are based on the software analysis of an image without the user providing sample classes. The computer uses techniques to determine which pixels are related and groups them into classes. The user can specify which algorism the software will use and the desired number of output classes but otherwise does not aid in the classification process. However, the user must have knowledge of the area being classified when the groupings of pixels with common characteristics produced by the computer have to be related to actual features on the ground (such as wetlands, developed areas, coniferous forests, etc.). Supervised classification is based on the idea that a user can select sample pixels in an image that are representative of specific classes and then direct the image processing software to use these training sites as references for the classification of all other pixels in the image. Training sites (also known as testing sets or input classes) are selected based on the knowledge of the user. The user also sets the bounds for how similar other pixels must be to group them together. These bounds are often set based on the spectral characteristics of the training area, plus or minus a certain increment (often based on "brightness" or strength of reflection in specific spectral bands). The user also designates the number of classes that the image is classified into. Many analysts use a combination of supervised and unsupervised classification processes to develop final output analysis and classified maps.

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What is the family life cycle?

The family life cycle is a series of stages through which a family may pass over time. Typical stages in family development include the periods of a single young adult, a newly married couple, a family with young children, a family with adolescents, launching the children, and a family in later life. The family life cycle emphasizes the effects of marriage, divorce, births, and deaths on families, as well as changes in income, expenses, and assets.

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Using Learning Centers in Child Care

Learning centers are a purposeful way of dividing up your classroom into different subject/learning areas. The location of each learning center, placement of any furnishings or equipment, and easily available materials give a clear message to the child about what is to take place in that area.

Planning for Learning Centers

Establishing the centers requires some initial planning, work, and possible expense, but once they are established they save time and money. For example, you don't want to place the reading area (quiet and comfy) near the block, music, or dramatic play areas (loud and active). You also probably want the art center on hard, easy-to-clean floors and near a sink, but the science center near a window or other source of natural sunlight. Learning centers capitalize on children's natural need to explore because they are given the chance to gain experience by trying out their own ideas in a hands-on way. Once established, you can write your lesson plans according to each learning center to make sure you're offering something to enhance each subject. Then you can easily set up your planned activities for the morning/afternoon in each corresponding center, and children can play in whatever center interests them.

Advantages of Learning Centers

Discipline problems are reduced because groups are limited to a number which can reasonably function in each area. Classroom management is easier since children are in the area of their choice and interest. Children are engaged in hands-on activities as they explore and experiment. Caregivers can support children by supplying the resources as they learn by themselves. Caregivers can determine, by observation, the progress of the children. Caregivers can easily determine what items need to be added to each area that will encourage children in further discovery. Children understand classroom rules more easily when they apply to specific areas. Each area contains only the essentials that allow children to control and create. The purpose of the area is clear and understandable to children.

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What does it mean to foster distinctive, attractive communities with a strong sense of place?

What does it mean to foster distinctive, attractive communities with a strong sense of place?
The Smart Growth Tenet: Foster distinctive, attractive communities with a strong sense of place that reflect the values, culture and vision of residents through the growth and history of their community.
Why is fostering distinctive, attractive communities with a strong sense of place important?
Communities with a strong sense of place build on their unique history, identity and assets to foster community pride, increase social interaction and market their community to potential businesses and residents. The results can improve economic stability, increase property values and greatly impact the lives and memories of residents. Urban sprawl is creating a new image for growing communities that is commonly referred to as "Anywhere USA." The monotony of this sprawling development pattern moves people farther away from our town centers and from each other. The results have led to the loss of millions of acres of farmland and open space, disinvestment in our cities and decreases in social interaction, diversity and civic pride. To create a distinct image and maintain a sense of place, many communities are investing in their history as the foundation for new growth.
How do you apply this tenet to your community?
Investing in your community's unique assets and history can create a situation where residents will become your greatest ally in guiding growth that benefits the entire community. Involving the public in planning decisions and community improvement projects is the first step in building a sense of place. While the greater public should be intimately involved in creating a vision for the community, it is the role of government officials to use the zoning ordinance, site plan review, capital improvement planning and state and federal assistance to make this vision a reality. Communities that are effective in implementing this tenet have consistent policies and regulations in place that create synergy between preservation efforts and new development and are always looking for ways to improve by building sense of place.

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What is a spectral signature in remote sensing?

Features on the Earth reflect, absorb, transmit, and emit electromagnetic energy from the sun. Special digital sensors have been developed to measure all types of electromagnetic energy as it interacts with objects in all of the ways listed above. The ability of sensors to measure these interactions allows us to use remote sensing to measure features and changes on the Earth and in our atmosphere. A measurement of energy commonly used in remote sensing of the Earth is reflected energy (e.g., visible light, near-infrared, etc.) coming from land and water surfaces. The amount of energy reflected from these surfaces is usually expressed as a percentage of the amount of energy striking the objects. Reflectance is 100% if all of the light striking and object bounces off and is detected by the sensor. If none of the light returns from the surface, reflectance is said to be 0%. In most cases, the reflectance value of each object for each area of the electromagnetic spectrum is somewhere between these two extremes. Across any range of wavelengths, the percent reflectance values for landscape features such as water, sand, roads, forests, etc. can be plotted and compared. Such plots are called “spectral response curves” or “spectral signatures.” Differences among spectral signatures are used to help classify remotely sensed images into classes of landscape features since the spectral signatures of like features have similar shapes. The figure below shows differences in the spectral response curves for healthy versus stressed sugar beet plants. The more detailed the spectral information recorded by a sensor, the more information that can be extracted from the spectral signatures. Hyperspectral sensors have much more detailed signatures than multispectral sensors and thus provide the ability to detect more subtle differences in aquatic and terrestrial features.

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The Building Blocks of Climate Models

In a virtual system, climate models attempt to integrate as much as possible the known factors that influence climate, from the transfer of atmospheric heat into the oceans to the reflection of solar rays by polar and mountain ice. From the climate modeler's standpoint, the processes that control the climate can be expressed by mathematical equations derived from scientific laws, empirical data, and observations. These equations are converted into computer language and, along with information about the Earth's geography - such as topography and vegetation - form the basis of a climate model. To understand how a climate model is constructed, it helps to think of the Earth's climate as a complex system of many interacting parts that include the atmosphere, oceans, land surface, and sea and land ice. Atmosphere models are the oldest and evolved during the 1960s. They have at their core the equations for fluid motion, which describe air movement, and the first law of thermodynamics, which relates to the conservation of energy, including heat. Ocean component models followed atmospheric models and were built to simulate ocean currents, salinities, and temperatures. By 1970, the first model integrated the atmosphere and ocean components into what is commonly referred to as atmosphere-ocean general circulation models, or coupled GCMs. Researchers continue to refine these coupled GCMs, by improving their resolution, for example. Models that go beyond climate, such as Earth system models, remain more experimental.

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Topography and Understanding Topographic Maps

Among the many mapping tools available, the most commonly used is the topographic map. Topography is defined as the relief (relative elevations) of a surface and the relative relations between its natural and man-made features. Topographic maps systematically portray the spatial relationship among both the physical features, such as contour lines (lines of equal elevation) and hydrographic symbols, and cultural features, such as roads and administrative boundaries. Topographic maps are also known as "topo maps." Reading a topographic map begins with understanding the extent of reduction necessary to represent a given area of the Earth's surface. This reduction is known as scale and is defined as a representation of the size of something on a drawing, photo, or map relative to the size of the real thing. The U.S. Geological Survey (USGS) has been responsible for creating topographic maps of the United States since its inception in 1879. These maps come in a variety of scales. The most common for natural resource management purposes is the 1:24,000 series (where 1 map inch = 24,000 Earth inches or 2,000 feet). Maps at this scale cover an area measuring 7.5 minutes of latitude and 7.5 minutes of longitude and are commonly called 7.5-minute quadrangle maps, also known as "quads" or "quad sheets." These mapping sheets represent 64 square miles in southern U.S. latitudes and 49 square miles in northern latitudes; thus, it takes about 57,000 7.5-minute quad sheets to cover the entire United States and its territories. These maps are used for local area planning, engineering, and recreation purposes. Maps at 1:50,000 to 1:100,000 show less detail but cover areas large enough for landscape management support. USGS also has smaller scale maps at 1:250,000, 1:500,000, and 1:1,000,000, which cover very large areas on the sheet and are used for regional and statewide planning. The USGS has an excellent webpage with graphic depictions of map scale. The content of topographic maps may seem bewildering upon first glance; however, there is a method behind all the colored points, lines, and areas distinguishing key features. The smaller features of limited extent (such as the location of houses) are often represented by points, whereas much larger features (such as the outline of a large building) may be depicted as areas. In the mapping world, these areas are often known as polygons.

Colors that catch the eye first when looking at most 7.5-minute quadrangles are these: green (vegetation) blue (water) gray or red (densely built-up areas) purple (information updated with aerial photography but not field verified)

Unique combinations of line style and color indicate similar features: brown for contour lines (which will be discussed in the next paragraph) blue for lakes, streams, irrigation ditches, etc. red for land grids and important roads black for other roads and trails, railroads, boundaries, etc. purple for updated features A series of standardized symbols are used to depict features such as springs, water tanks, wells, mines, buildings, campgrounds, and survey control points. The brown contour lines on topographic maps show elevation. Each contour line joins points of equal elevation above a specified reference, such as sea level. A contour line represents one and only one elevation and thus never splits or intersects other contour lines (expect in the rare case of an overhanging cliff). Note that the vertical distance between contour lines (the contour interval) is always equal; the smaller the contour interval, the higher (or more detailed) the vertical resolution, or the minimum separation of objects, of the map. The horizontal distance between contours, on the other hand, is determined by the steepness of the landscape and can vary greatly depending on the terrain. The closer the lines are together, the steeper the object. USGS cartographers select a contour interval that will best show the shape of the terrain for each individual quad sheet. A flat area in Iowa might need a contour interval of 10 feet to capture some sense of relief. By contrast, a mountainous region of Arizona may have contour intervals of 100 feet or more; any finer would result in contours too tightly packed together to distinguish. Concentric circles of contour lines indicate a hilltop or mountain peak, whereas concentric circles of hatched contour lines indicate a closed depression. Contour lines form a V pattern crossing streams with the V pointing upstream. Rounded contour lines generally denote hills or ridges.

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Imported Fire Ant History

More than 75 years ago, the red imported fire ant, Solenopsis invicta Buren, was accidentally brought into Mobile, Alabama, from South America. It now infests more than 325 million acres, comprising most of eleven southern states and Puerto Rico, with infestations also in New Mexico and California. It has recently been reported in northern Mexico, Australia, Taiwan and China. Another species, the black imported fire ant, Solenopsis richteri Forel, was introduced earlier, but this species is limited to northeastern Mississippi, northwestern Alabama, and Tennessee. Colonies move vertically and horizontally in the soil profile to escape floods, droughts, and extreme temperatures. When new colonies are not actively foraging, they may be unaffected by baits or other pesticides applied to the soil surface.

Technological obstacles to eradication

Pesticide treatments are expensive, time-consuming, and limited in their effectiveness. There are three basic approaches: Surface treatment using a residual contact poison. This approach is the least environmentally sound because the treated surface remains toxic for a long time. The ants may survive by foraging underground. Individual mound treatment. This approach involves applying a large volume of pesticide to reach the queen. However, it is nearly impossible to locate all of the colonies in an area and difficult to manipulate large volumes of liquid. Also, mound treatment is more expensive and time-consuming than broadcast treatments. Colonies not eliminated may move or split into several colonies. Bait treatment. This approach uses some sort of attractive substance the ants like to eat. Unfortunately, baits are not always consumed, and the bait's attractiveness is short-lived. The bait must be slow-acting and effective over a range of doses, since the dose the ants get cannot be controlled. Baits may also be attractive to and kill some native ant species that compete with fire ants.

Economic, regulatory, and environmental obstacles to eradication

The best way to treat large areas (hundreds of acres) is by an aerial application of bait. The larger the treatment area, the more slowly reinfestation occurs. However, not all areas can be treated because of label restrictions and application limitations. Even with a bait product, it is not feasible to treat the entire infested area or even a large part of a single state, and untreated areas may be reinfested. If periodic treatments are discontinued, the area may become more infested than it originally was within a year or two.

