

**Social Networking Teaching Tools:
A Computer Supported Collaborative Interactive Learning Environment for K-12**

by

Curtis Clifford Cain

A thesis submitted to the Graduate Faculty of
Auburn University
in partial fulfillment of the
requirements for the Degree of
Master of Science

Auburn, Alabama
August 9, 2010

Keywords: Computer Supportive Collaborative Work (CSCW), Content Management System,
Social Networking, Interactive Education, Online Learning Environment, KXNN

Copyright 2010 by Curtis Clifford Cain

Approved by

Cheryl D. Seals, Chair, Associate Professor of Computer Science and Software Engineering
Wei-Shinn Ku, Assistant Professor of Computer Science and Software Engineering
John A. Cook, Extension 4-H, FYFL Project Leader, Assistant Professor of Agriculture

Abstract

Computer Supported Collaborative Work (CSCW) is a broad area which, is to investigate using technology to facilitate collaboration. This research is to investigate and develop a collaborative educational environment as a tool to aid teachers in grades K-12 in the STEM, Science, Technology, Engineering and Mathematics, disciplines.

The resulting model will be used as a component of a larger learning environment that will remove the social networking taboo stigma currently associated with social networking sites. The model will extend beyond that of traditional social networking by supplementing class lectures in a fun, engaging and thought provoking manner instead of the typical classroom lectures. The final product will be a web-based collaborative educational tool for online interactive tool development.

Surveys were used to analyze the perceived effectiveness and receptiveness to the proposed educational tool as determined by K-12 teachers. This paper seeks to gauge teacher's receptiveness and willingness to utilize an online educational forum to supplement traditional classroom lectures.

Acknowledgments

I would like to express my thanks to Dr. Cheryl D. Seals for being receptive to becoming my advisor after Dr. Gilbert left Auburn and for being a great mentor and advisor for the past year. Not only this, her guidance has been truly appreciated and helpful along my journey here at Auburn University. I would also like to express my sincere thanks to my committee members Dr. John Cook and Dr. Wei-Shinn Ku. Your time and participation as a committee member is greatly appreciated in this study. Dr. Cook, special thanks goes out to you for your innovation and leadership in exploration of educational learning environments. A special thanks to Justus Nyagwencha for your interest and assistance in formulating the grounds for this research and Albanie Bolton for your continuous support and guidance throughout this process.

Finally, I would like to thank my God, Mom, Debra Everett, Dad, Robert Cain, Grandmother, Ethel Cain, Aunt, Rocile Cain, and my immediate family for all their continuous prayers and inspiration throughout these years. Without them, I know that none of this would have ever been possible. I am truly blessed that each of them are here today to share yet another experience with me down this road called life.

Table of Contents

Abstract	ii
Acknowledgments	iii
List of Tables	viii
List of Figures	ix
Chapter 1 Introduction	1
1.1 Problem Statement	2
1.2 Research Justification	4
1.3 Research Purpose	5
1.4 Hypotheses	5
1.5 Document Review	5
Chapter 2 Literature Review	7
2.1 Computer Supported Collaborative Work	7
2.1.1 CSCW Overview	7
2.1.2 Importance of CSCW Today	9
2.2 Examples of CSCW	9
2.2.1 Synchronous CSCW Environments	9
2.2.1.1 Text-based Chat	10
2.2.1.2 Graphics-based Chat	10
2.2.1.3 Shared White-Boards	11

2.2.2 Asynchronous CSCW Environments	11
2.2.2.1 Message Systems	11
2.2.2.2 Shared File Systems	11
2.2.3 What I Know Is (Wiki)	12
2.2.4 Swiki	14
2.3 Social Networking Communities	14
2.3.1 Facebook	15
2.3.2 Twitter	17
2.3.3 YouTube	18
2.3.4 MySpace	19
2.3.5 LinkedIn	19
2.3.6 Elgg	20
2.4 Online Educational Environments	20
2.4.1 Modular Object-Oriented Dynamic Learning Environment	21
2.4.2 Blackboard	21
2.4.3 Microsoft SharePoint	22
2.4.4 LogiCampus	22
2.4.5 ATutor	23
2.4.6 TappedIn	23
2.5 Kids Extension News Network	24
2.5.1 What is KXNN	24
2.5.2 KXNN Motivation	25
2.5.3 Overall KXNN Project	25

Chapter 3 Methodology	26
3.1 Initial Workspace	26
3.1.1 Using wiki for Content Management	27
3.1.2 Problems with wiki for Educational Environments	27
3.2 Planned Educational Environment	28
3.2.1 KXNN Cloud Computing	29
3.2.2 KXNN Modeling and Life Process	30
3.2.3 KXNN Use-Case Scenario	36
3.2.4 Testing Educational Environment	38
3.3 Hypertext Preprocessor	39
3.3.1 Hypertext Preprocessor Bulletin Board	39
3.4 Description of Initial Study	40
3.4.1 Test Environment and Experiment	40
3.4.2 Hypotheses and Variables	41
3.4.3 Setup of Experiment	42
3.4.4 Experimental Procedure	42
Chapter 4 Implementation	44
4.1 PHPBB Implementation	44
4.1.1 Domain Registration and Hosting	44
4.1.2 MySQL Database Setup	45
4.1.3 Email Server Setup	46
4.1.4 Scripting for Content Support	47
4.1.5 Content Management	51

4.1.6 Google Analytics	51
Chapter 5 Results and Discussion	53
5.1 Information Gathered from Pre-Questionnaire	53
5.2 Results from KXNN Environment Experiment	54
5.3 Study Participants Comments	59
Chapter 6 Future Work and Conclusion	61
6.1 Future Work	61
6.2 Conclusion	62
References	63
Appendix A Approved IRB Form.....	67
Appendix B For Youth, For Life: Logic Model	68
Appendix C Electronic Information Form	69
Appendix D KXNN Study Pre-Questionnaire	71
Appendix E KXNN Study Participant Task List	76
Appendix F KXNN Study Post-Questionnaire	77
Appendix G Prototype KXNN Home Page	81
Appendix H Prototype KXNN Captivate Lesson	82
Appendix I Prototype KXNN Lesson Workspace	83

List of Tables

Table 1: Pre-Questionnaire Results	55
Table 2: Educator Perception of Online Educational Tools	55
Table 3: Educator Reception to Educational Forum	56
Table 4: Post-Questionnaire User Experience and Satisfaction Results	56
Table 5: Post-Questionnaire Usefulness Results	57
Table 6: Post-Questionnaire Combined Results	58
Table 7: KXNN Method of Collaboration	59

List of Figures

Figure 1: Computer Supported Collaborative Work Matrix	7
Figure 2: Sample Internet-based Chat - Internet Relay Chat (IRC)	10
Figure 3: Sample Graphics-based Chat – Avatar Chat	11
Figure 4: Simplified KXNN Illustrative Model	24
Figure 5: For Youth, For Life – Social Learning Environment	25
Figure 6: Initial KXNN Workspace	26
Figure 7: Minimalistic KXNN Hardware/Software Model	28
Figure 8: KXNN Context Diagram	30
Figure 9: The Prototyping Model	31
Figure 10: KXNN Domain Model	32
Figure 11: KXNN Use-Case Diagram	33
Figure 12: KXNN System Sequence Diagram – Login	34
Figure 13: KXNN System Sequence Diagram – View Available Forum Topics	35
Figure 14: KXNN Survey Flowchart	43
Figure 15: Prototype KXNN Home Page	44
Figure 16: Prototype KXNN Instant Chat	48
Figure 17: Prototype KXNN Agriculture Lesson	49
Figure 18: Adobe Captivate Support within KXNN Environment	50
Figure 19: Prototype KXNN Lesson Creation Workspace	51

Figure 20: Prototype Google Analytic Data 52

CHAPTER 1: INTRODUCTION

With the expanding power of computers and the recent growth of information technologies, such as the Internet, it is possible for large numbers of people to have direct access to a wide array of information sources and services. An increase in Internet usage, inevitably, causes a growing concern of Internet usage to facilitate the transfer of educational information. The Internet, since its acceptance into homes, has always been heralded as the last place for true freedom without limits. As with all things limitless also comes lawlessness and recklessness, which is a growing concern for educators. According to the U.S. Department of Commerce, in 2003, about 61.8% of households in the United States owned a personal computer and approximately 54.7% of these households had Internet access. In the United States today, the questions are not, does the household own a computer and are equipped with Internet access but rather how many computers and how fast is the Internet. In order to truly embrace the limitless capabilities of the Internet, educators must not only be open to use the Internet as a method of supplementary and cooperative education but also learn to use the strengths of the Internet to their advantage.

Along with the technology expansion is also the reach of this technology to youth. There has never been a time where the youth of today may know more about the technology than those trained to use it and certainly more than educators. In this regard, the youth have an upper hand when it comes to deployment of the Internet for educational use; the youth can either embrace the technology or revolt against it. The youth know that the popular Internet search engine Google completes and holds more than 60% of today's market share for Internet queries such

that any question they have can be answered, simply by “Googling It!” Such that is has become iconic, thus when you are searching for any information we simply “Google It!”

There are also newer technologies called social networking which encompass Facebook and Twitter which most educators see as taboo in educational environments however Facebook, the world’s largest social networking site, has over 350 million registered users. It is impossible to deny the reach and impact of these sites; they surround each and every move that we make today. Facebook not only is free, but anyone can register and instantly be put in touch with those whom they had to acquire a calling card in the past to reach. With technology expansion to youth and the overwhelming reach of social networking sites, educators face an uphill battle of how to embrace these newer technologies and more techno-savvy and intelligent youth [23].

1.1 PROBLEM STATEMENT

There are many different methods of attempting to engage the learner through online learning environments however many of them are for older learners outside of elementary and middle school aged children. Many of these technologies are structured in such a way that younger learners lose interest relatively easily and miss concepts that should have been learned. This lack of technology utilization places younger adolescents at a disadvantage when compared to their older counterparts. This also places educators at a disadvantage resorting back to older teaching methods for teaching material to younger students. There is also pressure for educators to integrate new technology into their class to provide greater intrinsic motivation for younger students to engage in material. Technology holds great potential for improving the quality of education to younger students, however, if the technology created is not designed with a user centered approach it will inevitably fail to achieve the desired effect. In general, the younger

students are more acclimated to technology, this is primarily due to age and the environment in which they grow up, however, this is not always true for all younger learners. It is hard to gauge a young learner's comfort level and ability to navigate and comprehend technology, which likely is directly correlated to the environment in which they grow up. The National Association for the Education of Young Children states, "Technology plays a significant role in all aspects of American life today, and this role will only increase in the future. The potential benefits of technology for young children's learning and development are well documented. As technology becomes easier to use and early childhood software proliferates, young children's use of technology becomes more widespread. Therefore, early childhood educators have a responsibility to critically examine the impact of technology on children and be prepared to use technology to benefit children" [26] [27]. There is substantial evidence which suggests elementary aged students brains are significantly more developed than those of the previous generation; researchers contribute this enhancement directly to technology and having access to information which significantly dwarfs the previous generation in both depth and breadth [28].

To spread the information technology to educators and engage the young learners, not only should the current tools available be easy for educators to use but also the technology must engage and interest the younger learners. Although there are many educational tools available, none are specifically focused on younger populations. Furthermore, educators are not well versed in Hypertext Markup Language, HTML. This project will focus on the faults of these technologies as well as an implementation of older technology that will combine various factors to increase the likelihood that it appeals to educators as well as young learners thus eliminating a gap that has existed since the inception of educational tools.

Due to several limitations of traditional classroom environments, educational institutions are moving away from traditional approaches and attempting to find alternative ways to engage the learner. The costs to build, develop, deploy and train educators to use these tools may put a strain on already stretched educational budgets. The problem with many of these environments is they are not designed for younger learners. The learning environments are organized in a very structured manner making them reminiscent to traditional classrooms, which do not engage younger learners with interactive learning. Many educational institutions budget are already being strained by shortcomings in funding, the cost incurred to train, build and develop custom software to suit educational tools would usually exceed the allotment for information technology. Therefore, the purpose of this study was to develop an educator friendly and youth oriented learning environment centered on ease of use and interactive technology for the educator and with the learner as the focus of the learning environment.

1.2 RESEARCH JUSTIFICATION

The growth of online learning communities emerged as a byproduct of the rapid growth of the Internet and related media. Data and information are now being created at a rate far faster than most experts can convert this information into forms of knowledge that can be communicated effectively to teachers, students, and the general public. Social networks, depending on their usage, can address this problem by providing entertainment for people to connect and learn from others through collaboratively participating in the construction of new knowledge. In addition, social networking communities address the needs of their members such as interests, imagination and transactions.

Research in the cognitive and learning sciences has demonstrated that different people learn in various ways and have distinct learning needs at various times in their lives [29]. These differences in learning can be address with social learning communities. Such communities allow members and trainees to control their teaching and learn at their own pace, which can supplement information previously learned which is excellent for younger learners.