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What is geospatial technology?

Geospatial technology refers to equipment used to measure and analyze Earth's land and features. Systems such as Global Positioning System (GPS) and Geographical Information System (GIS) are used in geospatial work. "Geo" is a prefix that comes from a Greek word meaning earth. "Spatial" means relating to space. GPS was developed by the United States Department of Defense in 1973. The first satellite was launched in 1978. GPS was originally designed to help military service members as they move vehicles, planes, and ships to the correct locations around the world. Today, GPS and GIS are used for many different things. GPS can be used to help navigate airplanes, boats, and cars. GPS can also be used in outdoor recreational activities such as hiking, fishing, kayaking, and boating. In the scientific community, GPS plays an important role in the earth sciences. Meteorologists use GPS for weather forecasting and global climate studies. Geologists can use GPS to help measure tectonic motions during and in between earthquakes.

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History of Feral Hogs in the United States

Feral hogs (also called wild hogs), belonging to the species Sus scrofa, are not native to the United States. The presence of these animals in this country is solely attributable to man-made introductions, some of which were intentional while others were accidental. Basically, two types of Sus scrofa, Eurasian wild boar and domestic swine, were introduced into the United States. Because these two types are conspecifics, wherever both of them were found together in the wild, interbreeding occurred. As a result, there are now three general types of wild hogs present in this country. However, because this situation represents a very diverse hybrid complex, the distinguishing lines among these three general types are not always clear morphologically; genetic analyses may be necessary to sort out the ancestry of any one specific population of unknown origin. Historically, the first man-made introduction of hogs into the United States was on the Hawaiian Islands. These animals were carried there by the early Polynesian immigrants who first colonized these islands. Hogs were abundant on all of the islands within this archipelago at the time of the first European contact in the 18th Century. The first hogs to be brought to continental North America were of European origin. The first importation of domestic swine into North America came with the second voyage of Christopher Columbus in 1493. Among the livestock acquired in the Canary Islands to provision this expedition were eight "selected" domestic pigs that were taken onboard at the island of Gomera. These animals and their offspring became the stock that populated the newly formed settlements and outposts on the islands of Cuba, Hispaniola, and Jamaica. From these animals sprang the immense herds that sustained the Spanish explorers on their journeys to the mainland during the early 1500s. It was from these ambulatory stocks of swine used by these initial expeditions that the first well-documented feral populations of wild hogs originated in the continental United States. The expedition of Hernando de Soto is attributed as the first documented source that introduced hogs into the continental United States. From the initial stock of animals, De Soto's herd of swine increased to a reported total of 700. Over a three year period, De Soto and his army traveled through what are now 14 states. Along the 3,100-mile journey, the hogs variously escaped into the wild and were either given to or stolen by the Indians encountered by the Spaniards. De Soto was followed by many other Spanish, English, and French explorers and colonists that brought hogs to the continental U. S. (e.g., Pedro Menéndez de Avilés, Juan de Oñate, Pierre de Iberville, Fernando del Bosque, Rene-Robert Cavelier Sieur de La Salle, and Sir Walter Raleigh). The escaped hogs from these various expeditions and settlements went wild and rapidly became established in a variety of areas. Among the domestic livestock being raised in the early settlements in the European colonies in the New World, hogs were among the most common. The free-ranging of domestic livestock, including hogs, was a commonly practiced husbandry method employed in these colonies. Often, these free-ranging domestic swine went wild. Combined with the escaped stock from the earlier expeditions, these animals established the early populations of wild hogs throughout the eastern and southwestern United States. Beginning in the 1890s, pure Eurasian wild boar were introduced into several areas of the United States to provide a new huntable big game species for wealthy sportsmen. All of these initial introductions were into fenced shooting preserves (e.g., Corbin's Park, NH; Litchfield Park, NY; Hooper Bald, NC). Many were followed by secondary introductions into other locations. A number of these later releases were made into unfenced areas. In other instances, the wild boar were able to break out of and escape the fenced enclosures where they were being maintained. In such areas where feral hogs were already established, interbreeding between the two forms readily occurred, further complicating the taxonomic composition of the wild hogs found in those areas. From 1900 until the late 1980s, feral hog populations in the United States were primarily found in the southern tier of states and in states on the West Coast. Between 1989 and the present, the number of states reporting the presence of feral hogs has more than doubled. Similar to the initial introductions of this species into this continent, this new range increase has also been man-made. Concurrent with this range expansion has been an increase in the estimate national population size of this species. The range expansion in the central part of the country was reportedly largely due to clandestine releases by feral hog hunting enthusiasts. In most states the practice of releasing hogs is highly illegal. Other expansions have been the result of these animals escaping from fenced shooting preserves. The identified sport hunting sources (i.e., clandestine releases and escapes from fenced preserves) of this species increase are consistent with the fact that feral hogs have become the second most popular big game animal in North America, second only to white-tailed deer (Odocoileus virginianus) in the numbers harvested every year. Because of continuing illegal releases of feral hogs into new areas, the number of states with these animals will probably increase. In fact, the potential exists to ultimately have introduced populations of feral hogs in all 50 states at some time in the future.

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Energy Drinks: History

1960 Energy drinks appear overseas
1980 Jolt Cola 1st "energy drink" in US
1997 Red Bull 1st energy drink to be imported
2001 US energy drink market retail sales grew to 8 million annually
A 2008 statewide Patient Poll conducted by the Pennsylvania Medical Society's Institute for Good Medicine found that: 20 percent of respondents ages 21–30 had used energy drinks in high school or college to stay awake longer to study or write a paper; 70 percent of respondents knew someone who had used an energy drink to stay awake longer to study or work. Today, new products are constantly emerging...

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The History of Crops as an Agroterrorism Target

Plant systems, the "base" of our food production system, have been targeted by military and other groups several times throughout history. In the year 346 BC, while battling Carthage, the Romans spread large quantities of salt on cultivated fields creating toxic conditions for crops. This forced local citizens to abandon the area, ultimately influencing the outcome of the war. During the U.S. Civil War, the Confederacy alleged that troops from the Union deliberately destroyed crops in the southern region of the U.S. by intentionally introducing an insect known as the harlequin bug, Murgentia histrionica. The insect caused great damage, but the direct connection to the Union was never proven. The appearance of this insect species may have occurred naturally since it was indigenous to Mexico. In World War II, Germany was accused of dropping containers of Colorado Potato Beetles on Britain. The reports indicated that these "bombs" were made of cardboard and each contained as many as 100 beetles. However, this allegation has been widely debated, with some suggesting the insect's appearance in England actually occurred as a result of an accidental introduction through food shipments. However, Germany did have a "potato beetle research" program, set up as a defense program to counter Allied biological weapons research. Also during the second World War, the Soviet Union was alleged to have developed and used different types of fungal disease agents on wheat and other cereal crops in enemy countries. During the Cold War between the U.S. and U.S.S.R., both countries stockpiled tons of wheat stem rust spores, a serious disease that can wipe out a wheat crop. Plant-based food products intended for direct consumption by people have also been targeted by terrorist activities in the past. In 1989, the U.S. Embassy in Chile received a call declaring that grapes moving from Chile to the United States and Japan were contaminated with cyanide. In fact, after investigation by the FDA, two contaminated grapes were found. However, because the amount of cyanide found was so small, the contamination wasn't deemed to be a real threat to human health. As a result of the event, several countries cut off importation of several fruit products from Chile. Chilean growers claimed losses of more than $300 million.

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Avian Influenza Homepage

Wild birds such as migratory ducks and geese have historically been known as reservoirs for avian influenza (AI) viruses. These birds normally can carry low pathogenicity avian influenza viruses in their respiratory or intestinal tracts and usually do not get sick. However, AI viruses, particularly H5 and H7 strains, can infect domestic poultry such as chickens and turkeys resulting in severe economic losses due to reduced production and increased mortality and culling. In 2014, USDA identified Eurasian H5N8 highly pathogenic avian influenza (HPAI) and mixed-origin viruses, H5N2 and a novel H5N1, in the Pacific Flyway. The HPAI H5N2 virus strain was later confirmed in several states along three of the four North American Flyways: Pacific, Central and Mississippi. This virus was associated with the HPAI outbreaks that started in the Pacific Northwest in December 2014 and spread to commercial chicken and turkey farms in the Midwest. The last case was reported in June 2015. However, by that time, the U.S. had endured the largest animal health emergency in its history, with more than 200 cases of HPAI affecting more than 50 million commercial and backyard poultry as well as wild birds across 15 states. On March 5, 2017, USDA confirmed HPAI H7 in a commercial poultry breeder flock along the Mississippi flyway in Tennessee. This HPAI H7 strain was found to be of wild bird lineage and was later confirmed by the USDA's National Veterinary Services Laboratories as a North American wild bird lineage H7N9 HPAI.

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The Special Milk Program: An Introduction

Background

The Special Milk Program (SMP) was established in 1955 to increase the milk consumption by children in schools and childcare institutions that do not participate in other Federal meal service programs. In 1966, the Special Milk Program was incorporated into the Child Nutrition Act. The Special Milk Program provides milk to children in schools, childcare institutions, and eligible camps. Through this program, schools and institutions are reimbursed for the milk they serve. In 2011, 3,848 schools and residential childcare institutions, 782 summer camps, and 527 non-residential childcare institutions participated. Schools in the National School Lunch or School Breakfast Programs also participate in the Special Milk Program to provide milk to children in half-day pre-kindergarten and kindergarten programs where children do not have access to the school meal programs. The Food and Nutrition Service administers the program at the federal level. At the state level, the Special Milk Program is usually administered by State education agencies, which operate the program through agreements with school food authorities.

How It Works

To enroll in the Special Milk Program, schools must apply and serve children who otherwise do not have access to school meal programs. Participating schools and institutions receive reimbursement from the U.S. Department of Agriculture (USDA) for each half-pint serving of milk served. The participating schools operate their milk programs on a non-profit basis and agree to use the federal reimbursement to subsidize the selling price of milk to all children. Any child at a participating school or half-day pre-kindergarten program can get milk through the Special Milk Program, regardless of their FARMS (Free and Reduced Meal Service) status.

Impact

In fiscal year 2012, over 61 million half-pints of milk were served through the Special Milk Program. A survey of 768 schools and 20,000 students assessed the impact of the free milk provision on the Special Milk Program (SMP). Free milk service increased total milk consumption of needy children, and milk programs were not disincentives to student participation in school lunch or school breakfast (1). Students in SMP schools drank 42% more milk at school than those in non-SMP programs, this relationship was seen at all grade levels. In schools that participated in the National School Lunch Program the milk consumption was almost 30% higher than in schools with the SMP but not the NSLP.

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Basic Math Skills in Child Care: Shapes and Spatial Relations

Some child care providers may think of geometry as an advanced math concept learned in high school. But even young children are aware of basic concepts related to shapes and spatial relationships. Child care providers can help young children build math skills by encouraging them to explore and compare shapes and spatial relationships.

Spatial Relationships

Spatial relationships explore the concept of where objects are in relationship to something else. When child care providers use the following words, they are teaching spatial concepts: above, below before, after high, low in front of, in back of, behind inside, outside on top of, under Learning to understand spatial relationships helps children talk about where things are located. For example, a ball may be behind the chair, or under the table, or in the box. The dog may be on the blanket, outside of the house, or in the doghouse. To help children practice spatial relationships, hide a toy in the room, and give directions to find the toy using some fo the spatial terms above. For example, you might say, "Look behind the chair."

Geometry

Understanding shapes is basic to understanding geometry. As children start to identify shapes, they develop a beginning understanding of geometry. Most preschool children begin to learn the names of basic two-dimensional shapes: circle, square, triangle and rectangle. Some preschoolers can even learn to recognize and name more complex shapes (rhombus, trapezoid, hexagon) and three-dimensional shapes (cube, sphere and pyramid). The block area is a great place to reinforce children's knowledge of shapes. As you build a structure together, encourage the child to add a specific shape. You might say, "The top of this column looks like a great place to add a half-circle. What do you think?"

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Basic Math Skills in Child Care: Matching, Classifying, and Measuring

Teaching young children how to match, classify, and measure is an important part of developing early math skills because these skills help children identify and describe relationships between items. As a child care care provider, you can help young children learn these skills in several ways. Matching mainly involves one-to-one correspondence. The game "Memory" is one good way to teach young children about matching. This game begins with pairs of pictures face down. Each player flips over two cards. If the cards match, the player keeps them and flips over two more cards. If they don't match, the player flips them face down, and the next person has a turn to find a match. Comparing involves identifying similarities and differences among objects. For example, talk about how my block is the same as, or different than, your block. Being able to compare objects and identify similarities and differences leads to the ability to classify objects. Classifying/sorting involves finding things that are the same, or alike, and grouping them by specific traits. For example, the bunch of animals in the picture to the right can be grouped based on their color or type of animal. You can have young children classify anything, including blocks, leaves, plates, or toy cars. Once they have classified items, children can compare items further to learn more specific similarities and differences between items, both within and between matched groups. Sets are simply a collection of things that have been classified together because they have something in common. In your child care program, you could find many sets, such as blocks, markers, food, people, and animals. Measuring is determining the extent or degree of something. For example, children can measure a block in many ways; height, weight, length, even temperature. If you don't have rulers or other measuring tools, help children practice measuring with everyday objects such as yarn or paper clips.

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Math in Child Care

Math is everywhere, and it's more than just learning numbers. When children sort crayons by color, put puzzles together, build with blocks, count their raisins during snack, and sing "Five Little Monkeys Jumping on the Bed," they are learning about math. These kinds of hands-on learning activities create a solid foundation for children to understand shapes, sizes, length, addition, and subtraction. Children who have the opportunity to learn math-related concepts in early childhood often do better in school and are more skilled at using math as an adult. High-quality child care programs provide young children with many opportunities to sort and classify, find similarities and differences, measure and estimate, and solve problems. For more information on how to support and nurture young children's developing math skills, see the following articles. If you are looking for specific math activities for your child care program, check out the Hands-On Activities for Child Care database.

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Breakfast and the Brain: How Eating Breakfast Impacts School Performance

The claim that breakfast is the most important meal of the day has an abundance of sound science behind it. A brief compiled by the Food Research and Action Center (FRAC) outlines the correlation between breakfast and school performance among children, based on numerous research findings. The findings include how eating, and not eating, breakfast affects academics, brain function, and overall wellness. Children who do not eat breakfast at home or at school were less able to learn. Hunger can lead to lower math scores, attention problems, and behavior, emotional, and academic problems. Furthermore, studies show that children who are consistently or often hungry are more likely to repeat a grade. It is these problems that have lead many schools to participate in school breakfast programs including the United States Department of Agriculture's (USDA) School Breakfast Program and the Breakfast in the Classroom program. Both programs make breakfast available to all students. While it is true that students can chose not to eat, children themselves have reported a belief that eating breakfast increases their energy and ability to pay attention in class. Providing breakfast at school can also ensure that children are getting enough to eat. Children who eat a complete breakfast have been shown to work faster and make fewer mistakes in math problems and to perform better on vocabulary tests than those who ate only a partial breakfast. They also show improved concentration, alertness, comprehension, memory and learning. Beyond academics, children who participate in school breakfast programs show decreased anxiety, depression, and hyperactivity. The breakfast offered can improve a child's overall nutrition by providing her/him with necessary vitamins and minerals and can actually reduce the risk of obesity! Numerous studies show how students will benefit from school lunch programs in the classroom and beyond. Visit the links below to discover how your school community can benefit from school breakfast.

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Play Helps Young Children Be Ready for School

With the increasing pressures of school readiness, many child care programs are actually cutting back on unstructured free play time. Pressured teachers believe that structured, teacher-led activities are the only way to help children be ready to read, do math, and understand science when they enter kindergarten. But what do we really know about young children and play? How does play help children learn? Many adults are mistaken about play. We view "playing" as a frivolous activity, meant to fill empty waiting periods between more important activities. But for young children, play is the centerpiece of learning. Playing is not an "extra" for young children. It's actually the single most important way they explore, learn about the world and practice and perfect new skills. When children play, they get to decide what materials to use, what to do and when to stop or change to a different activity. Children playing in a child care setting are testing out new materials, trying out roles, experimenting with cause and effect, making guesses and testing conclusions and practicing getting along with others. Researchers have shown that high-quality play experiences help improve children's memory, social skills, oral language abilities, pre-reading and pre-math skills and school adjustment. All of these will be crucially important learning skills when children get to kindergarten and beyond.

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How can I balance a checkbook that has not balanced for several months?

Balancing or reconciling a checkbook each month is a task many of us avoid. If you have tried balancing your checkbook but can find no agreement between the last number in your check register and the ending balance your financial institution has stated is in your account, you do have some alternatives: Even if you have done so before, try balancing your checkbook using the form provided by your financial institution. Simply subtracting or adding each entry in your checkbook entry does not allow for outstanding checks or deposits. The forms vary, but the basic steps are checking off checks, ATM withdrawals, automatic deposits and withdrawals, and other deposits that have cleared on your statement. Total all outstanding checks (the ones not found on the statement yet). Subtract this total from the ending balance your bank/credit union is showing. Total all outstanding deposits. Add this to the number you arrived at after subtracting the outstanding checks. By following the form provided, you are more likely to notice either deposits or withdrawals you previously overlooked and to find errors. Check the accuracy of your entries and the basic math in your checkbook register. Work your way through each transaction to see if you recorded it accurately and did the appropriate subtraction or addition correctly. Did you write a check for $54 but entered it in the checkbook register as $45? Did you subtract that $100 deposit instead of adding it? Do not look for outstanding checks or missed deposits. Concentrate only on the accuracy of the entries and the math associated with them. Allow all outstanding checks to clear before writing any more checks. In other words, stop using your checkbook. Pay with cash only, or use cash to purchase money orders to pay bills. If you have checks that have been outstanding for three or more months, contact the person or business the checks were written to and ask for the current status of the check. Has the individual/business lost or forgotten the check? Encourage them to cash it as soon as possible. If it has been cashed, review your monthly statement to confirm that it was deducted from your account. If there is another person on the same checking account? a spouse or a child? ask him or her for information on all transactions he or she may have made on the account. Were those transactions recorded on the checkbook register? Are there any double entries? Be certain that all deposits have been credited to your account, especially if you have more than one type of account with the same financial institution. Was a cash deposit erroneously credited to your savings account or to a loan instead of to your checking account? When making a deposit, always use a deposit slip, and keep your deposit receipt until the deposit is shown on your checking account statement. Use a computer program such as Quicken to manage your checkbook. Accurately enter all the information from your checkbook register and then run the reconciliation segment of the computer program. Set up an appointment with a financial consultant at your bank/credit union. Inform them in advance that you are having difficulties balancing your checkbook. Bring with you all current checkbook registers and statements. You may need to give them written permission to access your account information online so the two of you can compare information. View your account online and compare transactions. Many financial institutions now send monthly statements via e-mail, and some even allow daily access to your account information. Some sites have financial calculators that do the math for you after you enter your information. Balance your checkbook more often. When your checkbook is not balancing in the first place, that may sound contradictory, but by attempting to balance your checkbook more than once a month, you are more likely to find an error early and before it costs you overdraft fees. If you have direct deposit of your paycheck or other funds, consider balancing your checkbook every pay period, which is often every two weeks.

Which categories do you think the above article belongs to?

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How is your interest level in this article?

Not interested at all — Very interested

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What is a crush point?

A crush point exists at the point where two objects meet. The objects can be moving toward each other, or one object can be moving toward a stationary object. Crush points are hazardous because the objects coming together can easily crush body parts. The most common example of a crush-point hazard is the attachment to the drawbar of a tractor. Other examples of crush point hazards include three-point hitches and components moved by hydraulic cylinders.

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Three "Bs" in Child Care: Blocks, Balls, and Books

Some of the best toys for kids have been around for a long time. Blocks, balls, and books are simple, durable, and fun and can help children build skills. They can also be enjoyed by kids of all ages. These should be staples in every child care program.

About Blocks

Blocks are good toys, because children of different ages can use them in different ways. Infants like to carry them around and dump them into and out of containers. Toddlers like to build towers. As children get older they like to build more elaborate structures with blocks. Children use physical skills as they lift and move blocks to build things. Math skills are used as children count, match, sort, add, subtract, and notice the weight and length of blocks. Thinking and problem-solving skills are used in making a tower or other structure. A child can learn how to work with other children in the program and share ideas when building with blocks.

About Balls

Like blocks, balls are fun for children of all ages! Infants love to roll them. Toddlers enjoy rolling a ball back and forth to someone. This teaches them how to take turns – something toddlers need to learn because it leads to sharing. As children get older, they can learn how to throw and catch a ball. Children enjoy games with balls. Some children develop a love of sports and may play ball of one kind or another all their lives.

About Books

Children learn so much from books. Infants and toddlers like to look at picture books and to listen to short stories. Board books and cloth books are best for them to handle. Preschoolers enjoy stories and learning about new things. There are books about science and nature. There are books about magic and music. There are fairy tale and folk tale books. There are books about people or events, and others are fiction. Child care settings should have a variety of books available for children and a special reading time every day. Once children learn to read, child care providers can encourage children to take turns reading to one another. Consider taking children on a field trip to the library. Make books and reading times important for the children in your care.

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What is the Difference Between Physical Fitness, Exercise, and Physical Activity?

What is the Difference Between Physical Fitness, Exercise, and Physical Activity?
Health care professionals, the media and now the White House. Everywhere we turn today we hear how important exercise and physical activity are to long life and good health. But what exactly constitutes physical activity and exercise and what's the difference between the two? Let's take a closer look at how these terms relate to you and what you can do to improve your overall health no matter where you are on the fitness spectrum. Physical activity involves any bodily movement such as walking to and from work, taking the stairs instead of elevators and escalators, gardening, and doing household chores. For inactive people, there's no doubt that increasing this sort of activity can reduce risk for disease and improve health. Exercise, however, is a type of physical activity that requires planned, structured, and repetitive bodily movement with the intent of improving or maintaining your physical fitness level. Exercise can be accomplished through activities such as cycling, dancing, walking, swimming, yoga, working out at the gym, or running, just to name a few. Regular exercise, depending upon the kind, improves aerobic fitness, muscular strength, and flexibility. Aerobic fitness is the ability of the body's cardiovascular system to supply energy during continuous physical activities such as biking and running. Studies show that this type of exercise provides many health benefits such as decreasing risk for heart disease, stroke, high blood pressure, type II diabetes and some cancers. The 2008 Physical Activity Guidelines for Americans state that most health benefits occur with at least 150 minutes/week of moderate-intensity aerobic activity. Examples of aerobic activities that would meet this recommendation include walking at a brisk pace, swimming, jogging, dancing, etc. Muscular strength is the ability of the muscles to exert a force during an activity such as lifting weights. Muscle strengthening exercises involve using your muscles to work against a resistance such as your body weight, elastic bands or weights. The Physical Activity Guidelines recommend that adults participate in muscle strengthening exercises for all major muscles groups at least two days a week. Bone strengthening exercise, or any weight-bearing activity that produces a force on the bone, is also important to overall health for children and adults. This force is usually produced by impact with the ground and results in bone growth in children and healthy maintenance of bone density in adults. Examples of bone strengthening activities include jumping, walking, jogging, and weight lifting exercises. As you can see, some exercises such as walking or jogging serve a dual purpose of strengthening our bones and our aerobic system. Lastly, flexibility is the ability of the joints to move through a full range of motion. Stretching exercises can be an excellent way of increasing flexibility. While the 2008 Physical Activity Guidelines for Americans do not include specific recommendations for increasing flexibility, some individuals such as dancers and some athletes may need to include flexibility activities as part of their exercise regimen. The bottom line is that increasing your everyday physical activity and regularly participating in aerobic, muscle and bone strengthening exercises are all beneficial to your health and will improve your quality of life. So what are you waiting for? It's time to heed the advice and get active. You have nothing to lose and everything to gain. If you'd like to know more about the benefits of starting an exercise program or just increasing your everyday physical activities, visit the 2008 Physical Activity Guidelines for Americans.