There have been few studies of younger learners that actively seek to understand their learning capacity using online learning environments. Computers and information technologies hold the tools necessary to increase the knowledge base of younger learners. However, the successful use of the technology is based on whether the systems can support the educators as well as the learners in a capacity that they easy to use, challenging and engaging.

1.3 RESEARCH PURPOSE

The primary objectives of this research were to:

1. Design an educational learning environment to provide educators and younger learners the ability to use an online system that is interactive and open to younger learners and easy for educators to use to post their content.
2. Investigate educational tools currently available to facilitate and supplement traditional classroom learning for their effectiveness.
3. Determine if the educational prototype environment will improve the effectiveness of educators.

1.4 HYPOTHESES

The main hypotheses of this study is that teachers embrace computer aided learning that is interactive in a setting inside and outside of the traditional classroom and educators would use the environment if it engaged students and was not difficult for them to use and required no technical programming skill. Another hypothesis is that an informal learning environment better supports students as opposed to structural educational environments.

1.5 DOCUMENT REVIEW

The rest of this thesis is organized as follows: Chapter 2 consists of a literature review, which discusses computer supported collaborative work, social networking communities and online educational communities; their strengths and weaknesses in regards to younger learners as well as an overview of the Kids eXtension News Network (KXNN). Chapter 3 provides a description of the initial KXNN workspace, problems that exist within the current framework, a description of the planned framework that addresses the issues with the existing framework and a description of hypertext preprocessor. Chapter 4 goes over detailed implementation of the framework that has been built to alleviate the issues of the initial framework. Chapter 5 discusses the details of the KXNN project and analysis of the deployed Google Analytics data on the KXNN project. Chapter 6 concludes the thesis with the results of the project along with the future work to come.

CHAPTER 2: LITERATURE REVIEW

2.1 COMPUTER SUPPORTED COLLABORATIVE WORK (CSCW)

2.1.1 CSCW Overview

Computer Supported Collaborative Work (CSCW) was first derived by Irene Greif and Paul M. Cashman in 1984. CSCW addresses how collaborative activities and their coordination can be supported by means of computer systems [4]. Essentially, CSCW deals primarily with design and how tools can be designed and suited to the user and a particular task or set of tasks. CSCW tools can be synchronous, asynchronous as seen in Figure 1. CSCW extends beyond that of traditional thinking as well and includes aspects of psychological, social and organization effects. Researchers in CSCW have divided the area into 3 core dimensions which include Awareness, Articulation and Appropriation.

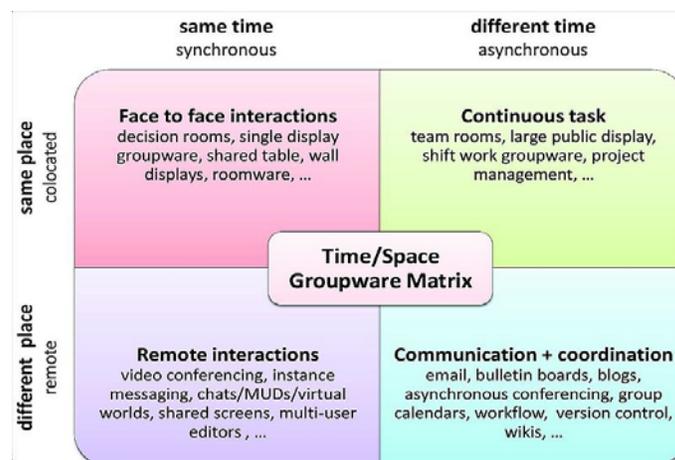


Figure 1: Computer Supported Collaborative Work Matrix. (Source: Johansen, R. 1988 "Groupware: Computer Support for Business Teams" The Free Press.)

CSCW Awareness deals with user's ability to work together with others for educational gain and knowledge about each other. For example, this is often best demonstrated without computer aid, in meetings as a form of introduction where users are paired up into groups and a set of questions are asked that allow users to get to know each other. On a larger scale, with computer aid, users from all over the world can participate and learn useful information about each other that could build relationships and strengthen ties [5].

CSCW Articulation is how individuals group together for a task and must manage to divide the task amongst them, complete the divided parts and reintegrate the parts. For example, classroom group projects, in which classmates divide the project into smaller parts, complete the smaller parts individually and come together to pull each individual part into one large group project. Articulation of work can remain the same on a larger scale in which the total project is only as good as the sum of its parts from individuals. The same concept works in industry as it does in academia with software development, programming code in which software is used to track individual progress and work as well as compilation.

CSCW Appropriation deals with how a group or individual adapts technology for their own situation; the technology may be used for a different use than what was intended by designers. When technology is used for an alternative purpose than it was initially designed this is normally be attributed to the designer's point of view as opposed to the users. For example, in human computer interaction, a good design is when the users mental model, which is how the user feels a system works, and the designers conceptual model, an mockup or prototype of how the system is to be designed, match the design is considered to be very structured and that the user and designers agree about the requirement model. When there is an inconsistent mapping between user and developer models this will create problems with the product. Designers and

engineers may blame the user for the failure, while not realizing that they too share in the failure [6].

2.1.2 Importance of CSCW Today

CSCW plays an integral in product development today, as it is the focus point of collaborative learning. In order for collaborative environments to grow and thrive they must be designed and engineered in a fashion that nurtures the learner as an individual, but adds the element of collaborative work using the three core attributes of awareness, articulation and appropriation to accomplish goals. Unlike other areas of Computer Science, CSCW, is interdisciplinary in nature, the perspective of some backgrounds from the sciences and others from the arts, makes for a rather diverse culmination of ideas and thought processes but also yields problems with the understanding and synthesizing of information. CSCW plays an important role, especially in the development of our youth. There is no denying the fact that information technology plays a vital role in the lives of young learners and the impact will not decrease, but rather grow as time passes. As information technology becomes more sophisticated, CSCW provides access to groups with little access to technology in the past. CSCW allows communication and collaboration across a broad spectrum of information technology areas, which are vital to the ever diversifying nature of education and collaboration.

2.2 EXAMPLES OF CSCW

2.2.1 Synchronous CSCW Environments

Synchronous Environments are similar to all other methods of synchronous communication. One definition of synchronous communication is direct communication in which all parties are involved [11]. Synchronous typically refers to time; therefore to be in sync

all parties must be available at the same time. Synchronous environments have evolved over time to include certain methods of asynchronous communication, but still retain their synchronous characteristics, for example a phone call is made but the user does not answer, while the phone call is direct communication therefore synchronous the voicemail system that the caller will be transferred to is not synchronous.

2.2.1.1 Text-based Chat

The most prevalent communication systems on the web are basic Internet-based chats. Internet-based chats that are the midpoint in between UNIX talk applications and Internet Relay Chat (IRC). Most of these type systems are written in Java.

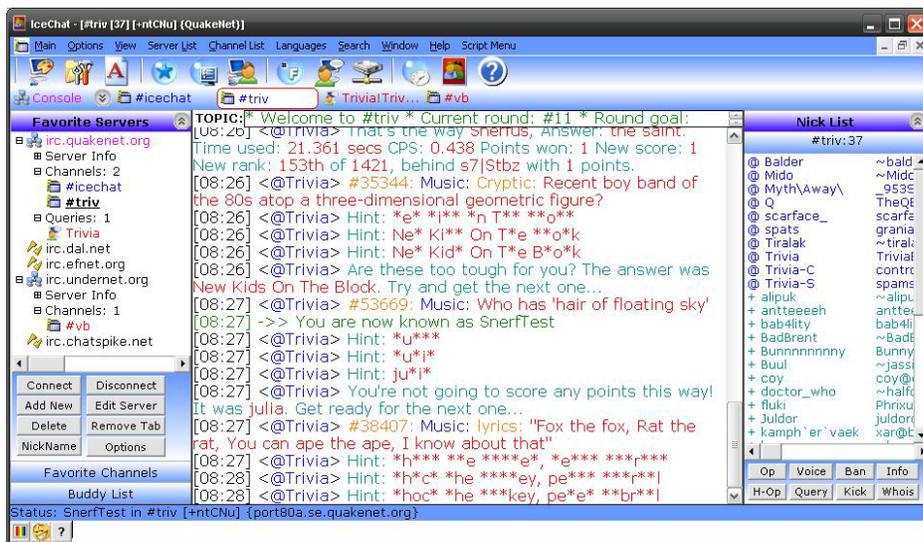


Figure 2: Sample Internet-based Chat - Internet Relay Chat (IRC)

2.2.1.2 Graphics-based Chat

Graphic-based chat is similar to text based chats but adds some graphical capabilities of the Internet. An example would be Avatar Chat as pictured below.

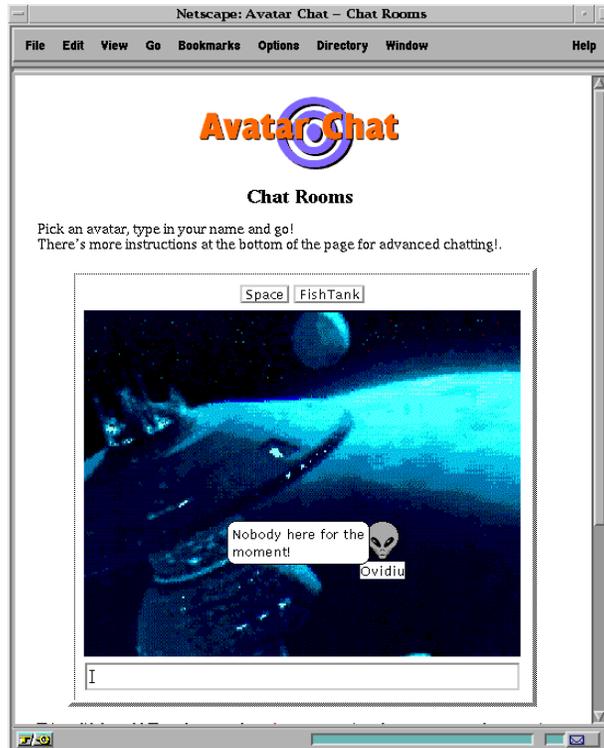


Figure 3: Sample Graphics-based Chat – Avatar Chat

2.2.1.3 Shared White-Boards

Shared white-boards are currently being deployed in many smart classrooms where the instructor has access to the primary white-board, but students can also use their computers to manipulate the same white-board. This form of learning allows students the ability to enter input and show their strategies to other students who may be sharing similar concerns and questions.

2.2.2 Asynchronous CSCW Environments

Asynchronous Environments are the opposite of synchronous environments in which parties do not collaborate at the same time. Often these type systems revolve solely around messaging, which allows the initial user to leave a message and the recipient can check the

message at their earliest convenience and respond. Asynchronous communication rarely leads to synchronous communication while often synchronous communication does support asynchronous communication, as in the phone call to voicemail example. Messaging systems, however, are not the only form of asynchronous communication; email and file sharing systems are too, just to name a few.

2.2.2.1 Message Systems

Messaging systems may be the most prolific method of asynchronous communication. Users compose, edit and send messages to other users and groups, those users and groups receive the message and respond at their convenience. These styles of messaging systems include cellular text messaging as well as online messaging systems.

2.2.2.2 Shared File Systems

Shared files systems are another method of asynchronous form of communication. File sharing systems such as Microsoft SharePoint are repositories for information as they allow a user to save information to a server and other users, whom have access, can also login to the server and view and modify the content at their convenience.

2.2.3 What I Know Is (Wiki)

Wiki's have gained traction over recent years as a viable information repository. A wiki is a website that allows the easy creation and editing of any number of interlinked web pages via a web browser using a simplified markup language [13]. By far the most popular wiki found on the web is the Wikipedia, the free encyclopedia. Wikipedia has shown the strengths and weaknesses of using wiki software. Among some of the strengths are the ability for users to

navigate through wiki's with relative ease and usually wiki's are easy to setup. Weaknesses are, utilizing wiki's still require some level of understanding markup language, depending on the triggers set within the wiki software, pages can be edited by users, which can either add useful information to discussions or add controversial information to subjects as well as issues with security and the handling of users [8].

In educational environments where the student is more mature and self directed and the teacher has time to learn a bit of markup language a wiki is a useful collaborative tool. The problem with the wiki is where do students go to ask questions about content; they may be confused and do not wish to add or edit content but rather ask a question and the wiki does not provide a workspace for that type of feedback. However, in more structured environments the wiki has been used as an educational tool and quite successfully.

At many institutions there have been courses taught using the wiki as a course website. Biology 414/614: Eukaryotic Genetics and Molecular Biology taught at the University of Maryland Baltimore County, PY55 Introduction to Sleep at Brown University, PY111 Personality and Clinical Assessment at Brown University, English 15 at The Pennsylvania State University and The Collaborative Writing Project at SUNY were all taught using wiki's as a content management and collaborative educational tool.

The problem at hand for this research to leverage and redesign wiki's is an obvious one; the audience that a wiki is catered to is not younger learners. The reason why wiki's have become so successful is the capacity for learned individuals to add their knowledge to the discussion. This is not the case for younger students, particularly students whom have not reached high school age. The wiki environment constrains the user to learn a new programming

language to converse in this discourse, which is prohibitive for an informal learning environment. Furthermore, to use a wiki effectively, the administrator of the wiki must know, to a reasonable degree, HTML, if the educator does not know HTML it is hard to format the wiki and content correctly [14].

2.2.4 Swiki (Squeak + Wiki)

Swiki was developed after wiki; it was implemented by Mark Guzdial at the Georgia Institute of Technology in the Collaborative Software Laboratory. Swiki is written in Squeak and is most commonly used by the Georgia Institute of Technology's College of Computing as collaborative group web pages. Squeak is a free open-source implementation of the object-oriented programming language smalltalk. Swiki has been used in K-12 education and had been used successfully with 4th graders and higher. A valuable feature of Swiki is that you can choose to password protect certain web pages and can lock certain pages to prevent users from changing existing content which is a feature the standard wiki is lacking [15]. Swiki never really reached its full potential of use; it is still used by Georgia Tech today in the College of Computing but rarely used outside of the institution.

2.3 SOCIAL NETWORKING COMMUNITIES

Sociologists define a social network as a social structure made of individuals or organizations called "nodes," which are tied by one or more specific types of interdependency, such as friendship, kinship, financial exchange, dislike, sexual relationships, or relationships of beliefs, knowledge or prestige [16]. Regardless of the formal definition of social networks it is impossible to deny the fact that as early as February 1, 2010; the social networking site Facebook announced through their Chief Operating Officer, Sheryl Sandberg that some 175 million users

log into Facebook every day. That is the equivalent of 1 in 5 people in the world that are on the Internet visiting Facebook. Sociologists may have never thought of a social network including forms of collaborative education, as evident by education missing from the formal definition of social network, but education can definitely be leveraged into social networking for collaborative use.

Many social networking sites, blogs, web applications, video-sharing sites and blogs are forms of Web 2.0 styled tools. Contrary to its name, Web 2.0 does not constitute any change in revision to the Internet but rather a change in the way software is developed and end-users use the Internet [18].

2.3.1 Facebook

When thinking about social networking communities, Facebook is the first to come to mind. Facebook since its creation in 2004 has been a hub for communication with its more than 400 million registered users. The Facebook platform seems basic to the user, but the components supporting it are very complicated and complex. Facebook has extended beyond just a place for social gathering and has become a collaborative tool. Facebook integrates games, applications and quizzes which can be used in groups to share information. As of February 2010, Facebook became the second most popular site in the U.S., drawing nearly 134 million unique visitors in January, 2010. However, social networking has not been well received as a tool for educational use. Facebook was not built to become an educational tool and what some in education find difficult is to adjust to a tool that was not built with their interests in mind. The philosophy of Facebook also alarms educators and security experts, users of the Facebook system are not

customers but products and the customers are the advertisers and marketers who place their ads on Facebook so user data becomes what Facebook sells to bring in advertisers.

Facebook has setup an environment for teachers to utilize; there are two approaches that a teacher may use. The first is to simply create an account, setup a profile and allow friends, co-workers and family to connect in a generalized fashion to them. The second approach, perhaps the best approach, is to create a page specifically for class. This type of page is in addition to the typical Facebook page. After the page is created, all that is left is to invite the students to become “fans” of the page, essentially students, parents and other teachers could become fans of the class. After becoming a fan students can post homework questions and receive feedback from other students and the teacher. Teachers also communicate with other teachers about homework load, upcoming events and schedule conferences with parents. The teacher creates class specific events and receives RSVP’s from parents and the teacher also prepares quizzes for the class. Facebook has mechanisms in place for opening up to the educational institutions.

Facebook however is not without its faults; using Facebook in this manner is asynchronous with little control in place, for parents or teachers, to monitor when students talk to while on Facebook. There are also no parental controls on Facebook. Some parents do not allow their younger children to access social networking sites and therefore is a potential problem for teachers looking to incorporate Facebook as a part of their teaching plan.

The vision of Facebook was not intended to be open to the general public. The original incarnation of Facebook was for college students only, had it remained this way educators might not have felt as reluctant to use the site for educational purposes. However, there is no denying that the hands of Facebook stretch far and it happens to build social capital for students, which

are an integral part of building long lasting relationships and connecting students of diverse backgrounds so that they may relate to aspects that they consider important [17].

2.3.2 Twitter

Twitter is another Web 2.0 technology. Twitter is a combination of a social networking site as well as a microblogging site. It is known as a microblogging site because posts on the site or “tweets” are restricted to the character limit in a standard short message service (SMS) or “text” message which is 140 characters. Like other blogging sites and other social networking sites these tweets can be open to only friends or openly accessible. The number of Twitter users has climbed to 75 million, however, unlike Facebook the growth of new users is slowing and a lot of current Twitter users are inactive [19].

Since its creation in 2006, Twitter has been met with mixed reviews from casual users to those in academia. Studies by Stirling University psychologist Dr. Tracy Alloway, finds that Twitter actually lowers the human IQ. Dr. Alloway states, “Those using longer and more creative sentences showed fewer signs of memory loss. It isn't the programme Facebook itself that is helpful, but its letting people meet in person which improves memory.” However, that information does not stop educators from choosing Twitter as the social application of choice. Marquette University associate professor Gee Ekachai uses Twitter to discuss what she's teaching in class with students and connect them with experts in the field of advertising and public relations. Instructor Linda Menck, who also teaches at Marquette, encourages students to include social media as a strategy in marketing campaigns for clients.

Twitter receives mixed reviews from educators and also receives its fair share of criticism from average users. The Wall Street Journal wrote that social-networking services such as

Twitter "elicit mixed feelings in the technology-savvy people who have been their early adopters. Fans say Twitter is a good way to keep in touch with busy friends. But some users are starting to feel 'too' connected, as they grapple with check-in messages at odd hours, higher cell phone bills and the need to tell acquaintances to stop announcing what they're having for dinner" [20]. Twitter has managed to take the idea of updating the world of your every move to a new level; some manage to use the tool constructively while some use it to update their every move. This concept works in environments with college aged students who are well aware of the risks around them but in younger environments this can be seen as a potential security risk and one that cannot afford to be poorly managed. Twitter like Facebook has no parental controls, which makes the site even more dangerous for younger users.

2.3.3 YouTube

YouTube emerged on the Internet in February 2005, since its birth it has the global repository for videos on the web. YouTube has the potential to be used for educational purposes by allowing educators to show videos that relate to lessons in class. However, YouTube is not without its faults, most videos on YouTube are not educational and many are controversial such that many educators would like to keep beyond the reach of their students. YouTube can be used in conjunction with other environments with its ability to embed videos into other pages which allow YouTube videos to be viewed by access to the main YouTube site restricted which plays quite well into the hands of cautious educators. YouTube allows users to upload content in various formats, for example, one could upload a PowerPoint, make comments, use the voice over feature as well as highlight important concepts for distribution through YouTube as opposed to email. Users could also use the translation feature to translate videos from a foreign language to one more they could understand. The ability to skip through a video seamlessly and

jump to key points is also a benefit of YouTube. Using YouTube as a repository also alleviates the need for huge amounts of disk space as users are not limited in their storage space on YouTube. YouTube alone cannot stand as an educational tool, but can supplement other tools to enhance their multimedia reach to students.

2.3.4 MySpace

In 2006, MySpace was the leader of social networking sites, but was surpassed in 2008 by Facebook. MySpace was never known for its innovation in the realm of education, nor does its layout promote education usage. MySpace has always been known for a type of personal website but that does not mean it cannot be used as a type of educational tool. MySpace can be used effectively in the design realm, users can create free accounts then look at sample pages, those that follow good design and those that do not. Users could also look at pages that employ a good color scheme and those that do not. Next users could learn how to modify background colors and text colors, then explorer web safe fonts and readable fonts. Then the user could learn to use boxes, borders and experiment with divisions. The culmination of the aforementioned topics results in a well designed MySpace page since MySpace is essentially a personal HTML editor. Not only does the user learn the basics of web site design but the MySpace page, if wanted, is an added bonus by accomplishing two tasks at once [23].

2.3.5 LinkedIn

LinkedIn is the most professional of all the aforementioned social networking sites as it is a business-oriented social networking site. The goal of the site is primarily for professional networking. The site does not use the multimedia components of other sites; there are not individual HTML pages, there are no videos and there are no games to be found on LinkedIn.

The site is contact list driven; meaning that a network is built by making a connection to someone and those connections can branch off into second-degree and third-degree connections; i.e. meeting someone through a mutual friend. LinkedIn carries no obvious use in the educational realm; the demographics of LinkedIn are well out of grade school.

2.3.6 Elgg

Unlike the aforementioned communities, Elgg is not a site but rather software. Elgg is open source social networking software developed at the University of Brighton, which has been specifically designed with academic uses in mind. Students, tutors and researchers receive a profile page, a blog, photo sharing capabilities and friend's lists, and they can create and join on-site discussion committees. Elgg represents a shift from aging, top-down classroom technologies like Blackboard to what come call personal learning environments. "The virtual learning environment model used by nearly all universities these days is based on the traditional tutor-led, course-structured mode of learning and doesn't easily allow for significant participation by students or for crossing course boundaries," said Stan Stanier of the University of Brighton [23].

2.4 ONLINE EDUCATIONAL ENVIRONMENTS

Online educational environments, learning management system and virtual learning environment all share a singular concept, the concept of course management systems (CMS). The main purpose of an online educational environment is to manage the content such that it is accessible and usable. Online educational environments pave the future of classroom lectures. Examples of these environments are found in a variety of different places and used in many different ways. Much like CSCW they can be asynchronous and synchronous. While many of the online environments embody the same traits there are differences, which make them unique.

Content management systems are great tools for universities and educators, their structured nature do not make them ideal for use with younger audiences.

2.4.1 Modular Object-Oriented Dynamic Learning Environment (Moodle)

Moodle is likely the most used open source content management system available. It can run on many different platforms though it is recommended to run in a Unix/Linux environment. As of January 2010, Moodle has a user base of over 45,000 registered and verified sites serving over 32 million users in 3 million courses. Moodle's interface supports many plug-ins for activities, question types, graphical themes, enrollment methods and content filters. The philosophy of Moodle includes a constructivist and social constructivist approach to education, emphasizing that learners and not just teachers can contribute to the educational experience. By Moodle being open source, it poses one problem that many academics have an issue with, when there is an issue, who do you go to for support? As the case with most open source applications, there is no central repository for direct help. While the software may be free, it does cost money to support and if the cost to support runs over the cost of other proprietary systems, then the savings of using open source software have evaporated [21].

2.4.2 Blackboard

Blackboard is a software company; their content management system is the Blackboard Learning System. Blackboard is the preferred content management system for many universities in the United States. Blackboard's main purpose is to be used in conjunction with traditionally face-to-face taught courses to deliver content such as lectures, assignments, quizzes and tests. Blackboard also has features that allow discussion on a posted topic. Blackboard went public in 2004 and is now a publicly traded company on the NASDAQ stock market. Blackboard unlike

Moodle is proprietary and to use Blackboard costs average sized universities is in excess of \$160,000 per year. It is important to realize that the Blackboard Learning System can never be bought, it can only be rented. However, while the software is rented it is also fully supported (i.e. less people need to be trained at the university level to troubleshoot the system. A call to Blackboard should resolve potential issues). The cost analysis of utilizing a proprietary system versus open source should be taken into effect prior to deploying either system.

2.4.3 Microsoft SharePoint

Microsoft's SharePoint is also a CMS with integrated functionality developed by Microsoft that allows users to work in a web-based collaborative environment. SharePoint is not a single tool, but a collection of products and software that include web browser collaboration functions, process management modules, search modules and a document management platform. SharePoint is not widely used, as developers have not grown to enjoy developing for SharePoint. SharePoint is often criticized for its lack of well integrated tools for developers and its complex software architecture that differs significantly from other web based applications. However, SharePoint does have its benefits, for example it includes all the tools necessary to run and host collaborative communities without the need for additional software but its usefulness is limited because it lacks developer support.

2.4.4 LogiCampus

LogiCampus is another open source course management system that is designed specifically to fit the needs of distance learners. LogiCampus provides built-in master calendars and textbook requisitions. LogiCampus provides tools that are found in other content management systems such as the ability to create online courses, process assignments, make tests

and stay in contact with students. LogiCampus is not as widely used as the aforementioned content management systems.

2.4.5 ATutor

ATutor is an open source learning content management system that prides itself as being the only content management system to be fully accessible. ATutor is currently the only CMS that complies with the software evaluation criteria established by The American Society for Training and Development. A few of the accessibility features of ATutor are text alternatives for all visual elements and keyboard access to all elements of the program. ATutor is also formatted to run on a wide variety of technologies such as cell phones, personal data assistants and text-based web browsers. The system allows for increased adaptability in design principle, themes, privileges, tool modules and groups [22].