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Jet Stream Activity in Climate Models

Jet streams high in the atmosphere direct where moisture lands on the surface. Global climate models (GCMs) generally do a good job at simulating jet stream activity, especially in the mid-latitudes – roughly 40 to 70 degrees north of the equator. Indeed, this is considered one of their strengths. Even so, potential problems include inadequacies where the mid-latitudes interact with the tropics (Bader et al. 2008) — namely, the subtropics, roughly centered around 30 degrees from the equator. Jet streams can be seen as meandering rivers of air, generally located about 30,000 to 40,000 feet above sea level. The polar jet stream occurs consistently along the polar front, where cold air meets warm air, fueling many mid-latitude storms. Occasionally, the polar jet stream dips down into the low mid-latitudes, influencing precipitation and temperature in the southwestern United States. A separate, and somewhat less consistent, subtropical jet stream occurs between 20 and 40 degrees latitude from the equator. As their names imply, the polar jet stream can help carry cold air southward, while the subtropical jet stream can help usher in warm, humid conditions. The subtropical jet stream in North America is more likely to get a boost during El Niño years, wielding a large effect on winter precipitation along the southern tier of U.S. states. Thus, recent improvements in modeling El Niño variability in the distant tropics have implications for modeling regional jet stream activity and its effect on winter precipitation. Still, only about a third of the 18 GCMs tested were identified as having a relatively realistic interpretation of El Niño fluctuations (Bader et al. 2008). The most skillful models tend to have relatively high resolution — with some as fine as 500 square miles — in the tropical Pacific, where El Niño has its greatest effect on sea surface temperature. In general, modelers have found it challenging to capture the historic year-to-year variability of the subtropcial jet stream in the northern hemisphere, including a recently observed shift toward the poles. Several research teams have shown a poleward shift of this jet stream, linked to the expansion of the Hadley cell circulation Seidel et al. 2007, Hu and Fu 2007). Researchers at the University of Arizona have linked the poleward shift of the jet stream to drier southwestern springs in the time frame they considered, from 1978 to 1998 (McAfee and Russell 2008). In addition, the poleward shift of the jet stream observed for the past several decades means that the regional impacts of El Niño could change along with global climate. This remains difficult to model at any scale. The modeling of tropical storms is also a challenge at the global scale. However, this challenge of modeling of tropical storms can potentially be resolved at the regional scale. The subtropical jet stream resides around the descending branch of the Hadley cell, shown in this idealized graphic at about 30 degrees in latitude. The polar jet stream resides along the polar front, where it tends to reinforce the temperature difference on either side of the front. In reality, both jet streams often meander widely north and south rather than following the straight (zonal) pattern shown here. Credit: Barbara Summey, NASA Goddard VisAnalysis Lab

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How to Encourage Your Children to Eat More Vegetables

Every parent knows the key to keeping children healthy is to get them to put down the junk food and eat more vegetables, but this is often more easily said than done. So how can you promote vegetables in your home? Try these simple tips to get your kids to love veggies! Smile. Studies have shown that if you smile while you eat vegetables, your children are more likely to want to eat them. Modeling healthy eating by not only eating vegetables around your kids, but also by clearly showing that you enjoy them, is incredibly important. Even if they've never liked that vegetable before, simply seeing you enjoy it will make them like it more. So be sure to set a good example by eating vegetables in front of your kids with a smile on your face2! Buy more vegetables than junk food. If your kitchen is filled with vegetables instead of unhealthy junk food, your kids will be more likely to reach for the carrots instead of the chips3. Try extending this to your child's school cafeteria by asking if the salad bar can be moved to a more prominent location and ask that the vending machines be moved to a less prominent location or even better removed completely. Make vegetables kid-sized. Children like to eat food they can eat easily, so cut up vegetables and keep them easily accessible in the fridge4. Try cutting them up into small, fun shapes and serving them with low-fat salad dressing or dip too! Be positive. Avoid forcing your kid to eat vegetables and punishing them when they don't. Instead, use positive reinforcement by praising them when they do finish their vegetables or when they ask for their snack to be their favorite vegetable4. Let them have a say. When kids can help decide what vegetable will be a part of dinner, they'll feel more involved and will be more excited to eat them4. See what your child likes helping with the most, from grocery shopping to meal planning to preparing the vegetables themselves. Eat together. Just eating together as a family can encourage your children to eat healthier. This has been shown to be one of the best ways to make sure your children are getting their recommended intake of vegetables1. Make vegetables fun. Giving fun names to vegetables will make them seem more fun and attractive to younger kids. It's also a great way to teach them about the benefits of vegetables by linking each food's name with how they make you healthier, like "X-ray Carrots" or "Power Punch Broccoli5." Don't be afraid of trial and error. There are some vegetables your kids might not like, and that's okay! Expose your child to a vegetable at least 10 times. If your children still don't like the taste of a certain vegetable, move forward by exploring new options and replacing the unwanted vegetable with one of their favorites4.

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Not interested at all — Very interested

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What is the difference between discipline and punishment?

Discipline is a positive method of teaching a child self-control, confidence, and responsibility. The key to positive discipline is teaching a child what behavior is okay and what behavior is not okay. The focus is on what children are expected and allowed to do. It includes catching kids being good and encouraging appropriate behavior. It also includes modeling appropriate behavior. Punishment is quite different from discipline. Punishment may be physical as in spanking, hitting, or causing pain. It may be psychological as in disapproval, isolation, or shaming. Punishment focuses on past misbehavior and offers little or nothing to help a child behave better in the future. When punishment is used, the person who punishes the child becomes responsible for the child's behavior. Children who are raised in a way that stresses positive discipline will understand their own behavior better, show independence, and respect themselves and others. Positive discipline is a process, not a single act. It teaches children how to get along with other people. Children are held responsible for misbehavior, but the consequences are meaningful and related to the behavior.

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School Gardens Engage Students: Traverse Heights Elementary School

The Traverse Heights Elementary School garden program in Traverse City, Michigan teaches students about the importance of healthy food and healthy eating. Partnerships with FoodCorps and Michigan State University (MSU) Extension make their garden-to-table program a success. The partnership staff work with students in all grades to engage and team them about growing food. Traverse Heights Elementary School has been conducting their gardening program for the past five years and through it they are not only able to teach children about nutrition, agriculture, and food systems, but also math, science, and language arts. Along with the gardening program, the partnerships also like to do taste tests with healthy items such as smoothies. The Policy Specialist at Groundwork Center, Megan McDermott, says that if children plant, care for, and grow their own fruit and vegetables, they are much more likely to eat those fruits and vegetables over students who don't grow their own.

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Not interested at all — Very interested

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Best Management Practices for Reducing Gas Emissions from Manure Application in Semi-Arid Regions

*Abstract
Gas emissions from animal feeding operations (AFOs) create adverse impacts ranging from short-term local effects on air quality, particularly odor, to the long-term effects from greenhouse gas generation. Best management practices (BMPs) have been designed and implemented to mitigate gas emissions from farm operations. Our study investigates emission control strategies widely used in AFOs including manure management and land application. The primary objectives were to evaluate the efficiency and identify improvement of the currently available BMPs. We simulated and monitored gaseous emissions from a range of manure application and incorporation methods. The gaseous emissions were monitored using the closed dynamic chamber (CDC) method with a Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer, which is capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. In this presentation, we will discuss the efficiency of the current manure management BMPs to reduce air emissions from dairy operations, based on the gaseous emission monitoring during the course of our experiment. Results from our study should enhance development and implementation of more flexible and more efficient air quality management approaches for dairy operations.
Why Study Gas Emissions from Manure Application Sites?
Evaluate gaseous emissions from manure application. Identify ways to improve manure management and land application BMPs.
What Did We Do?
Manure application and incorporation methods were simulated and evaluated in a greenhouse setting. Scraped dairy manure was applied at a rate of 50 tons/acre to a Millville silt loam soil. Incorporation versus no incorporation was compared. Gaseous emissions were monitored using a closed dynamic chamber with a Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer, which is capable of monitoring 15-pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. On Day 3, after emissions had subsided, the soil surface was rewetted. Emissions were monitored for 7 days.
What Have We Learned?
Emission rates for CO2 and NH3 peaked after 24 hours, with the majority of emissions occurring within the first 2 days. Rewetting had limited impact. Based on this data, it appears that rapid incorporation is needed to have a meaningful impact on reducing gaseous emissions.
Future Plans
Examine gaseous emissions from a range of manure application and incorporation methods in a field setting. The gaseous emissions will be monitored using the closed dynamic chamber method with a Fourier Transformed Infrared (FTiR) spectroscopy gas analyzer.

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Blood Pumping Mechanism of the Hoof

Blood is pumped from the heart through arteries to the hoof and is assisted in its return through a "pumping mechanism" in the hoof. This mechanism is necessary due to the position of the hoof in relation to the heart. There are no muscles in the lower leg or hoof to aid in the return of venous blood to the heart. Thus, the hoof has to pump venous blood back to the heart. An extensive network of veins called a venous plexus are located on both sides of each of the lateral cartilages and in the sensitive structures of the hoof. The compression of these veins by the plantar cushion against the lateral cartilages or the coffin bone against the hoof acts as a "pump" to force the blood up the leg and back to the heart. Blood is prevented from returning to the hoof by one-way valves in the veins of the leg. Compression of the plexuses also acts as a valve to contain blood in the vessels of the hoof below the plexuses. This produces a "hydraulic cushion" that further dissipates concussion and protects the fragile coffin bone. This valve action also creates a fluid pressure that, when the hoof is raised and the compressed veins are open, causes the blood to exit up the leg and the plexuses to fill. Each time the foot bears weight, the veins are compressed. Each time the foot is raised, the veins open, and blood is pushed in by the arterial pulse and gravity. The weight of the horse forces the blood back up the leg, which is commonly referred to as the second heart. How the coffin bone aids in pumping blood back up the horse's leg is integral for proper circulation in the horse.

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Drying and Rewetting Effects on Gas Emissions from Dairy Manure in Semi-arid Regions

Abstract
The major source of emissions in animal production sites is from animal waste (manure), which can be in solid, slurry, or liquid states, exhibiting varying physical properties. Once manure is excreted from an animal, processes of biological decomposition and formation of gaseous compounds continue, but diminish as the manure cools and dries. However, increases in gas emissions following rewetting, particularly from precipitation, have been observed in various agricultural lands. Our study investigates changes of gaseous emissions through manure drying and rewetting processes to identify the effects of climatic conditions and manure management on gaseous emissions. We carried out drying and rewetting processes of dairy manure in a greenhouse to maintain moderate wintertime temperatures (20 - 40 C) while monitoring gaseous emissions through these processes. Closed dynamic chambers (CDC) coupled with a multiplexed Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer provided gas flux estimates. The analyzer was capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. Magnitude of dairy manure gas emissions resulting from variations in moisture and temperature provide insight toward enhancing manure management decisions. Results from our study should further understanding of manure gas emission temporal dynamics that are largely dictated by heat and by drying and rewetting processes that impact the generation and delivery of gasses to the atmosphere. Our overall goal is to advance development of appropriate best management practices to reduce gas emissions for dairy operations in semi-arid regions.

Purpose
The objective of this project is to identify the effects of climatic conditions and manure management on gaseous emissions. The results from our study will be used to advance development of appropriate best management practices to reduce gas emissions for dairy operations in semi-arid regions.

What Did We Do?
We investigated changes in gaseous emissions by carrying out drying and rewetting processes of dairy manure in a greenhouse to maintain moderate summertime temperatures (20 - 40 oC) while monitoring gaseous emissions. Closed dynamic chambers (CDC) coupled with a multiplexed Fourier Transformed Infrared (FTIR) spectroscopy gas analyzer provided gas flux estimates. The analyzer was capable of monitoring 15 pre-programmed gases simultaneously including typical gaseous compounds and greenhouse gases emitted from manure sources; namely, ammonia, carbon dioxide, methane, nitrous oxide, oxides of nitrogen, and volatile organic compounds. Gas emissions from two dairy manure samples were monitored to compare the magnitude of gas fluxes during 14 days of manure drying and rewetting processes.

What Have We Learned?
An increase in surface water content occurring after a rewetting event (e.g., simulated 5 mm of rain) represents an abrupt increase in manure moisture content, which can promote microbial activity and a commensurate increase in gas emissions from manure. In our study, we found gas fluxes were actually suppressed during and shortly after the rewetting process, mainly due to reduction in air-filled pore space causing reduced gas diffusivity in the manure crust layer. As the wet layer dried, gas emissions eventually increased to levels prior to wetting.

Future Plans
Future experiments include: (1) simulation of manure drying-rewetting with various amount of water and rewetting times, (2) considering the immediate response time and effective period of the pulse response of the gas fluxes after rewetting which might have been missed in our study, (3) Further investigation of the effect of the crust layer on water and gas transport from and into manure.

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Physical Development in Child Care

Physical development is an important area of child development that includes children's physical growth, as well as their increasing ability to control the muscles of their bodies. Children's physical development follows a predictable pattern, but each child grows at his or her own rate. Active play helps children develop their motor skills. Child care programs can support children's physical development by providing safe surroundings, good nutrition and plenty of time for active play and exploration.

Which categories do you think the above article belongs to?

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The Name Game: Sending the Right Message

Why do restaurants use appealing descriptive adjectives like “succulent” or “fresh” on their menus? Because it makes dishes sound more appealing and can even make us enjoy our meal more! This very same low- cost technique can also be used to make healthy foods in school meals more appealing to students. In this webinar, David Just, PhD, Behavioral Economist and Co-Director of the Cornell Center for Behavioral Economics in Child Nutrition Programs (BEN Center) and Smarter Lunchrooms Movement, shares the psychology behind why increasing appeal increases selection and consumption of healthy foods. He also shares some practical advice and best practices based on real-world challenges and successes.

Learning Objectives

Understanding of the psychology and evidence behind renaming and increasing the appeal of healthy dishes to increase selection and consumption Best practices for making healthy foods more appealing in the lunchroom

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Ways to Encourage Self-Help Skills in Children

Children have a drive to be independent and do things on their own. This is a healthy part of normal child development. As children grow, they learn to do more and more tasks. Child care providers can help young children become independent by allowing and encouraging them to take responsibility for themselves whenever possible. It can be faster and less messy to do things for children, but they learn so much from doing things for themselves. When children practice self-help skills such as feeding and dressing themselves, they practice their large and small motor skills, gain confidence in their ability to try new things and build their self-esteem and pride in their independence. There are four main types of self-help skills: Self-feeding. The best way to build independent feeding skills is to learn the normal developmental stages of self-feeding. Encourage children to practice feeding themselves from infancy on. Begin by offering older infants finger foods. Introduce a spoon and fork and give children plenty of time to practice. Let children be as independent as possible during mealtimes. Give them the tools they need to be successful. Consider bowls that attach to the table, child-sized utensils and small cups with handles and spouts (such as measuring cups) for pouring. Encourage children to try for themselves but provide help and encouragement when needed so they don't get frustrated. Independent dressing and grooming. Encourage children to dress and groom by themselves; just provide minimal assistance. Begin with older infants and toddlers by encouraging them to help pull socks on and off, pull up pants after diapering and help put their arms through sleeves. As children get older, encourage them to dress themselves but help with challenging steps such as zipping and buttoning. Hygiene and toileting . Look for signs of readiness for toileting. Encourage children learning to use the toilet to climb on and off the toilet seat, pull clothing up and down, and wash their hands independently. Also teach children how to brush their teeth after lunch and snacks. Be ready to provide support and help if they need it. You can find more suggestions at Keeping Children's Teeth Clean in Child Care and Hand Washing in Child Care. Encouraging children to take care of everyday hygiene routines and to use the toilet independently helps them learn how to become more independent and self-sufficient, and frees up your time to help children with other activities. Helping with daily chores like table setting and picking up toys. Encourage children to help with clean-up early on. Give toddlers responsibility for placing napkins or utensils on the table. Encourage children to begin clearing their own plates when they are old enough to carry them without dropping them. When children are involved in regular chores starting before the age of 4, they tend to be more independent in early adulthood than children without the experience of helping out. Self-help skills are worth the time and effort in a child care program. The secret to success is to give children age-appropriate experiences and provide the appropriate supports to help children be successful. Child care providers can offer opportunities for children to develop self-help skills and give them ample time to work on these important tasks. Remember that adults are important role models. We model self-help skills; children learn a great deal from watching us.

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What is the difference between power and authority in an organization?

Power and authority are separate but related concepts. A manager in an organization has authority if he or she has the right to direct the activities of others and expect them to respond with appropriate actions to attain organizational purposes. Authority most often comes from the duties and responsibilities delegated to a position holder in a bureaucratic structure. A company president can order a product design change, for instance, or a police officer has the authority to arrest an offender of the law. Power is the possession of authority, control, or influence by which a person influences the actions of others, either by direct authority or by some other, more intangible means. A prime source of power is the possession of knowledge. A person with knowledge is oftentimes able to use that knowledge to directly or indirectly influence the actions of others. The authority of knowledge is often independent of levels or positions. Power can reinforce authority, and authority is one of the primary sources of power.

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Not interested at all — Very interested

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What is a "process observer"?

A "process observer" is a position that some boards and committees choose to appoint. This individual's responsibility is exactly what the title suggests – to observe the process. Throughout the meeting, the process observer takes note of things that are handled well and those when the process did not work as well. In normal circumstances, the process observer has a few minutes at the end of the meeting to summarize the behavior of the group so that the group can learn and, if needed, improve its functioning. This is not a summary of the meeting itself, only the process. Some examples of what might be shared are: How well discussion flowed and the extent to which all participants were engaged and contributing. Any conflicts that were left unaddressed. Any side conversations or other distractions. The emotional tone of the meeting: Was it tense, supportive, etc.? Was the agenda followed? Were participants well prepared? Were comments appropriate and thoughtful? When summarizing the meeting process to the group, it can be useful for the comments to be appropriate for the general dynamics of the meeting, meeting design and management, and/or the group's developmental stage rather than targeting any one individual or group of individuals. The process observer should be selected at the beginning of the meeting, although it should not fall to the facilitator or the recorder (minute taker). It is a position that should be rotated among group members with a different observer at each meeting. The goal of having a process observer is to help keep the group's meetings functioning well and encourage group members to share responsibility for the tone and productivity of the meeting. It may be helpful for the group to have a handout or checklist for the process observer to use, particularly if this role is new to some group members. A sample template is available at New Directions Consulting.

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Cataloging and Evaluating Dairy Manure Treatment Technologies

Purpose

To provide a forum for the introduction and evaluation of technologies that can treat dairy manure to the dairy farming community and the vendors that provide these technologies.

What Did We Do?

Newtrient has developed an on-line catalog of technologies that includes information on over 150 technologies and the companies that produce them as well as the Newtrient 9-Point scoring system and specific comments on each technology by the Newtrient Technology Advancement Team.

What Have We Learned?

Our interaction with both dairy farmers and technology vendors has taught us that there is a need for accurate information on the technologies that exist, where they are used, where are they effective and how they can help the modern dairy farm address serious issues in an economical and environmentally sustainable way.

Future Plans

Future plans include expansion of the catalog to include the impact of the technology types on key environmental areas and expansion to make the application of the technologies on-farm easier to conceptualize.

Corresponding author name, title, affiliation

Mark Stoermann & Newtrient Technology Advancement Team

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What does vegetation index mean in remote sensing technology?

A vegetation index (also called a vegetative index) is a single number that quantifies vegetation biomass and/or plant vigor for each pixel in a remote sensing image. The index is computed using several spectral bands that are sensitive to plant biomass and vigor. The most common vegetation index is the normalized difference vegetation index (NDVI). NDVI compares the reflectance values of the red and near-infrared regions of the electromagnetic spectrum using the following formula: NDVI=NIR-RED/NIR+RED NIR is the pixel's reflectence value in the near-infrared band RED is the pixel's reflectence value in the red band The NDVI value, which ranges from -1.0 to 1.0 for each pixel in an image, helps identify areas of varying levels of plant biomass/vigor. Higher values indicate high biomass/high vigor.

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Nutrient Recovery Membrane Technology: Pilot-Scale Evaluation

Purpose

Animal manure contains nutrients and organic matter that are valuable to crop production. Applying manure to nearby fields can be a significant source of environmental contamination, however, if managed incorrectly. In many cases, concentrated animal production facilities are not close enough to sufficient cropland to fully utilize these resources and management of manure becomes more of a disposal issue rather than a utilization opportunity. One potential solution is to remove and concentrate manure nutrients so they can be cost effectively transported longer distances to cropland that is lacking in nutrients. The objective of this work was to design and test a pilot-scale system to implement a hydrophobic, gas-permeable, ePTFE (a synthetic fluoropolymer) membrane (U.S. patent held by USDA) to recover ammonia from swine wastewater in a solution of sulfuric acid. The pilot-scale system was designed to replicate the laboratory results and to determine critical operational controls that will assist in design of farm-scale systems.

What did we do?

Through a series of preliminary experiments, we established operational criteria and selected a membrane with an inside diameter of 0.16 in., wall thickness of 0.023 in., and a density of 0.016 lb in-3. A test system was developed with 19 membrane tubes within a 2.01-inch diameter, 24.7-inch-long reactor, giving a membrane density of 3.83 sq. in. per cubic inch of reactor volume. Wastewater first passed through a CO2 stripping column (4.016 in. diameter, 55 in. length) where a small air stream (0.0614 cfm) stripped CO2 from the wastewater and raised the pH one full unit, shifting the equilibrium to NH3 and enhancing transport across the membrane. Batch tests (0.706 ft3) were run for 9-12 days with wastewater recirculating at a rate of 0.16 gpm. The recovery fluid inside the tubular membranes was a 0.01 N sulfuric acid solution with the pH automatically maintained below 4.0 standard units and recirculating at a rate of 1/100th the wastewater flow rate. Freshly collected settled wastewater and anaerobic digester effluent were tested to determine the mass of ammonia collected, the acid required to maintain the low pH of the recovery solution, and potential ammonia losses to the atmosphere.

What have we learned?

The freshly collected wastewater had an initial mass of 35.6 g nitrogen but the NH3 was only 14.5 g, leading to a recovery of 11.8 g (33% of initial content) over 12 days. The anaerobic digester effluent had an initial mass of 33.2 g nitrogen with an NH3 mass of 31.3 g. The higher fraction of ammonia helped push the recovery to 25.7 g or 77% of the initial nitrogen content. Very little ammonia was lost with the exhaust air.

Future Plans

An optimized membrane reactor could be a viable tool in ammonia nitrogen recovery from a manure treatment system if used in conjunction with digestion. Higher economic value could be generated by further concentrating the ammonium sulfate product.

Corresponding author, title, and affiliation

John J. Classen, Associate Professor, Biological & Agricultural Engineering, NCSU

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What is technology?

Technology is a broad concept that refers to use and knowledge of tools and crafts, and how these tools and crafts affect our ability to control and adapt to the environment. In human society today, technology is a result of science and engineering. A specific definition for the word "technology" is difficult to determine, because "technology" can refer to material objects of use to humanity, such as machines, hardware or utensils, but can also encompass broader themes, including systems, methods of organization, and techniques. The term can also either be applied generally or to specific areas: examples include "construction technology", "medical technology", or "state-of-the-art technology".

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Treatment Technologies for Livestock and Poultry Manure

Historically animal manures have been handled as a solid and were either deposited directly to pasture by the animals or collected along with the bedding used in the animal shelter and applied to land as a crop nutrient. As the number of animals on farms has increased the need for more efficient methods of manure management has also developed. The emphasis of the resources on these web pages are to provide an overview of manure treatment technologies, research being done in this field, and highlight the considerations involved in selecting candidates for a particular farm.