2.4.6 Tapped In

Tapped In breaks away from the typical content management system, developed by researcher at the Stanford Research Institute; Tapped In is a teacher professional development online tool. Research has shown that student achievement is directly attributed to teacher quality therefore Tapped In seeks to link teachers with other teachers and professionals while providing a framework to foster and nurture professional growth. Tapped In is a virtual environment that simulates the ongoing process of professional development throughout teacher's careers. Tapped In features customized virtual buildings with public, group and personal rooms, group creation and management, event rooms with registration, calendar systems, job banks, text-based chat and private messaging, threaded discussion boards, conversation transcripts and asynchronous messaging. Tapped In is a tool that has the potential to help teachers become better content

managers. The environment provides instruction and guidelines about good content management practices before permitting teachers to distribute information through Tapped In to students. It has the potential to teach the teacher how to teach, what information is usable to share with students and how the teacher may facilitate that information being shared.

2.5 KIDS EXTENSION NEWS NETWORK (KXNN)

2.5.1 What is KXNN

KXNN is a process by which to develop content that is used to educate youth across a broad range of ages. KXNN is a network of interconnected subject areas that can be utilized in education to engage and facilitate information to share their story to a youth audience. Key components of KXNN include:

- Service learning opportunity for college students contributing their time, enthusiasm, and creativity to a production team working with pre-college youth
- Use of pre-college students as news reporters and as part of the production team – kids sharing the news with kids
- Learning forums on topics presented via KXNN moderated by faculty and students.

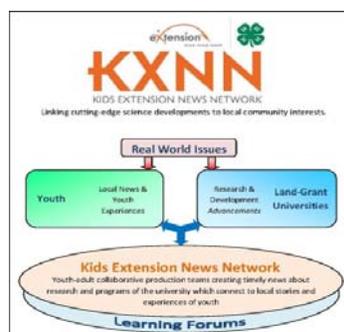


Figure 4: Simplified KXNN Illustrative Model: Copyright © 2009 Auburn University, Alabama Cooperative Extension System (Dr. John A. Cook)

2.5.2 KXNN Motivation

KXNN is only a small part of a larger concept, the eXtension For Youth, For Life FYFL model. This model is best displayed illustratively. KXNN is a subset of the For Youth, For Life concept, which is modeled in Appendix A as a series of users and events and their respective outputs. The logic model below best illustrates the need and motivation driving the KXNN movement as well as the other segments of the FYFL project.

2.5.3 Overall KXNN Project

The overall KXNN project is a series of two parts, one being an educational learning concept and the other being a social learning concept. Figure 5 illustrates how the social learning environment can be created as a series of flow charts and diagrams depicting users, groups and groups of users. In the diagram, learning starts with the individual learner, but can be extended to the collaborative learning environment. This model can be used as a basis of software design and implementation to be catered to the specifications of users.

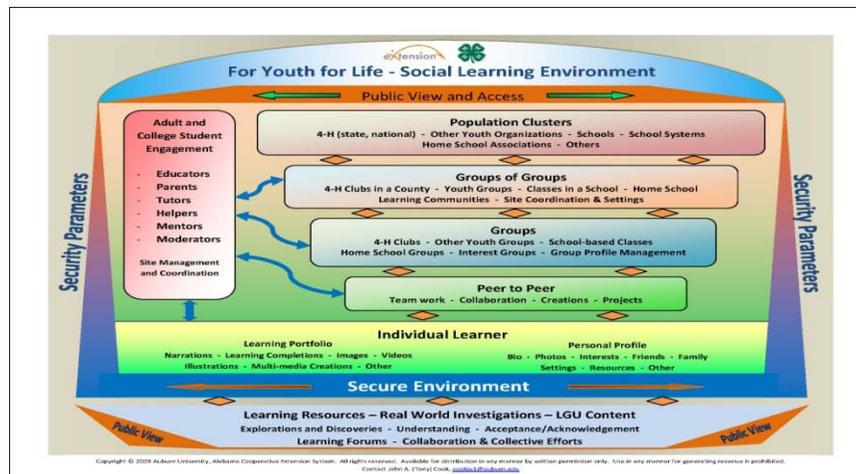
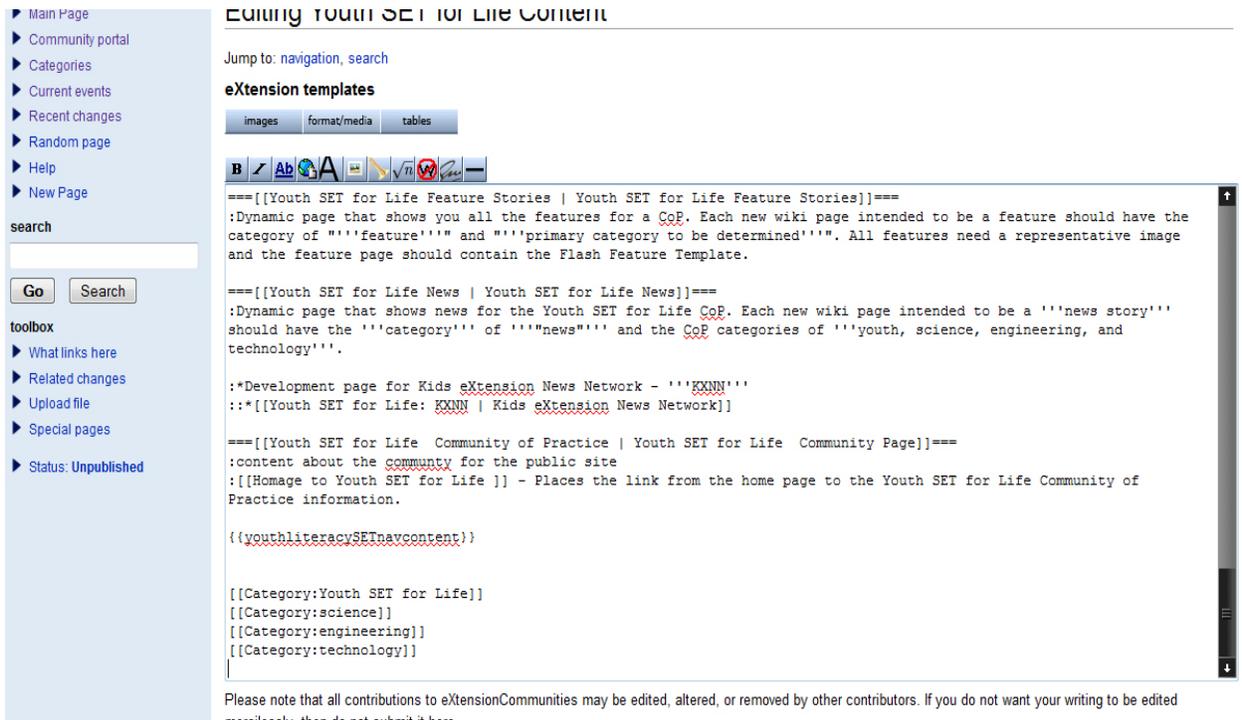


Figure 5: For Youth, For Life – Social Learning Environment: Copyright © 2009 Auburn University, Alabama Cooperative Extension System (Dr. John A. Cook)

CHAPTER 3: METHODOLOGY

3.1 INITIAL WORKSPACE

There is no industry standard for the initial workspace; it is usually determined during the early planning stages however the initial workspace can vary vastly. The National eXtension Initiative was designed using a wiki for content management and creation. Wiki offers a platform that works well for many types of online learning environments, however for younger learners and for use as an educational tool with a primary audience of youth wiki is not the best content management system to use.



The screenshot displays a wiki page titled "EDITING YOUTH SET FOR LIFE CONTENT". On the left is a sidebar with navigation links: Main Page, Community portal, Categories, Current events, Recent changes, Random page, Help, and New Page. Below these is a search box with "Go" and "Search" buttons, and a "toolbox" section with links for "What links here", "Related changes", "Upload file", "Special pages", and "Status: Unpublished". The main content area has a title bar "EDITING YOUTH SET FOR LIFE CONTENT" and a "Jump to: navigation, search" link. Below the title is a section for "eXtension templates" with tabs for "images", "format/media", and "tables". A rich text editor toolbar is visible above the main text area. The text content includes several paragraphs of wiki markup, such as:

```
====[[Youth SET for Life Feature Stories | Youth SET for Life Feature Stories]]====
:Dynamic page that shows you all the features for a CoP. Each new wiki page intended to be a feature should have the
category of '''feature''' and '''primary category to be determined'''. All features need a representative image
and the feature page should contain the Flash Feature Template.

====[[Youth SET for Life News | Youth SET for Life News]]====
:Dynamic page that shows news for the Youth SET for Life CoP. Each new wiki page intended to be a '''news story'''
should have the '''category''' of '''news''' and the CoP categories of '''youth, science, engineering, and
technology'''.

:*Development page for Kids eXtension News Network - '''KXNN'''
::*[[Youth SET for Life: KXNN | Kids eXtension News Network]]

====[[Youth SET for Life Community of Practice | Youth SET for Life Community Page]]====
:content about the community for the public site
:[[Homage to Youth SET for Life ]] - Places the link from the home page to the Youth SET for Life Community of
Practice information.

{{{youthliteracySETnavcontent}}}

[[Category:Youth SET for Life]]
[[Category:science]]
[[Category:engineering]]
[[Category:technology]]
```

 At the bottom, a disclaimer states: "Please note that all contributions to eXtensionCommunities may be edited, altered, or removed by other contributors. If you do not want your writing to be edited mercilessly, then do not submit it here."

Figure 6: Initial KXNN Workspace

3.1.1 Using Wiki for Content Management

Using wiki technology for content management works very well for certain, mature, audiences. Content is generally added by those who have a firm understanding of designing web pages using HTML but with a wiki content editing can be done by everyone. Sites such as Wikipedia utilize an open content management system, where any registered user can edit content on the wiki pages. Since the site is peer managed content can often times change to suit views that are not centralist. Much of the content on Wikipedia has disclaimers, which range from the content needing to be better cited to content being based purely on opinion with no citation present. For this reason Wikipedia is not considered to be a site to be used for factual information; it may provide a general understanding but for users whose opinions can be swayed easily, such as younger learners, Wikipedia is not a site for them to use. Many of the wiki styled sites found on the Internet follow the same approach as Wikipedia.

3.1.2 Problems with Wiki for Educational Environments

Using wiki technology for educational environments works for many institutions, however, their use for youth learners can be problematic. As previously discussed in Chapter 2, wiki environments allow users to change information as they see fit, which can be both constructive and destructive. Modifying content is constructive if it adds to the topic, has references for the material added and is neutral in position; content is destructive if it is opinionated, not referenced and is persuasive. Using a wiki in collegiate classrooms has the potential to be beneficial, but using it in grade school could lead to some problems. Typically in grade school classrooms teachers are attempting to convey factual information to their students, not particularly looking to add new content to the subject. Furthermore, grade school students are

more susceptible to persuasion than their older collegiate counterparts, thus making the wiki unreliable as an educational tool.

3.2 PLANNED EDUCATIONAL ENVIRONMENT

The planned educational environment consists of a learning environment that is centered on a forum style structure. The forum is a tool for learning that is structured to a certain degree, but at the same time open to more social communication utilizing chat. KXNN was the initial model to be used for this style of social learning environment. The planned environment is poised to replace the initial environment by allowing teachers to use an environment in which they can host their lessons easily without knowing the details behind HTML and for students to comment on the lessons as well as the teacher respond directly to the student’s questions in a way that benefits the entire community opposed to individually. However, teachers can respond directly to individual students by sending them a message to their inbox.

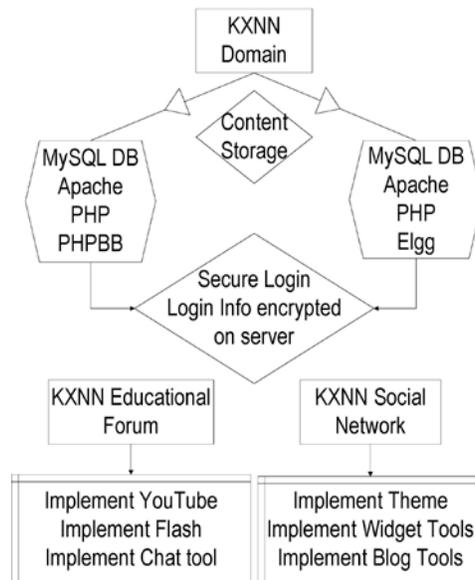


Figure 7: Minimalistic KXNN Hardware/Software Model

In figure 7, the method of design for the KXNN structure is described. The KXNN domain is split into two parts, an educational forum and a social network centered on education. This project is specifically concerned with the implementation and development of the educational forum.

3.2.1 KXNN Cloud Computing

To delve further into detail of the minimalistic KXNN model displayed in figure 7, the KXNN model is based on components of cloud computing. Cloud computing is Internet-based computing, whereby shared resources, software and information are provided to computers and other devices on-demand, like the electricity grid. It is a paradigm shift following the shift from mainframe to client-server that preceded it in the early 1980s. Details are abstracted from the users who no longer have need of, expertise in, or control over the technology infrastructure "in the cloud" that supports them [1]. Cloud computing describes a new supplement, consumption and delivery model for IT services based on the Internet, and it typically involves the provision of dynamically scalable and often virtualized resources as a service over the Internet [2][3]. It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the Internet [24].