Why Treat Manure?

Manure from animals is a very wet, bulky material, containing as much as 90% water. Of the 10% that is dry matter, much of it is carbon. The manure handling system can impact the characteristics of the animal waste stream. Water-based waste management systems may have a liquid stream with greater than 98% moisture while manure scraped from open lots can contain a very high percentage of soil. As a result, the plant nutrient content of the manure is a very small portion of the weight/volume. Hauling nutrients to cropland in the form of manure can get very expensive compared to hauling the same amount of nitrogen or phosphorus in the form of commercial fertilizer. Swine production facility with anaerobic lagoon, adjacent cropland is used for waste utilization. Correcting the imbalance in manure nutrient distribution will involve finding ways to economically move excess nutrients off the livestock or poultry farm. Many alternatives to land application of raw manure are being examined. Many of these "manure treatment technologies" have been used in one form or another for many years, while others are recent solutions. Often, technologies are used in combination to create a system that can be tailored to the species, management of the farm, climate, or other factors. Technology that may be very successful on one farm may not be appropriate for another.

Manure Treatment Technology is Not "One Size Fits All"

Treatment technologies are generally selected to meet specific treatment goals on the farm. These treatment goals include nutrient reduction (primarily nitrogen and phosphorus), odor reduction, volume reduction, energy recovery, and adding value to the manure. Manure treatment technologies are often linked together to address several challenges faced by animal producers such as excessive nutrient on farm, manure runoff and odor. There may be additional benefits to manure treatment technologies beyond the primary treatment goals such as the reduction of emissions of particulate matter or greenhouse gases.

Manure Treatment Goals and Potential Treatment Technologies

Nitrogen Reduction Phosphorus Reduction Odor Reduction Energy Recovery Adding Value to Manure Aerobic Treatment Vegetative Treatment Systems Manure Additives Vegetative Treatment Systems Solids Separation Manure Additives Aerobic Treatment Covers Anaerobic Digestion Anaerobic Digestion Thermal Technologies (Gasification, Combustion, Pyrolysis) Agronomic & Environmental Uses of Biochar (Part 1 | Part 2) Composting Vermicomposting

Recommended Reading About Manure Treatment Technologies

Livestock and Poultry Environmental Stewardship (LPES) Curriculum Lesson 25: Manure Treatment Options Heartland Regional Water Quality Initiative Alternative Technologies resources. The Heartland Region (EPA Region 7) consists of Iowa, Kansas, Missouri and Nebraska. This website includes many resources from this region as well as others from across the nation. Development of Environmentally Superior Technologies (Smithfield Agreement)

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What is mobile GIS?

Mobile GIS is taking Geographic Information Systems (GIS) out of the office and into the field. A mobile GIS allows folks out in the field to capture, store, update, manipulate, analyze, and display geospatial data and information. Mobile GIS integrates one or more of the following technologies: * mobile devices (such as a PDA, tablet, or laptop computer, and in some countries mobile phones) * Geographic Information System (GIS) software * the Global Positioning System (GPS) * wireless communications for Internet-based GIS access. For most applications, it is an extension of desktop GIS, although increasingly users are taking mobile GIS data and uploading it directly to powerful visualization tools online such as Google Earth. Mobile GIS can allow for edits and changes to be made in the field, increasing accuracy and saving time. Many mobile GIS systems are relatively inexpensive.

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Manure Management Technology Selection Guidance

Purpose

Manure is an inevitable by-product of livestock production. Traditionally, manure has been land applied for the nutrient value in crop production and improved soil quality.With livestock operations getting larger and, in many cases, concentrating in certain areas of the country, it is becoming more difficult to balance manure applications to plant uptake needs. In many places, this imbalance has led to over-application of nutrients with increased potential for surface water, ground water and air quality impairments. No two livestock operations are identical and manure management technologies are generally quite expensive, so it is important to choose the right technology for a specific livestock operation. Information is provided to assist planners and landowners in selecting the right technology to appropriately address the associated manure management concerns.

What did we do?

As with developing a good conservation plan, knowledge of manure management technologies can help landowners and operators best address resource concerns related to animal manure management. There are so many things to consider when looking at selecting various manure treatment technologies to make sure that it will function properly within an operation. From a technology standpoint, users must understand the different applications related to physical, chemical, and biological unit processes which can greatly assist an operator in choosing the most appropriate technology. By having a good understanding of the advantages and disadvantages of these technologies, better decisions can be made to address the manure-related resource concerns and help landowners: • Install conservation practices to address and avoid soil erosion, water and air quality issues. • In the use of innovative technologies that will reduce excess manure volume and nutrients and provide value-added products. • In the use of cover crops and rotational cropping systems to uptake nutrients at a rate more closely related to those from applied animal manures. • In the use of local manure to provide nutrients for locally grown crops and, when possible, discourage the importation of externally produced feed products. • When excess manure can no longer be applied to local land, to select options that make feasible the transport of manure nutrients to regions where nutrients are needed. • Better understand the benefits and limitations of the various manure management technologies. Complete-Mix Anaerobic Digester - option to reduce odors and pathogens; potential energy production Gasification (pyrolysis) system - for reduced odors; pathogen destruction; volume reduction; potential energy production. Windrow composting - reduce pathogens; volume reduction Centrifuge separation system - multiple material streams; potential nutrient partitioning.

What have we learned?

• There are several options for addressing manure distribution and application management issues. There is no silver bullet. • Each livestock operation will need to be evaluated separately, because there is no single alternative which will address all manure management issues and concerns. • Option selections are dependent on a number of factors such as: landowner objectives, manure consistency, land availability, nutrient loads, and available markets. • Several alternatives may need to be combined to meet the desired outcome. • Soil erosion, water and air quality concerns also need to be addressed when dealing with manure management issues. • Most options require significant financial investment.

Future Plans

Work with technology providers and others to further evaluate technologies and update information as necessary. Incorporate findings into NRCS handbooks and fact sheets for use by staff and landowners in selecting the best technology for particular livestock operations.

Corresponding author, title, and affiliation

Jeffrey P. Porter, P.E.; National Animal Manure and Nutrient Management Team Leader USDA-Natural Resources Conservation Service

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Assistive Technology Resources

Military Specific

Limb loss – An article in the Journal of Rehabilitation Research & Development provides examples of the resources available to service members including what each organization provides along with contact information. Computer/Electronic Accommodations Program (CAP) – Provides assistive technology and accommodations to individuals with disabilities and wounded service members so they can be employed in the federal government. Brainline Military – Provides military-specific information and assistive technology resources on traumatic brain injury (TBI) for service members. National Resource Directory – Provides a searchable database of government, national, and state assistive technologies and devices. In the box labeled "search for resources," type in assistive technology or the name of a specific technology, device, or disability, and a list of possible resources will be generated. Military In-Step – Detailed information for service members who have a military amputation on the unique characteristics of war injuries requiring an amputation, what to expect during surgery and rehabilitation, care after surgery, and the prosthesis.

National/State Specific

AbleData – A searchable database of over 40,000 assistive technology products including objective descriptions plus educational fact sheets on assistive technologies and products by state. Alliance for Technology Access (http://www.ataccess.org/) – A national and international network of technology resource centers, community-based organizations, agencies, individuals, and companies with a mission of increasing the use of technology by children and adults with disabilities and functional limitations so they can participate fully in their communities. Assistive Technology Industry Association (ATIA) – A professional organization of agencies that provide assistive technologies. It provides links to resources and partners that can provide specific information on different types of technology or devices. Brain Injury Association of America – A national organization that promotes awareness, education, treatment, research, and advocacy for individuals and their families who have some type of brain injury. DisabilityInfo.gov – A government website that links to federal, state, and local government agencies; academic institutions; and nonprofit organizations with disability programs and services in communities nationwide. National AgrAbility Project – Provides direct support to farmers and ranchers with disabilities or long-term health conditions that make it difficult to work in production agriculture. The project also has a searchable database of assistive technology solution for producers with disabilities. Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) – A professional organization dedicated to promoting the health and well-being of people with disabilities through increasing access to technology solutions. The organization provides a listing of state contacts at http://www.findatnow.org. Technology for Long-Term Care – A helpful site to explore and compare various adaptive products. It was designed for older adults but has helpful information regardless of the individual's age.

Educational

LiveAbility House – A demonstration home in the Second Life® environment that shows individuals with disabilities how different design principles and assistive technology devices can enable them to live independently in their own homes. eXtension – A website with many educational resources designed for family caregivers; provides a link to a military-specific caregiver page. Assistive Technology and You – An article that provides a brief discussion of what assistive technologies are, where to find them, and how to pay for them. Assistive Technology fact sheet by the Family Caregiver Alliance – Written for older adults but provides ideas on low cost assistive devices that can be helpful for everyday tasks.

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Introduction to School IPM

Providing safe and healthy school environments is a high-priority for communities everywhere. Schools are considered to be sensitive environments, in which effective pest management is an essential and critically important responsibility. Students spend a major part of their day at school and the environmental standards set, have profound impacts on their health and academic success. As with any high-traffic, built environment, schools face pest and pest management challenges that impact their proper functioning. Integrated Pest Management or IPM is a strategy that ensures safe, cost-effective and sustainable pest management, reducing risks associated with pests and their management. Everyone in a school community plays a role in IPM because common human habits may create pest-conducive conditions. This IPM introductory module explains the most important simple IPM concepts and helps to increase awareness of how our everyday choices affect pest populations around us. This module will help learners to gain a basic understanding of IPM principles, which will be essential as they progress to more role-specific modules. On successful completion of this course, you will be eligible for a Certificate of Completion. This 90-minute module covers: IPM as a concept, the key elements of IPM and how IPM reduces risk. Learners will also understand the benefits of practicing IPM and how members of the school community all have IPM roles and responsibilities. Learners will understand how to perform the basic steps in an IPM program, such as pest monitoring, inspection, reporting, identifying conducive conditions and avenues of pest entry. Key pest groups and the signs of infestation will also be covered in this lesson. Presentations to Help You Teach Is this a topic that you would like to teach in a classroom setting? These presentations provide talking points in the slide notes and keep the slides concise. You can customize the PowerPoint versions to fit your needs.

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Tips for Teens: How to Contribute to Family Needs During Tough Times

If your family is going through tough times financially, consider ways you can contribute. Asking your parent(s) to talk with you the family budget and being willing to take some action to help is the first step to gaining respect and to demonstrate responsibility as a family member.

Cost? savings things that you can do to help with family expenditures are: • Turn off lights, televisions, or other electronics when not in use. • Take shorter showers to cut down on water and electric bills. • Don't stand with the refrigerator door open while deciding what to eat. • Investigate cost of cable/phone/computer usage and newspaper delivery. Help figure out your family's real needs versus wants for these services, then talk about ways to meet them. For example, could you use the public library online services for homework? Do you need a daily newspaper deliverd to the house? • Hang up your clothes after wearing so they wear longer and need less frequent washing and care. • Volunteer to help with family chores in lieu of paying for services like cleaning, lawn care, take?out food, or childcare. If you have a job, you might offer or be expected to help cover some of your expenses, especially for "wants." This could include a new pair of shoes or a night at the movies with friends.

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Cooking with Kids: Opportunities for Partnerships

From learning lifelong skills to improving diet to fostering a sense of responsibility and accomplishment, the benefits of cooking with children are well-established. While parents are encouraged to find ways to involve their children in meal preparation at home, many schools are incorporating cooking activities into their health, science and math curricula as a way to promote healthy eating. There are several resources available to schools interested in incorporating cooking into school days or afterschool programming. Cooperative Extension and Cooking Matters may be great places to start. Cooking Matters is a Share Our Strength program founded in 1993 and is part of the No Kid Hungry campaign, which is working to end childhood hunger in America. Through cooking classes and interactive grocery store tours, Cooking Matters partners teach families how to make the most of the food budget so that families prepare affordable, nutritious meals. Cooking Matters uses a collaborative model designed to enhance the effectiveness and sustainability of the cooking classes. Educational materials, training, evaluation, and national leadership are provided by Share Our Strength. Local partners, such as Cooperative Extension, deliver the program to meet the needs of their communities. Cooking Matters partners may already exist in your area! Cooperative Extension agencies in many states across the nation have thriving partnerships with Cooking Matters. Likewise, Cooperative Extension is an excellent resource and is well positioned to help bridge the gap between home and school and increase the impact of nutrition education by providing the same messages to children at school as is given to the parents and adults. Cooperative Extension educators may be able to come directly to classrooms and/or afterschool programs to provide nutrition lessons, food demonstrations, cooking opportunities, and tasting experiences. Cooperative Extension programs like SNAP-Education, Expanded Food Nutrition Education, and 4-H use research-based curricula for different age groups and grade levels. The lessons are interactive, connected to many of the common core and state standards, and fun!