The term "cloud" is used as a metaphor for the Internet, based on the cloud drawing used in the past to represent the telephone network [25] and later to depict the Internet in computer network diagrams as an abstraction of the underlying infrastructure it represents [25]. Typical cloud computing providers deliver common business applications online which are accessed from another web service or software like a web browser, while the software and data are stored on servers.

Most cloud computing infrastructure consists of reliable services delivered through data centers and built on servers. Clouds often appear as single points of access for all consumers' computing needs [25].

The KXNN educational forum is the first phase of the cloud computing applications that can be used with the system. The KXNN system will provide services to the users and also collaborate with other systems as indicated in figure 8 below.

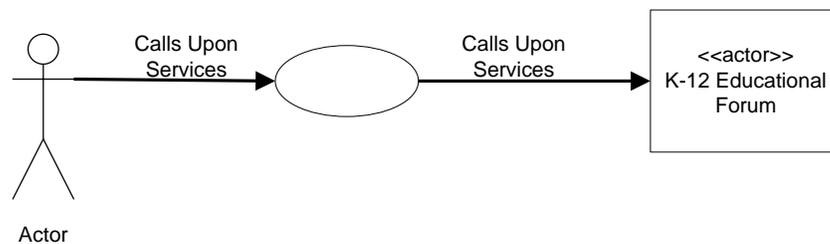


Figure 8: KXNN Context Diagram

3.2.2 KXNN Modeling and Life Process

In this project, we employed Evolutionary Prototyping (EP); whose main goal is to build a very robust prototype in a structured manner and constantly refine it. Thus an evolutionary prototype is the foundation of the main system whereas the new system is a product of improvements of the initial system based on new requirements and changes from users. This process allows a continuous refinement of the system and is based on an acknowledgement that designers don't understand all the requirements and will build on those well understood requirements while add features as they understand the requirements more.

One advantage with EP is that it can implement most of the features a user wants to integrate but on an interim basis with minimal functionality until the system is delivered. At the

same time, it allows developers to develop parts of the system that they better understand without the need to worry about those they understand less (i.e. developing a holistic system).

The partial system is sent to users for testing. When users work with the system they find missing features and make requests through feedback to the developers. The developers then use the feedback/requests along with their expertise to employ sound configuration-management practices to change and update the requirements, update the design, recode and retest.

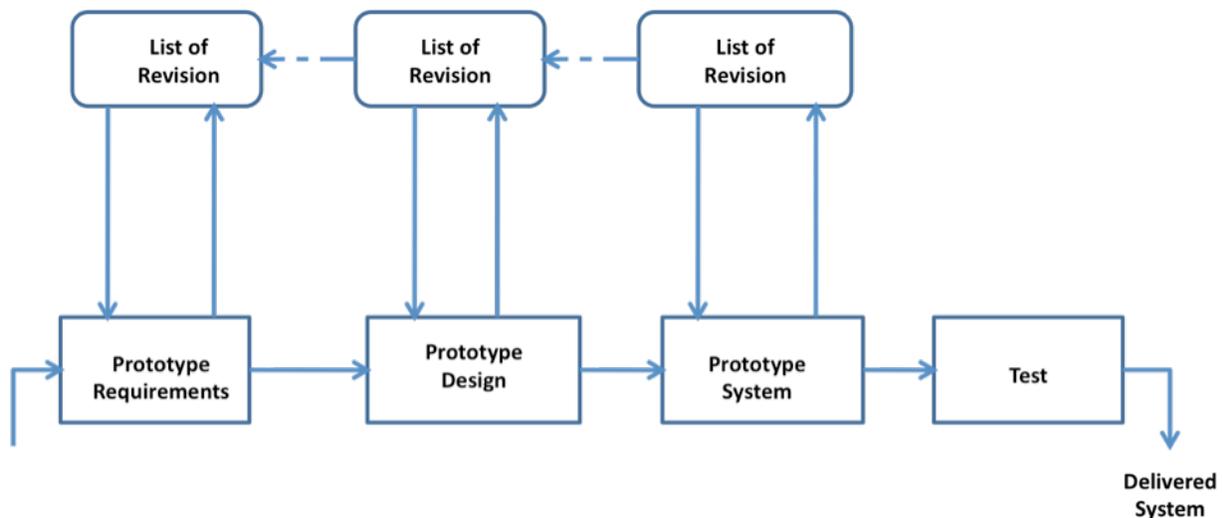


Figure 9: The Prototyping Model

The prototype system is based on actors, currently; these actors consist of K-12 students, parents and teachers. How each actor or group interacts with the system, or domain, varies based upon what the system allows the actors to perform. A detailed diagram of how actors can interact with the system is shown in the KXNN Domain Model, Figure 10; this model serves as the basis for implementation of the prototype system, however, actions may be modified and rights given to individual actors or groups administratively as the system requirements change in later

iterations of the design process. The main objective of the domain model is to relate objects in the system domain to each other, physical objects to abstract concepts.

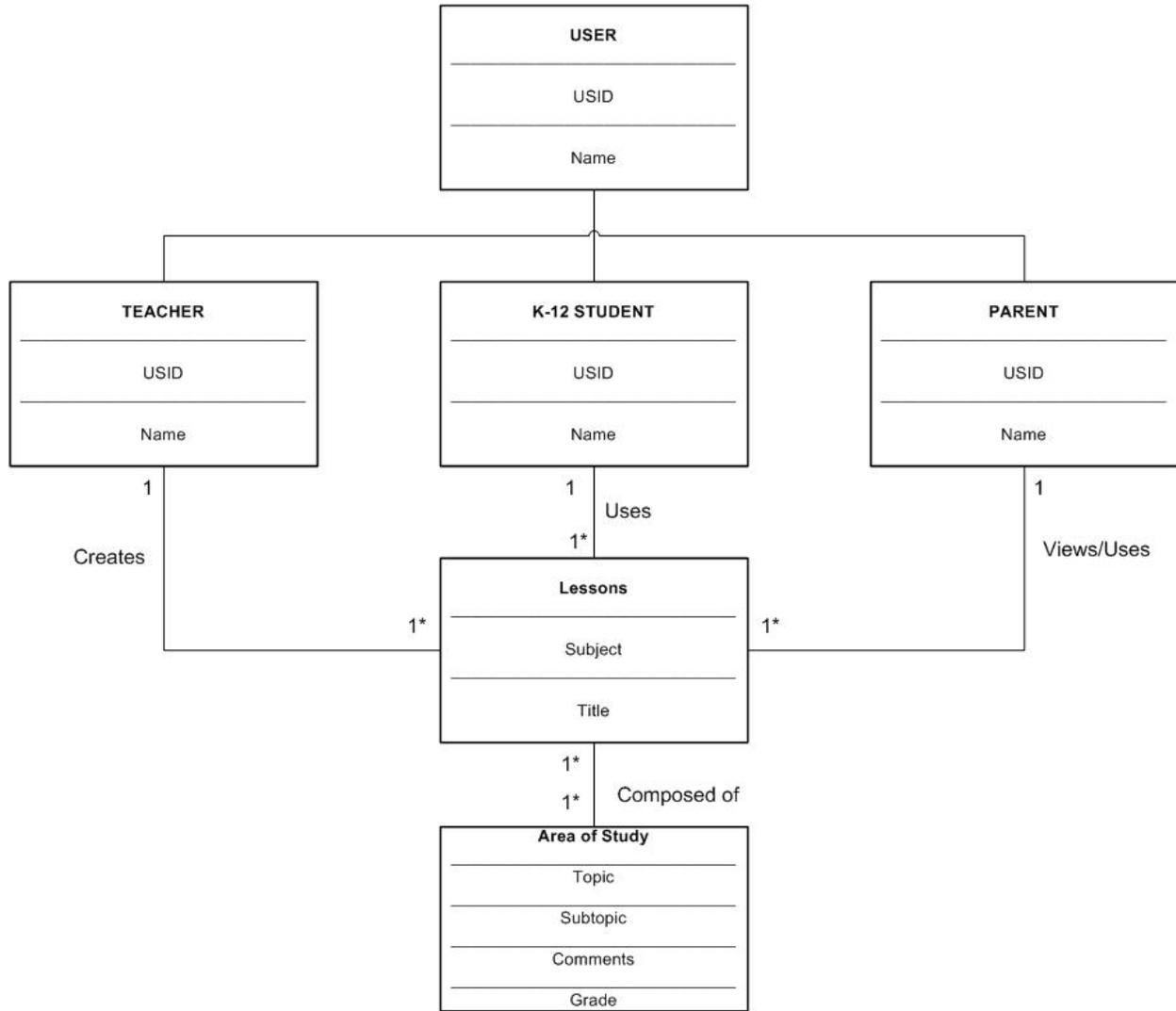


Figure 10: KXNN Domain Model

The user or actor may interact with the system, as shown in figure 8, in a variety of different ways. A few of these interactions in figure 11 are demonstrated in a use-case diagram. A use-case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram

defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

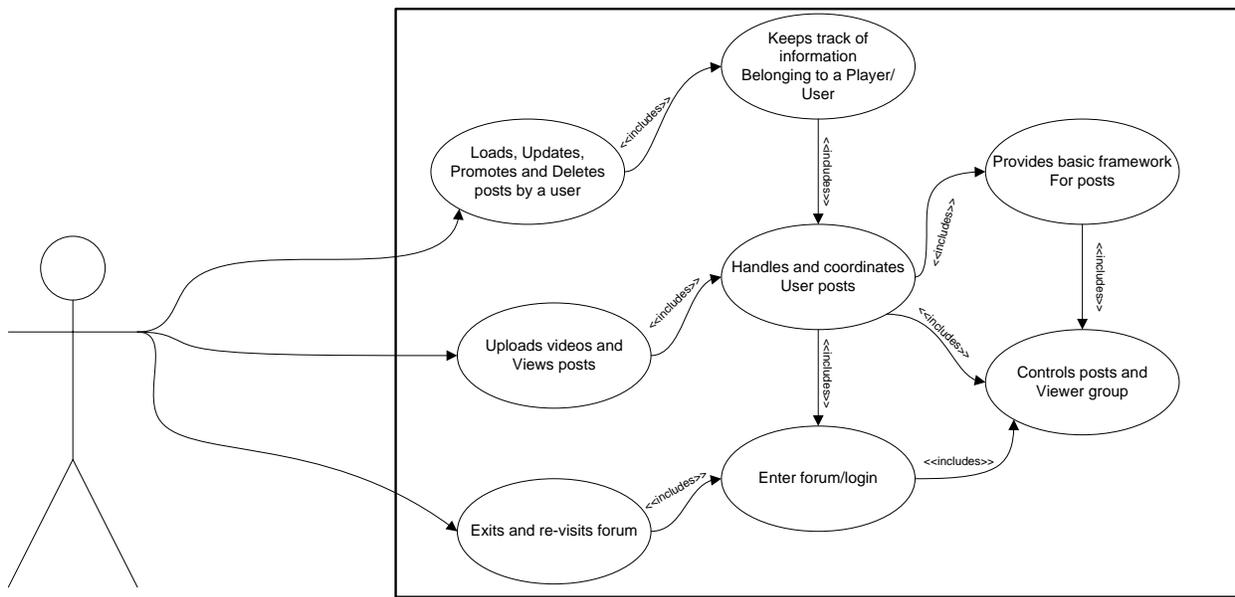


Figure 11: KXNN Use-Case Diagram

An important aspect of the system is how, if working appropriately, the system responds to tasks. There are many ways to illustrate how a system should respond to tasks if the system is running effectively and optimally. A System Sequence Diagram is a sequence diagram that for a particular scenario of a use-case, the events that external actors generate, their order and possible system events. Figures 12 and 13 are system sequence diagrams for login to the system as well as viewing the available list of forum topics, respectively.

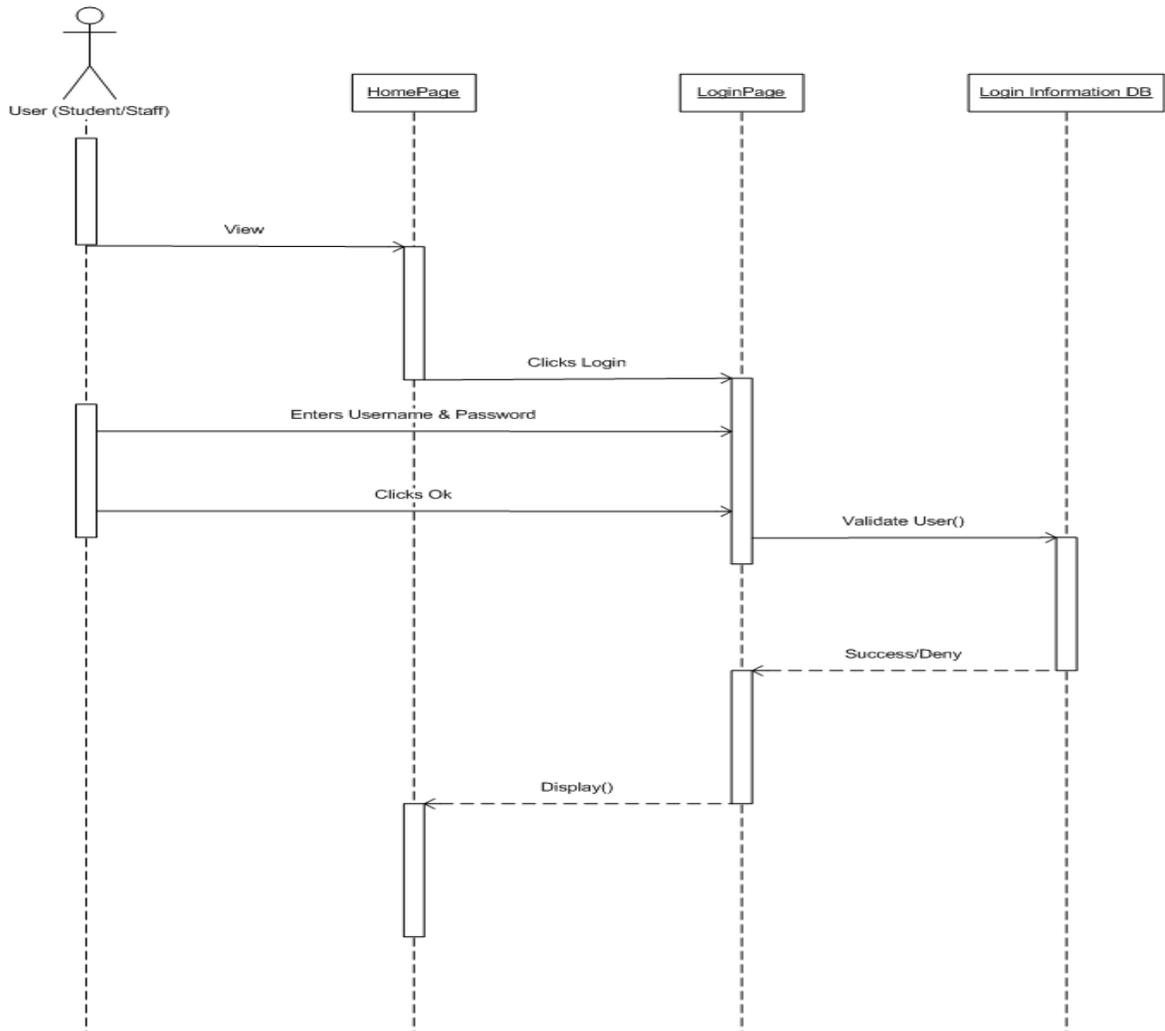


Figure 12: KXNN System Sequence Diagram – Login

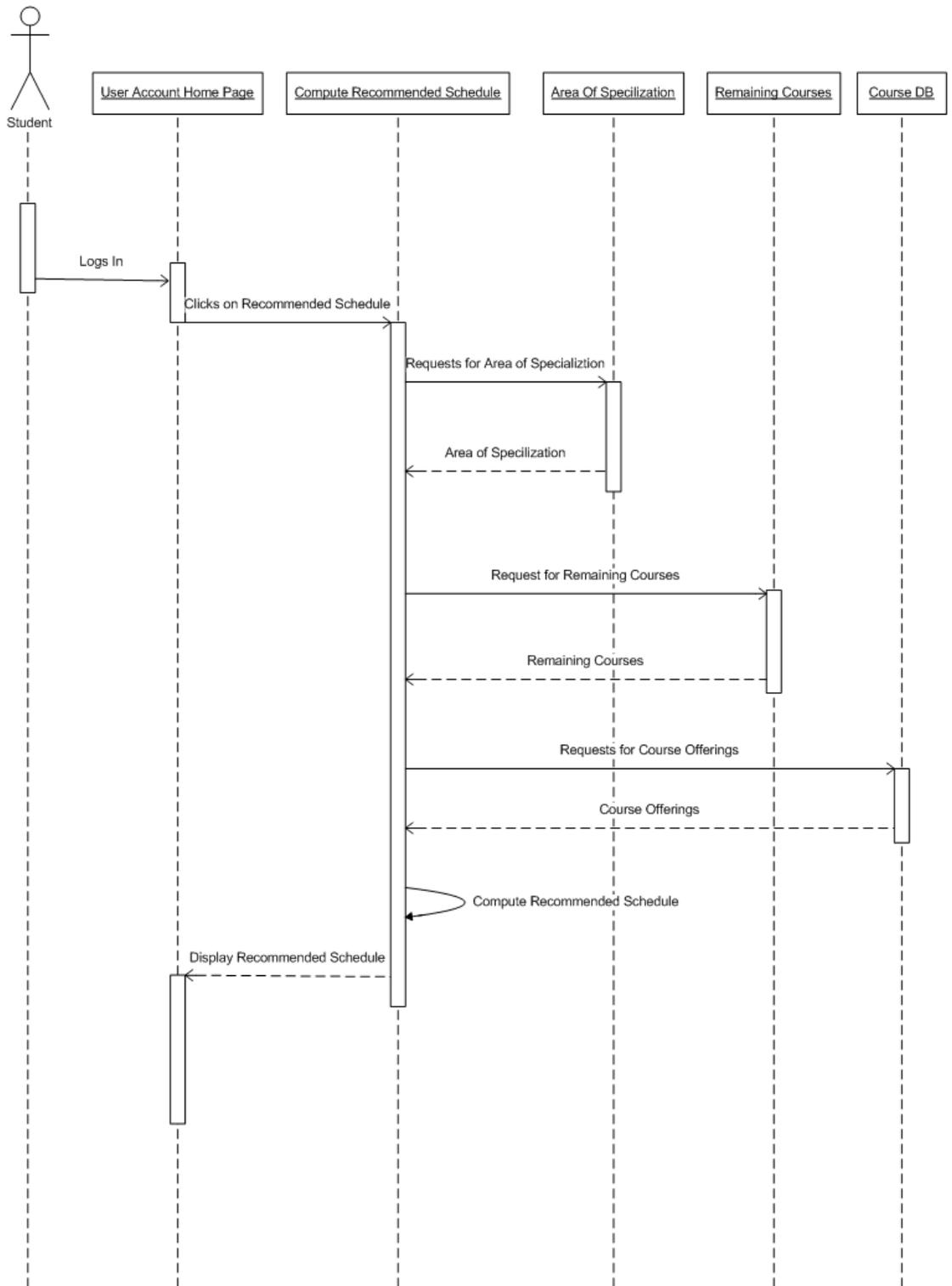


Figure 13: KXNN System Sequence Diagram – View Available Forum Topics

3.2.3 KXNN Use-Case Scenarios

CONCISE USE CASE SCENARIO

A. Visit KXNN Forum

Primary Actor: User / Student/Parent/Teacher

Secondary Actor(s): None

Description: The user will login, instantiate a new session and chooses a topic from the provided list of topics/choices to either view the lesson or posts a lesson material in any allowed media format accordingly with respective to the topic under discussion.

Name: Play or post video instance of a science lesson on the KXNN forum

Scope: KXNN server system

Level: User-goal

Primary actor: Player

Secondary actor: None

Stakeholder Interests:

Player: Wants to successfully view the available lesson, post comments and a score and post their own lessons prepared successively in a form of video or text avoiding pitfalls and errors. The system will allow the user to edit and update any changes in the selected data as it relates the user's personal account as well as comments on other users' posts.

Lesson server: Provides general requirements and lesson regulations for all users who login to view and post lessons and comments.

Pre-conditions: The users should have a valid user name and password to the cloud server system and a client to login from before that supports Internet browser before he/she view and post comments and lessons in the cloud.

Post-conditions: A list of the last 10 players, together with their respective scores can be displayed on the screen when necessary.

Basic Flow:

- 1) The user signs up for an account on the cloud/forum or login to the KXNN host server
- 2) The user selects topic interest from the menu; - FYFL – Get SCIENCE, Water, Transpiration
- 3) The system plays a list of topics on the science forum and the user to selects a topic of interest.
- 4) User chooses post lesson option from the provided features.
- 5) User posts lesson as text or video depends on the prepared material
- 6) System acknowledges successive post through a screen message to the user
- 7) The system/game adds and saves the lessons to the available list
- 8) The user test the post and sets parameters to allow her peers to view lesson
- 9) The system saves the details and returns to the post or view lesson menu.

Extensions: (External Flow):

The user does not enter an available view or post command:–

1. The system displays an error message.
2. The system returns the user to the lesson selection menu.

Open Issues:

- 1) System provides the functionality of deleting a post and corresponding comments from the list if needed

Technology of data variation list: video, text, flash, html, adobe captivate

Frequency of occurrences: Continuous.

Special Requirements:

1. The screen colors must be standard across the system.
2. The font should be formal and size should be standard across the system.
3. Text fields for entering data. If there are constraints in number of characters to be entered then it should be explicitly mentioned on screen or on the user manual.
4. Submission of data should be through “enter” key. Or click “submit”

3.2.4 Testing Educational Environment

Testing the educational environment is planned with the use of an online survey to K-12 teachers. The surveying would be done with teachers that have experience using any of the

online educational tools aforementioned in Chapter 2. The teachers recall their experience using any of the online educational tools and experiment with the designed educational environment and provide feedback based on their experience. The results from this survey are illustrated as graphs and models and conclusions presented in Chapters 5 and 6.

3.3 HYPERTEXT PREPROCESSOR

Hypertext Preprocessor, php, is a widely used scripting language that was originally designed for web development to produce dynamic web pages. PHP was originally created by Rasmus Lerdorf in 1995 and has been continuously developed since. PHP is embedded into HTML source code and is interpreted by a web server with a php processor module, which in turn generates what you see on the web pages. PHP is the primary scripting language, aside from static HTML, that was used to create our test educational environment.

3.3.1 Hypertext preprocessor bulletin board, phpBB

phpBB is an open source bulletin board software that is written entirely in PHP. phpBB is the base code that was used for the testing environment, it has basic security features embedded and forum style structure. In its most basic form phpBB does not offer all the functionality required to achieve the task of using as an educational tool, certainly not the functionality required for usage as an interactive learning environment for teachers and not that of KXNN. However, with the basic forum style learning environment software installed, this provided a baseline environment to make changes. Some modifications were implemented in the new software, still encompassing the major PHP code, which will be discussed in further detail in Chapter 4.

3.4 DESCRIPTION OF INITIAL STUDY

The goals of the study were to (a) enhance the skills of computer users, (b) familiarize the users with a new educational environment and (c) teach new skills to all computer users. The areas that were targeted for the study were the learning of a new educational environment in comparison to other environments, comprehension and computer technology. Prior to the study, data was gathered from the teacher population to find if the planned study was the right fit for the test group. The researcher created a broad array of questions that needed to be answered by each of the testing participants. All of the participants identified themselves as either being good with computers or computer literate.

The testing participants were given a series of tasks to perform at their leisure and once the task was completed, the participants were asked to complete a detailed, but brief survey of their experiences.

3.4.1 Test Environment and Experiment

Before the emergence of online educational learning environments, students were forced into traditional learning methods such as lectures. It is known that there are a variety of different learning styles based upon the type of learner and each student is different. There have been many environments created that cater to structured learning but none have been catered to younger learners or designed with a loose structure that gives students the ability to express themselves in a way that is comfortable for them to do so. While teachers know that there is more than one way to teach a class, many are relegated to teach the class the way it was taught to them instead of implementing new technology that can be used inside the classroom, in learning labs and at home. Therefore, this information provided the motivation for the study.

3.4.2 Hypotheses and Variables

The main hypotheses of this study is that teachers embrace computer aided learning that is interactive in a setting inside and outside of the traditional classroom and educators would use the environment if it engaged students and was not difficult for them to use and required no technical programming skill. Another hypothesis is that an informal learning environment better supports students as opposed to structural educational environments. In order to test these hypotheses, the researcher configured a set of variables. For the study, the independent variables were determined to be the phpBB forum software being used and the group being investigated which were K-12 teachers. The software that was chosen for this experiment was the open source phpBB version 3. Initially the study was to be opportunistic sampling; however, later the researcher realized that they had enough data to be statistically significant, greater than 30 teachers participated out of the 50 that were invited.

To test the hypotheses, pre and post-questionnaire were given using a Likert-type scale. The surveys were given online using Survey Monkey. A Likert scale is a psychometric scale commonly used in questionnaires, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement using a bi-polar questioning structure. Likert generally corresponds to five possible ratings on the scale. The surveys used for this experiment are Likert-type because they keep the odd number of possible ratings on the scale but use seven and nine point ratings as opposed to five. The types of surveys given to participants were the Computer Understanding and Experience, Perceived Usefulness and Ease of Use and the Questionnaire for User Interaction Satisfaction; all validated surveys.