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How should child care providers handle toileting accidents in young children?

In general, toileting accidents in the child care setting should be handled casually. Children who have learned to use the toilet may feel embarrassed if they wet their pants. Shaming or scolding the child will only make him more uncomfortable. Here are some quick tips for handling toileting accidents in the child care setting: Help the child change clothes. If the child is old enough to dress himself independently, have him take responsibility for changing his own clothes. Seal the soiled clothes in a plastic bag, and send them home with parents to wash. Remind the child that he is not wearing a diaper and needs to use the toilet. Encourage the child to tell you when he needs to go. Toilet learning is challenging for young children because it requires both the motor skills to control the bladder and bowels and the cognitive skills to understand and act on the urge to go. Help the child avoid accidents by reminding him to use the toilet every few hours. Many young children just learning to use the toilet may not recognize the need to go until it's too late. If a child who was once using the toilet regularly begins having frequent accidents, talk with the parents to find out if something unusual is happening in the child's life. Loss of bowel and bladder control is sometimes a sign of stress in young children. Work with the parents to find ways to help the child cope with the stress.

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Benefits of Growing Your Own Fruits and Vegetables

Benefits for you and your family:

Fresh and nutritious fruits and vegetables. Fruits and vegetables from your own garden are higher in nutrients than the ones that have traveled several thousands miles to get to your grocery store. Having your children assist you in the garden can increase the chance that they will eat more of the fruits and vegetables they have helped to grow. Growing your own fruits and vegetables can offer you the opportunity to reduce the amount of pesticides that you use in your garden, making them healthier. Growing your own fruits and vegetables will save your money at the grocery store. Gardening increases physical activity. It is a great way to engage the whole family in physical activity and lets them help to take responsibility for the garden. The fruits and vegetables grown in your garden will promote health because they are rich in nutrients, especially in phytochemicals, anti-oxidants, vitamin C, vitamin A and folate. Gardening gives you're a real sense of appreciation when you can see the bounty of your efforts. Growing a garden gives you a new appreciation for nature, when you can have the opportunity to see how things grow. Gardening may stimulate many new interests. You may want to learn more about botany, landscape architecture, photography, nutrition, and farmer's markets. Gardening gives you the opportunity to give back. If you have an abundant garden, you might give some of your produce to the local soup kitchen or food bank. This can be a great time to create memories with your children, memories that can last a lifetime. Your garden can lead to new skills, and knowledge for you and your family, your child may have a new found interest to become a chef!

Society and Community

Gardens can foster a great sense of community through parent to parent connections, teacher to student or student to student. Schools and community may decide to build a community or school garden. This is a tremendous learning tool for all involved as well a providing a source of nutritious fruits and vegetables. A community/school garden can help to foster and motivate future leaders (e.g., 4-H afterschool programs). Neighborhood Community Gardens beautify landscape, support local farmers, can create a food secure community where residents do not need to rely on vendors to supply fresh produce.

Environment

Tall fruit trees provide shade. You can use less pesticides or use natural pesticides and this will be less contamination to the environment. Produce peels and waste can create a lot of green waste and takes up a lot of space in the garbage can. Recycle them to make your own compost. It is less expensive than buying fertilizers. Turn unsightly lands into attractive landscapes. Get creative. There is a potential to grow an innovative gardens like futuristic horticulture gardens that are very cost-effective and require substantially less space. Start exploring today!!!

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Why is confidentiality so important in child care programs?

Child care programs routinely handle confidential information about enrolled children, families, and staff. Child care programs maintain confidentiality on a "need to know" basis. This information is shared only when it is necessary. This is important especially when there are specific health and safety concerns. Maintaining confidentiality also builds trust in child care programs. Fostering relationships with staff, children, and families is built on trust. When managing sensitive information, there is an ethical and legal responsibility to protect the privacy of individuals and families.

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Consumer Preferences for Car Loan Features

Brief Description: This work studied consumer preferences for car loan features. The results revealed preferences that conflicted with traditional financial rationality. For example, participants avoided choosing long term (six- or seven-year) loans even when the interest rate was zero. In addition, the consumers, particularly those with less education, appeared to focus predominately on the first digit of monthly payments. A $395 car payment, for example, would be viewed as much better than a $400 payment, but a $390 payment would not be viewed as much better than a $395 payment.

Implications: Policies, programs and personal efforts to increase financial education are warranted, and consumers should be encouraged to compare interest rates on their sources and uses of funds. Some irrational preferences, however, may reflect psychological phenomena that are impervious to education. Availability of alternative means of self-control is important to the extent that aversion to long-term loans is a method of restraining personal spending.

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Caring for Those with Severe Burns

Did you know that, according to Journal of Critical Care Medicine, burn injuries account for 5 percent to 10 percent of combat casualties? During military operations, burn injuries are usually caused by explosive device detonations or refueling operations. Such burn injuries can be accompanied by severe complications, including shock, infection, electrolyte imbalance, and respiratory distress. As a caregiver to a wounded warrior, you need to understand the recovery process and steps to take in the immediate aftermath of military burn injuries.

The recovery process

During the recovery process, a team of burn professionals, consisting of plastic surgeons, burn team nurses, counselors, social workers, and psychologists, helps your wounded warrior, you, and other family members. According to British Medical Journal, the recovery of burn patients is a continual process that comprises three stages—the resuscitative or critical stage, the acute stage, and long-term rehabilitation. Resuscitative or critical stage In this beginning stage of recovery, physical survival is the primary goal. Your wounded warrior may experience challenges, such as sleep disturbance, confusion, disorientation, and pain. Treatment may involve pain medication, suggestions for coping strategies, education, and support services. Acute stage Your wounded warrior may become more aware and alert and have greater awareness of his or her physical appearance and the psychological impact of the injuries. During this stage, symptoms of depression and anxiety may take effect. Options for treatment may include drug management (for example, depression and sleep medications), counseling, and relaxation techniques. Long-term rehabilitation: Reintegration is key during long-term rehabilitation. This stage begins when your wounded warrior is discharged from the hospital. He or she may experience the hassles and reality of daily activities, changes in body image, and the constant role of rehabilitation in his or her life. Treatment may consist of social skills training, peer counseling, vocational counseling, and support group participation. T

ypes of burns

Burns are categorized by degree of severity. First degree This type of burn is rarely serious and may heal by itself within days. These burns usually occur as a result of exposure to sun (sunburn) or hot liquids. Second degree Second degree burns require longer periods to heal and may result in permanent scarring. They can result from exposure to hot or scalding fluids or from flash or flame injuries. Third degree This type of burn may require skin grafting, a surgical procedure in which a partial segment of noninjured skin from the patient's body (referred to as the "donor site") is grafted to the burn area. Fourth degree Fourth degree burns can affect all layers of the skin as well as structures below the skin. They may result in permanent disability and require extensive rehabilitation.

Strategies for helping and coping

It's important to learn how to help your wounded warrior and yourself respond to your situation. Always check with your wounded warrior's doctors to learn about individualized treatment plans. Learn how to minimize and prevent negative effects of prolonged bed rest, including debilitation and loss of muscle tone, strength, and condition. Learn how to help your wounded warrior adapt to the environment and/or to equipment for enhanced independence. Anticipate the need to apply skin lotion to prevent your wounded warrior from becoming too dry. Control and prevent the formation of scars by applying pressure garments (garments worn after a burn to control scarring). Maximize wounded warrior and family education. Join a support group for caregivers who are experiencing similar wounded warrior situations. Locate such groups by contacting your local Army installation's Soldier and Family Assistance Center (SFAC).

Which categories do you think the above article belongs to?

☐ Art ☐ Biology ☐ Chemistry ☐ Education ☐ Geography ☐ History

☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Production Agriculture and Stress

Farming and ranching can be stressful occupations, and that stress can have a multifaceted effect on a person. There are numerous uncontrollable factors, such as unpredictable weather, untimely equipment breakdowns, time constraints, and financial markets, that cause stress in the lives of farm families. Stress is a physical response to perceived life-threatening events. In an evolutionary sense, it allows us to determine whether we should stop and fight or flee from an external threat. Our brains do not recognize the difference between psychological or physical threats, and therefore our bodies respond in the same fashion to something we perceive as negative, overwhelming, or threatening, irrespective of the real risk to physical well-being. Each person reacts differently to stress, but some common symptoms of chronic stress include changes in a person's sleep patterns, fluctuation in a person's weight, fatigue, restlessness, and physical health conditions such as headaches, ulcers, or high blood pressure. Besides the physical effects, stress can also hinder interpersonal relationships at work and home. Chronic and uncontrolled stress can be detrimental to your health and interpersonal relationships. It might not be possible to get rid of the things causing stress in your life, but there are things you can do to help manage the stress. The following are some simple ways that a person can decrease stress: Exercise: Many farmers feel that the physical labor that they do on the farm is enough, but having a regular exercise or stretching program provides a break in your daily routine, benefits your overall health, and provides a constructive way to relieve excess energy. Strive to exercise three times per week for a minimum of 30 minutes. Caffeine: Reduce or eliminate caffeine from your diet. By eliminating this stimulant, a person may have reduced headaches, increased relaxation, improved sleep, a calmer mood—and, counterintuitively, more energy. Humor: The old adage "laughter is the best medicine" isn't inaccurate—laughter might help to reduce your stress, so explore ways (social groups, books, and so on) to add some laughter to your life. Talking: Having a strong network of friends and family can help provide necessary support during stressful times. Make sure that you have a couple of people to whom you can vent your problems to help reduce built up stress. Relaxation Techniques: There are simple relaxation techniques that can help you clear your mind and reduce tension. Techniques include deep breathing and taking mini-breaks during the day. Sleep: If you are not getting enough sleep at night to be refreshed in the morning and energetic enough for the day, then you may need to consider a midday power nap. Nutrition: Make sure that you are eating balanced meals throughout the day. Breaks: Take some time from the stressful situation by going for a walk, spending some time alone, working on a hobby, meditating, and so on.

Getting Help

There are times when things get too difficult, and you might need professional help. Professional help can include your family physician or health care provider, a mental health professional, or a support group. Listed below are some signs that indicate that you should seek professional help: Depression Changed sleeping patterns Abusive behavior Suicidal thoughts Hallucinations Consideration of changes in your marital status Inability to express positive feelings Excessive alcohol intake Feelings of guilt, isolation, panic, or being overwhelmed

Which categories do you think the above article belongs to?

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☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

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Tell Me When! How Bowl Size Impacts the Amount Children Request and Eat

The effect of plate and bowl sizes on portion size and calorie consumption by adults and children is well documented in literature. Larger the dish the more food you or the server is likely to put on it. But how much of a difference are we really talking about?

What we know about portion size from previous studies:

Adults and children serve themselves portions that are relative to the size of the plate partially because of the Delboeuf illusion that makes a standard portion size look smaller on a large plate and bigger on a small plate. People tend to scoop more food onto bigger plates without realizing it (4,5,6). Larger serving dishes and utensils also influence us to take more food (3). Even food and nutrition experts who are aware of proper portion sizes are susceptible to big bowl illusions (1)! A 2013 study from the Cornell Food and Brand Lab helps to give perspective on the extent to which size of a cereal bowl impacts how much cereal children request and how much they consume. The study sought to answer two questions: Does bowl size affect the amount of cereal requested among children and does larger portion size translate into higher consumption and waste?

What this study found:

To determine the effect of bowl size on amount of cereal requested, consumed, and wasted by children two studies were conducted. In the first study, 69 preschool aged children were randomly given either an 8 or 16 ounce bowl and asked to tell servers when the bowl contained the amount of cereal that they wanted for a morning snack. The bowls were measured and researchers found that in alignment with previous findings that children: Requested about twice as much cereal in the larger bowls than smaller bowls. The second two day study looked at consumption and waste. Eighteen school-aged children were randomly given either a small (8oz) or large (16 oz) bowl at breakfast one day and the opposite size the following day. As in the other study, participants were asked to notify servers when they received the amount of cereal that they desired. These slightly older children also requested over twice as much cereal in the larger bowls. Regardless of gender or BMI these children: Consumed 42% more cereal from the large bowl vs. the small bowl Wasted 26% more cereal when give the large bowl vs. the small bowl Children in this study were also asked to indicate what size bowl they used at home from a selection of various sized bowls to determine the average bowl size that they normally eat from at home. The average bowl size that children reported using at home held 19.2 ounces (2)! According to the Academy of Nutrition and Dietetics one serving of cereal, before adding milk should be about 1 ounce.

What we can take away from this study:

Children unintentionally request more cereal in larger bowls indicating that they use the bowl as a reference for how much food they want. To combat this bowl size trickery: Purchase smaller bowls! An eight ounce bowl will hold a full serving size of most cereals. If new bowls are not an option, measure out the cereal before putting it into the bowl to maintain portion size despite the size of the bowl. Follow these easy tips and your children may consume fewer unneeded calories and your cereal may even go farther!

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☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Connecting Farm to School, SNAP-Ed Nutrition Education, and Smarter Lunchrooms

Cornell Cooperative Extension (CCE) of Jefferson County, Eat Smart New York (ESNY) and Watertown City School District partnered to provide monthly nutrition lessons, food demonstrations and food tastings based on the farm to school monthly harvest produce item to nearly 2,000 students in the district. The Farm to School movement enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools. However, more than just where the food is purchased needs to be addressed in a school to make an impact on the health and nutrition of students. Constant engagement – inside and outside the cafeteria – is key to students' willingness to change their eating habits. SNAP-Ed Nutrition Education provides interactive lessons that lead to behavior change such as increased consumption of vegetables and fruits. These lessons are important to promote optimal childhood health, growth and intellectual development, which is needed for children to reach their full academic potential. The Smarter Lunchrooms Movement is dedicated to providing schools with the knowledge, motivation, and resources needed to build a lunchroom environment that makes healthy food choices the easy choice. The Movement brings evidence from the fields of economics, marketing, and psychology into the school cafeteria. Smarter Lunchrooms strategies are free or low-cost solutions that nudge students to voluntarily select the healthiest food in the lunchroom. Smarter Lunchrooms can help school nutrition services see less waste, higher participation, more satisfied students, and increased consumption of important nutrient-rich foods.[1] Combining all three programs to maximize resources and impact is a win win for all involved. In the Watertown City School District, Cornell Cooperative Extension and Eat Smart New York educators developed a schedule to provide monthly education in each of the six elementary buildings in the district. They worked with school administrators and teachers to ensure there was enough time to provide a lesson in addition to a food tasting. The lessons are fast paced, interactive and engaging. Students are learning about the how's and the why's of nutrition. The food demonstration and tasting provide an opportunity to experience foods and recipes students likely have never tried before, and allow them to decide what they like and don't like. They are encouraged to try the recipes at home with their families (and many report doing so) as well as choosing the produce items when they are available in the school cafeteria. The district's new food service director is working to incorporate the harvest of the month produce item into the school menus. Over 75% of the students indicate through surveys that they intend to increase the amount of vegetables and fruits they consume at school. To help with this, the cafeteria is implementing Smarter Lunchroom strategies such as serving both hot and cold vegetables, having vegetables at many places on the serving line, and incorporating vegetables into entrees. Additional schools in the area are recognizing the positive impacts of these program partnerships and are beginning the planning and implementation process in their own school. Contributor Amanda Root, Cornell Cooperative Extension in Jefferson County [1] Smarter Lunchrooms Movement

Which categories do you think the above article belongs to?

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☐ Math ☐ Physics ☐ Psychology ☐ Responsibility ☐ Technology

How is your interest level in this article?

Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

What is mechanical pest control?

Mechanical control is the management of pests by physical means such as the use of a barrier (e.g., screens or row covers), trapping, weeding or removal of the pest by hand. It may also involve changing the physical conditions in a given area, for example, changing the temperature to make an area unfavorable for pests.

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Ventilation in Housing for Small and Backyard Poultry Flocks

Ventilation is the exchange of air between the inside and outside of a poultry house. The main function of a ventilation system is to maintain adequate oxygen levels while removing carbon dioxide, moisture, dust, and odors. During summer, ventilation also is important for removing heat. To achieve an effective ventilation system for your poultry house, consider both house placement and house design.

House Placement

The location of a poultry house can have an impact on the effectiveness of its ventilation system. In northern areas where it is very cold much of the year, the house should be positioned to reduce the amount of north wind exposure. In southern areas where heat is an issue, the house should be positioned to take advantage of maximum southern prevailing winds to help provide as much natural ventilation as possible.

House Design

An effective natural ventilation system in a poultry house relies on the laws of physics to generate air movement. In particular, two important concepts are the facts that warm air rises and that warm air holds more moisture than cold air. In summer, the chimney effect causes natural ventilation to occur in a poultry house that has a ridge or eave opening in the ceiling. A constant flow of air exists if the outside temperature is cooler than the temperature at bird level inside the building. During winter, the amount of fresh air brought in should be just sufficient to allow for adequate air exchange. The incoming air enters through the roof of the building and warms as it drops toward the floor. Because the warmed air picks up moisture, the ventilation system must include a method for removing this air from the building to allow the air flow cycle to continue.

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Not interested at all — Very interested

1	2	3	4	5	6	7	8	9	10

Geospatial Technology for Youth

Want to go on real treasure hunt? Want to know more about how maps are used to help you find where you are and where you're going? Ever get frustrated if the GPS in your phone takes you to the wrong place?
Geospatial technology is all about using maps and technological devices to design maps and locate specific points on Earth. Click below to learn how this technology works. Once you've mastered the basics, you might want to try your hand at geocaching, a treasure hunting game using satellite signals and GPS units to find the millions of hidden treasures around the world!

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Not interested at all — Very interested

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Basic Math Skills in Child Care: Creating Patterns and Arranging Objects in Order

Ordering, sequencing, and patterning are important foundational skills for mathematics. Child care providers can build young children's early math skills by help them learn sequencing, seriation, and patterning. Sequencing is the ability to create and identify patterns. For example, children may stack blocks in a pattern of red, blue, red, blue, and so on. As adults, using calendars is one way we use sequencing skills. We look at a calendar and look for the pattern that helps us predict what day or month comes next. For preschoolers, sequencing means knowing which number comes next. Seriation is arranging objects in order by size, location or position. Have you ever asked children to arrange objects from smallest to largest, largest to smallest, shortest to tallest or thinnest to thickest? You've been teaching seriation. Young children who understand seriation can put numbers in order from lowest to highest, smallest to largest. Eventually, they will come to understand that 6 is higher than 5 or 20 is higher than 10. Creating Patterns Having children copy patterns or create patterns of their own (such as red, blue, red, blue, red, blue) may seem simple, but it is a great way to help children recognize order in the world and prepare for later math skills, such as multiplication. Child care providers can begin exposing young children to patterns -- long before they are ready to learn multiplication facts -- by having them make groups and count the total number of objects. For example, four groups of three objects each make a total of 12 objects (4 X 3 = 12).

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iW2K-Android-v4.1 Pre-Survey

1. What is your gender?

- ◯ Female
- ◯ Male

2. Which category below includes your age?

- ◯ 18-24
- ◯ 25-34
- ◯ 35+

3. What is your classification?

- ◯ School Student
- ◯ Undergraduate Student
- ◯ Graduate Student
- ◯ Professional

4. What do you normally use a mobile for? (Select all that apply)

- ☐ Email
- ☐ Surfing the Internet
- ☐ Homework
- ☐ Blogging
- ☐ Maintaining social network like Facebook, Instagram, Twitter, etc.
- ☐ Work
- ☐ Entertainment
- ☐ Online learning

Other (please specify)

5. What type of mobile telephone do you PRIMARILY use?

- ◯ Regular cell/mobile phone (not a smartphone)
- ◯ Android
- ◯ iPhone
- ◯ Blackberry/RIM
- ◯ Windows Mobile
- ◯ I don't have a mobile phone

6. How often do you use a mobile phone for fun/work?

- ◯ More than 8 hours per day
- ◯ 3-7 hours per day
- ◯ 1-3 hours per day
- ◯ Less than 1 hour per day
- ◯ Less than 1 hour per week

7. Do you prefer to access a product through its application or through a browser in mobile device?

- ◯ Application
- ◯ Mobile browsers

8. Do you have prior experience working in an online learning environment?

- ◯ Yes
- ◯ No

9. Have you taken any course over the Internet?

- ◯ Yes
- ◯ No

If Yes, Please specify the name of the course.

10. Choose all the subject you like below:

- ☐ Science
- ☐ Health
- ☐ Responsibly
- ☐ Serve

11. Do you wish to share the interesting articles you read to others?

- ◯ Yes
- ◯ No

12. Do you have any social media connection? If so, please specify

- [ ] Twitter
- [ ] Snapchat
- [ ] Facebook
- [ ] Tumblr
- [ ] Instagram
- [ ] Linkedin
- [ ] Pinterest
- [ ] What's App

Other (please specify)

13. Do you have previous experience working with extension website?

- ( ) Yes
- ( ) No

14. Using mobile, what is your most frequently used educational app/website?

15. Would you like the Internet products to product you with advice based on your interest?

- ( ) Yes
- ( ) No

16. Do you accept suggestions of recommendation systems?

17. What would cause you to uninstall an application?

iW2K-Android-v4.1 Post-Survey

Usability & Comparison

1. What is the overall reaction to iW2K v4.3?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The application is attractive.	◯	◯	◯	◯	◯
The application is easy to use.	◯	◯	◯	◯	◯
The application is simple to navigate.	◯	◯	◯	◯	◯
Helps me get key information quickly.	◯	◯	◯	◯	◯
Based on this experience, I will use the application again.	◯	◯	◯	◯	◯

2. Please rate iW2K v4.3 with respect to the following aspects.

	Very High	High	Moderate	Low	Very Low
Flexibility	◯	◯	◯	◯	◯
User experience	◯	◯	◯	◯	◯
Learnability	◯	◯	◯	◯	◯
Visual look of the system	◯	◯	◯	◯	◯
Interactive feel of the system	◯	◯	◯	◯	◯

3. I will learn more knowledge from reading the recommended articles.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

4. Overall, I would recommend iW2K v4.3 to others.

- ◯ Yes
- ◯ No

5. Please rate ***The articles listed in "For you" tab match my interest*** for the four iW2K versions.

	1	2	3	4	5	6	7	8	9	10
v4.0	○	○	○	○	○	○	○	○	○	○
v4.1	○	○	○	○	○	○	○	○	○	○
v4.2	○	○	○	○	○	○	○	○	○	○
v4.3	○	○	○	○	○	○	○	○	○	○

6. Please rank ***The most attractive articles as the version that returns the most relevant results*** for the four iW2K.

	1	2	3	4
v4.0	○	○	○	○
v4.1	○	○	○	○
v4.2	○	○	○	○
v4.3	○	○	○	○

7. Please rate ***The articles from "you may like" at the end of the article I just read are more attractive*** for the two iW2K versions.

	1	2	3	4	5	6	7	8	9	10
v4.0	○	○	○	○	○	○	○	○	○	○
v4.3	○	○	○	○	○	○	○	○	○	○

8. I feel iW2K v4.3 runs slower than v4.0.

- ○ No
- ○ Yes

If yes, please specify which steps you feel slower