3.4.3 Setup of Experiment

In order to perform an experiment and collect data, an educational environment using the phpBB software needed to be created to perform some tasks. phpBB was acquired for free and additional setup and configuration steps are defined and explained in Chapter 4.

The test environment for all subjects was their personal computer with Internet capabilities through any web browser of their choice. The specifications of the machines were not a concern, as phpBB does not require anything more than the minimum specifications that the browser is able to render HTML pages. The test subjects consisted of three main groups. The first group were veteran teachers, who have been teaching for over 7 years and certified to teach in their respective states, the second group were Teach for America teachers who graduated within the past 5 years and certified to teach in their respective states, the third group were new college graduates whose major was Education and are certified to teach or planning to be certified to teach within in next 3 months. In hopes of having a diverse population, teachers were not filtered because of age and each must have had some basic computer knowledge as determined by the pre-questionnaire.

3.4.4 Experimental Procedure

Since the experiment was set up using the Internet, the participants were encouraged to visit the site at their leisure to complete the study. The experiment included three major sections: (1) Pre-questionnaire, (2) KXNN phpBB site, and (3) Post-questionnaires. Figure 8 shows a flowchart describing the benchmark tasks the participants were to complete.

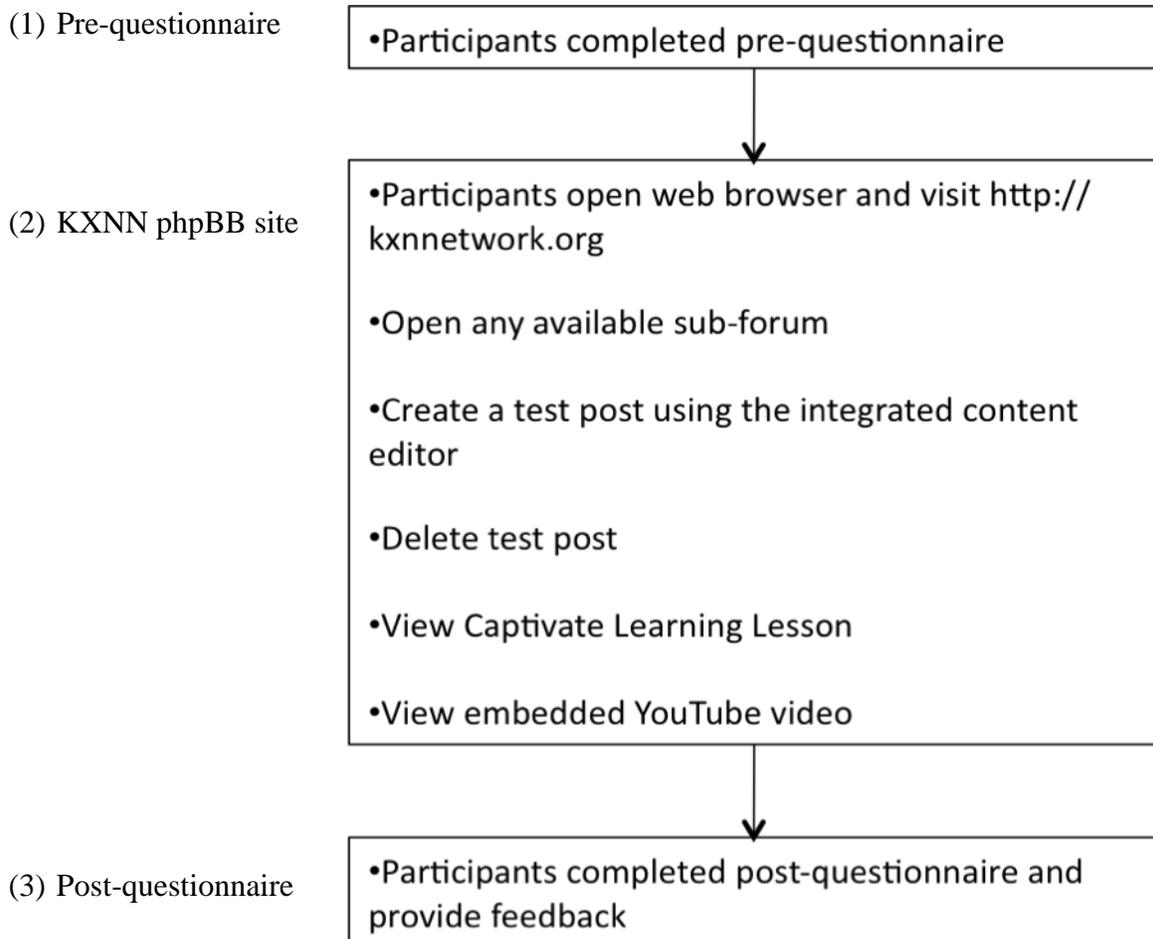
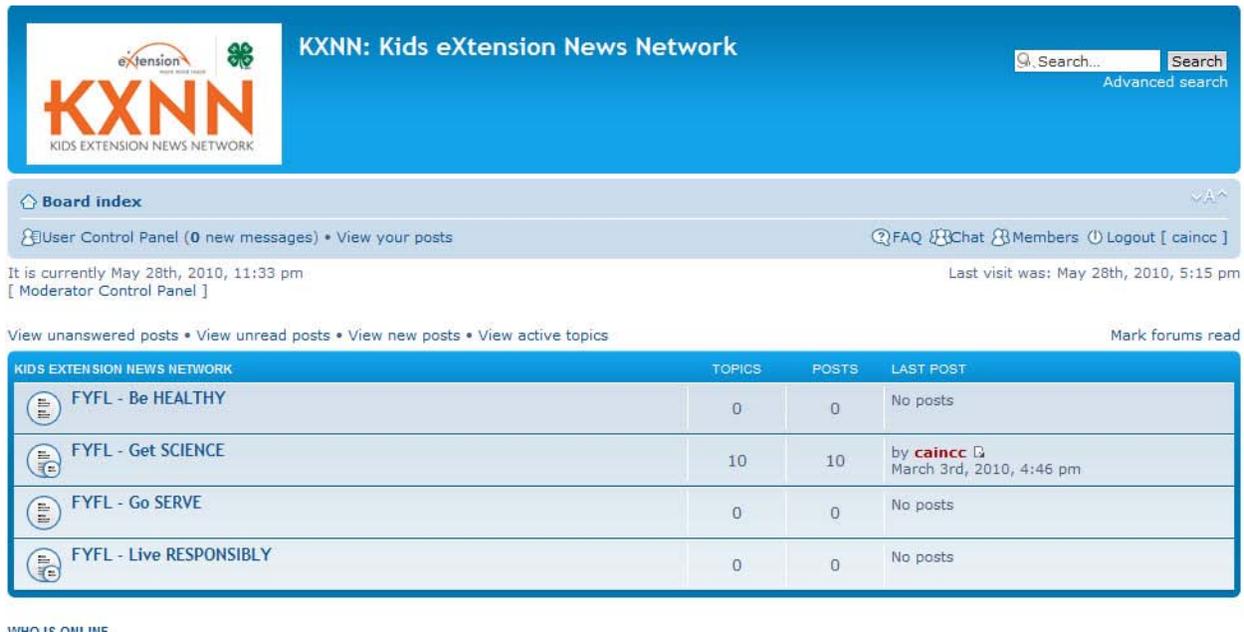


Figure 14: KXNN Survey Flowchart

CHAPTER 4: IMPLEMENTATION

4.1 PHPBB IMPLEMENTATION

As mentioned in Chapter 3, phpBB is open source. This chapter discusses the details behind successfully configuring our KXNN test environment. phpBB required some essentials which are discussed in the remaining sections of this chapter.



The screenshot shows the KXNN forum home page. The header includes the KXNN logo and the text "KXNN: Kids eXtension News Network". A search bar is located in the top right corner. Below the header is a navigation bar with links for "Board index", "User Control Panel (0 new messages) • View your posts", "FAQ", "Chat", "Members", and "Logout [caincc]". The main content area displays a table of forum topics under the heading "KIDS EXTENSION NEWS NETWORK".

KIDS EXTENSION NEWS NETWORK	TOPICS	POSTS	LAST POST
 FYFL - Be HEALTHY	0	0	No posts
 FYFL - Get SCIENCE	10	10	by caincc  March 3rd, 2010, 4:46 pm
 FYFL - Go SERVE	0	0	No posts
 FYFL - Live RESPONSIBLY	0	0	No posts

Figure 15: Prototype KXNN Home Page

4.1.1 Domain Registration and Hosting

Prior to phpBB being installed we first had to register the domain name and secure a host. A domain name is an identification label that defines a realm, for our environment that realm is kxnnetwork.org, based on the Domain Name System (DNS). The domain name resolves to an

Internet Protocol, IP, address, based on that IP address a route is determined using the host routing table that specifies the route from an end user to that of the IP address which returns the website to the browser. Our test environment kxnnetwork.org is registered with the largest Internet Corporation for Assigned Names and Numbers (ICANN) accredited registrar in the world. Without the use of the domain name, anytime a user wished to visit the site they would be forced to enter in the IP address for the site, 69.163.237.21, which is not easily recalled from memory. There are billions of IP addresses currently in use, and most machines have a human readable name, which makes the task of finding the sites much easier. There are many billions of DNS requests made each day and IP addresses can change daily, hence the importance of a domain name.

To use an analogy – think of a domain name as a license to have a website but where does the website exist? Where exactly do you put your website? Along with a domain name, in order for a site to be seen there must also be a host for the content a user wishes to display on their site. There are a variety of different types of hosting available on the Internet and the prices for each range greatly. For this particular study we chose our host based on a list of criteria that needed to be met to adequately support phpBB, those criteria include a MySQL Server, Email Server, PHP enabled server and Apache Web Sever. For our host, we chose Dreamhost particularly for their ease of use and instantaneous updates to content as we modify our implementation.

4.1.2 MySQL Database Setup

In order to use phpBB it requires that a database be setup and permissions be given to the phpBB software to access the server and populate data within the fields. To setup the MySQL

server we used the Dreamhost graphical user interface to access the PHP-MyAdmin control console to perform the initial creation of the database for KXNN use. After creating the database and importing those settings into the phpBB installation configuration file, phpBB accessed the database to create the first account for the site, which happens to be the site administrator account.

After creating the primary administrator account, the administrator had access to modify the forum site accordingly. phpBB utilizes the database for many uses, one primarily being new user registration. New user information such as user name and password are store securely within the database. There is little chance to gain access to a user's password as they are encrypted; passwords cannot be reset by the administrator either. If a user happens to forget their password the user can reset the password by checking the email address, which they registered for the site with. The database is also used to store pertinent information related to the site configuration. The database as well as the site can be backed up locally such that in the event of a crash, virus, hack or any other type of malicious behavior the site can be restored with virtually no downtime to a state which it was functioning as expected.

4.1.3 Email Server Setup

Having our own email server is an added benefit of using Dreamhost, which includes this feature as part of their hosting package. In order to have sites populated within search engines it is typically required that the site have a domain email address to verify prior to being listed. This extends far beyond functionality, but the capability that the site has to reach further to the public by being listed in search engines is an added benefit. Email server setup was straight forward if one wished to use the Dreamhost native web based email client, however, we opted to use the

Google email client because of its increased functionality and cloud based computing applications.

To use the email client a small piece of HTML code had to be added to the main page of the site, invisible to anyone other than the site administrator with access to the actual stored HTML files, to verify that the person registering the site was indeed the site administrator. After Google successfully verified this information they setup all mail addressed to a @kxnnetwork.org address to be stored on their servers.

Google offers practically unlimited storage space but also offers a host of other functionality such as shared collaborative calendars, access to Google Docs and much more. Any teacher that wishes to have an email address affiliated with the site may create one and that provides a source for teacher to communicate with each other in an environment that is separate from the learning forum.

4.1.4 Scripting for content support

As indicated earlier, while phpBB does offer some basic forum functionality, it does not include all the tools necessary to facilitate interactive learning. phpBB, in its native form, lacks support for flash based content, YouTube videos and Google videos, which are an integral component of KXNN content. Without the addition of these components, there would be no interactive content available for students to watch, but rather read as they did previously on the wiki platform. The researcher added support for YouTube videos, Google videos and flash content to the KXNN site using the php scripting language to accomplish the task. User uploaded videos to YouTube can now be embedded directly into posts on the site.

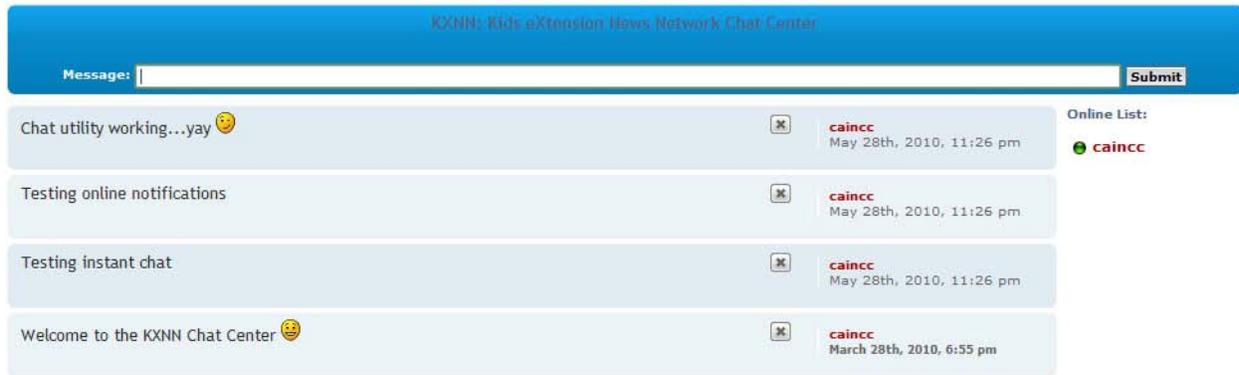


Figure 16: Prototype KXNN Instant Chat

Google video support was also added using the php and teachers as well as other users can add Google videos to their posts as well by embedding them. The embedding of videos removes any HTML code that a teacher needed to add when using the wiki infrastructure to a simplified version by simply placing the link to the video within the phpBB tags to embed the video into the users post.



21st Century Agriculture begins your exploration of how the world produces food and fiber for the present and will for the future! Just what is agriculture and why is it important?

Have you ever wondered where your food comes from? Here at extension.org, we want to help you figure out just what it take for your food to get to you!

What about food for other people across the world? Better yet, where will our food come from in the future?



Figure 17: Prototype KXNN Agriculture Lesson

KXNN utilizes Adobe Captivate to create interactive learning lessons, this was a feature that was also not included natively by phpBB, php code was written that allows this content to be embedded directly into the Internet browser. Furthermore, flash content can be viewed naively on any web browser that has HTML5 enabled without the need for an additional plug-in from Adobe to view flash content. Figure 13 shows a still image of Adobe Captivate support within phpBB.

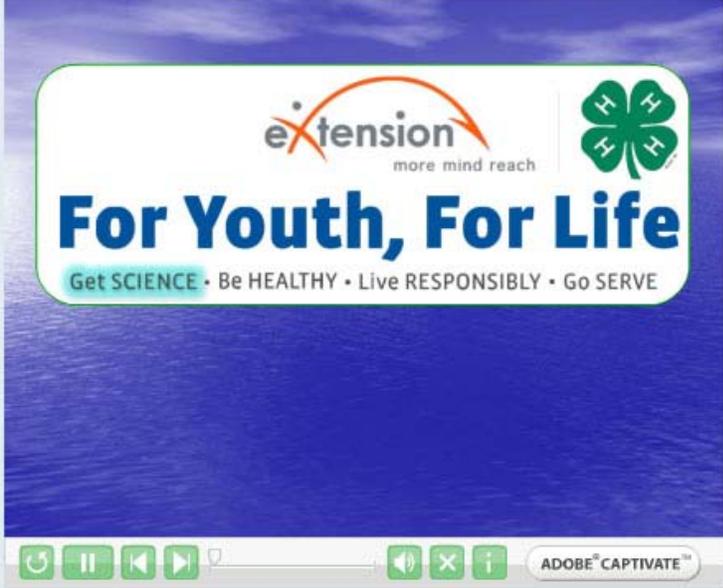
Precipitation

POSTREPLY ↩ 🔍 Search this topic... Search

Precipitation *EDIT ✖ ⚠ ? "QUOTE

□ by **caincc** » March 3rd, 2010, 4:45 pm

Precipitation



POSTREPLY ↩

Figure 18: Adobe Captivate support within KXNN environment

Integrating these features were an integral part of the success of KXNN as the environment was designed to be used by younger learners who have a tendency to be very fond of interactive videos and other content that is visual. KXNN already had a large amount of content in flash format, but found it difficult to have a central repository for that content where it could be viewed without visiting multiple sites, phpBB solves that issue.

4.1.5 Content Management

Content Management was a primary reason why phpBB was implemented, the software was much more accessible to learn and manipulate than HTML. Moving content over from wiki to phpBB was a seamless issue aside from embedding pictures, which sources are to go within image tags. Content is easily hosted on the phpBB which was a sub-goal of this study, however, it was brought to the researcher's attention that phpBB should be used for new content rather than content that already exists on another site, thus while the capability exists, there were only a few current lessons that were migrated from the existing wiki to KXNN's new phpBB site.

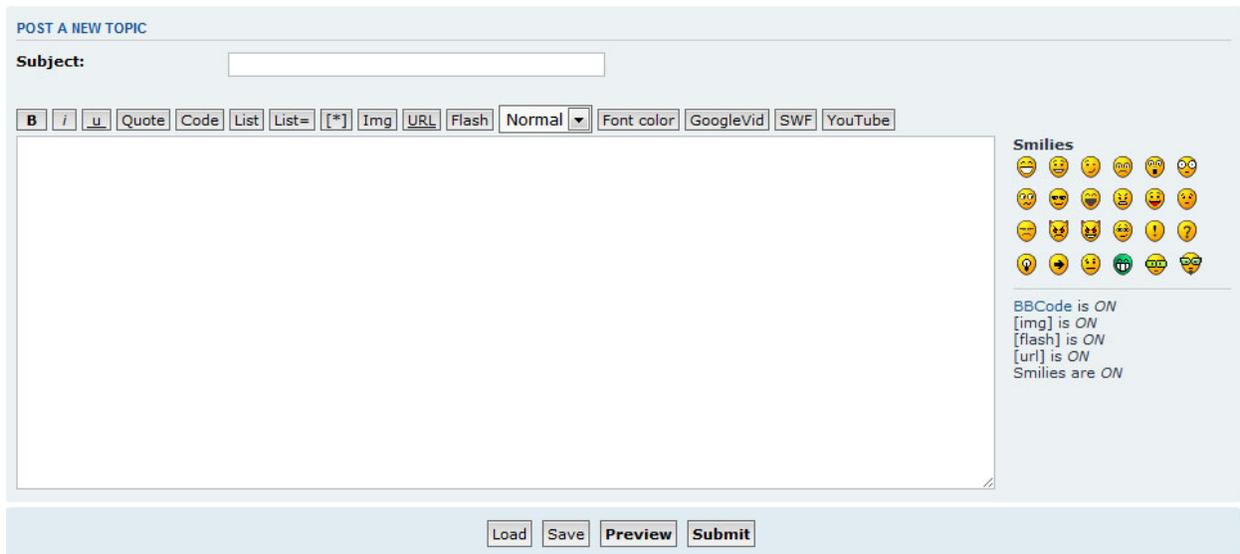


Figure 19: Prototype KXNN Lesson Creation Workspace

4.1.6 Google Analytics

KXNN is a national initiative, thus for the sake of adequate data to report we had to include a method to statistically track users as they visited the site. In order to accomplish that task efficiently we decided to use Google Analytics, which is an online marketing tool to see how users interact with the system. Google Analytics is embedded into the site utilizing a little

java script that runs in the cache of a users web browser, sets a cookie and transmits that data back to Google for analysis and forwards that information to the KXNN Google Analytics page in the form of charts and graphs for data analysis. The most current data from the Google Analytics page can be found in the Appendix. The data shows the average time a user spends on the site, how they were directed to the site whether directly, search engine or bounced from another source, the user's country based on their IP address, amount of page views and which pages were viewed most frequently, keywords used that relate to the site as populated by a search engine, the browser used while visiting the site and the users connection speed. This data can be used to further improve the site and track its popularity.

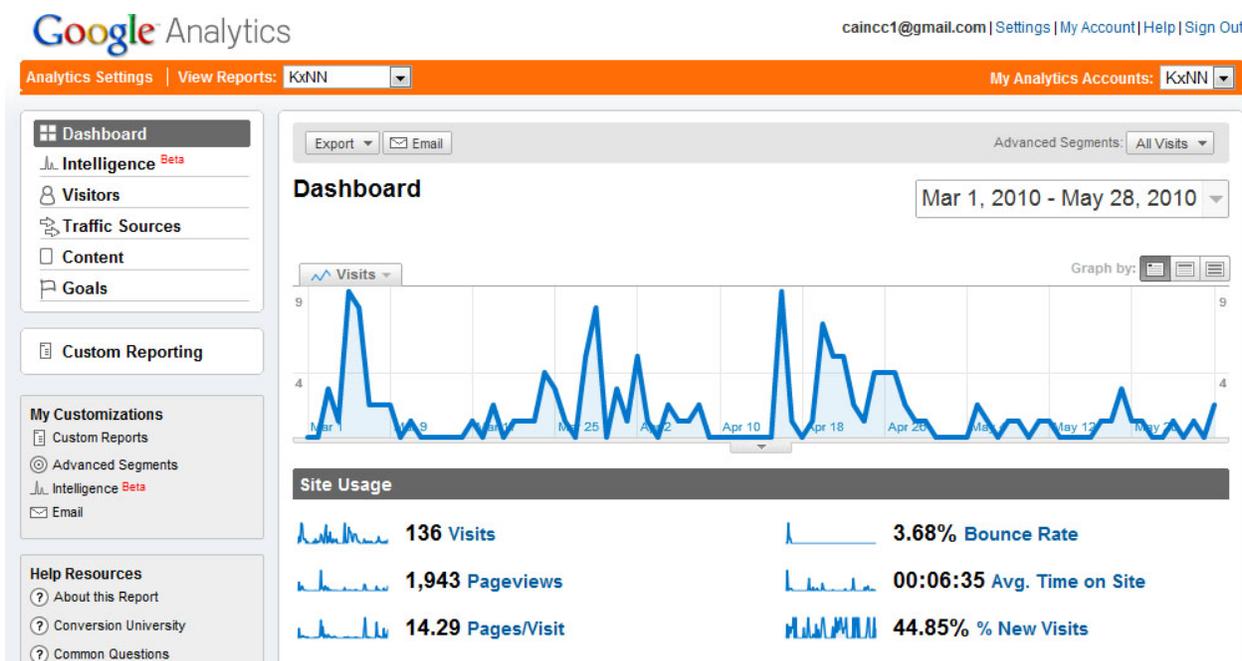


Figure 20: Prototype Google Analytic Data

CHAPTER 5: RESULTS AND DISCUSSION

As stated in Chapter 1, the primary objectives of this study were to address the following concerns:

1. Design an educational style learning environment to provide educators and younger learners the ability to use an online system that is interactive and open to younger learners and easy for educators to use to post their content.
2. Investigate educational tools currently available to facilitate and supplement traditional classroom learning for their effectiveness.
3. Determine if the educational prototype environment will improve the effectiveness of educators by providing more interactive lessons and more collaborative teacher communities.

To address these concerns, a series of studies were conducted in spring 2009. In addition, an educational environment was created using open source forum style bulletin board php software with modifications to allow flash content to be easily embedded. The results from these studies provided much information about how teachers perceive current educational content management systems and if the proposed environment is better suited for teaching K-12 students.

5.1 INFORMATION GATHERED FROM PRE-QUESTIONNAIRE

Based on survey information obtained from study participants, many already knew some basic information related to the information age and using computers. Many were still at an early

stage of their computer literacy but still understood most of the fundamental basics of computer usage. All of the study participants were college graduates so it was not a surprise that many understood the basics of computer usage especially considering 68.8% of study participants were at most 30 years of age.

With a nearly equal distribution of participants holding a Bachelors Degree, 53.1%, and Masters Degree, 43.8%, the participants were very well learned individuals. The breakdown between arts and science degrees were slightly skewed towards science degrees, with 40.6% of participants holding degrees in the arts and 59.4% degrees in the sciences.

All of the participants had experience with online educational content management systems, Blackboard, Moodle, SharePoint and WebCT, also a part of Blackboard with 40.6% of participants believing that none of the aforementioned content management systems could be used effectively as a K-12 educational tool.

In social networking usage, 81.3% of participants used Facebook, MySpace, Twitter or LinkedIn. 71.9% of participants believe that K-12 teaching should utilize online teaching methods to supplement traditional classroom learning and 78.1% would use or consider using an online educational forum if it were available to them.

5.2 RESULTS OF USABILITY KXNN ENVIRONMENT EXPERIMENT

This experimental tool of participants in total were 32 and involved teachers from Atlanta Public School Systems in Atlanta, GA, Charlotte-Mecklenburg School System in Charlotte, NC, Teach for America, and recent college graduates, these teachers were an integral part of the usability testing of this study.

Question	Response
I frequently read computer magazines or other sources of information that describe new computer technology	12.5% disagree, 34.4% neutral, 53.1% agree
I know how to recover deleted or lost data on a computer or PC	78.1% disagree, 3.1% neutral, 18.8% agree
I know what a LAN is	18.8% disagree, 25% neutral, 56.2% agree
I know what an operating system is	3.1% neutral, 96.9% agree
I know how to install software on a personal computer	3.1% disagree, 3.1% neutral, 94.8% agree
I know what a database is	28.1% disagree, 31.3% neutral, 40.6% agree
I am computer literate	9.4% neutral, 90.6% agree

Table 1: Pre – Questionnaire Results

Table 1 represents data self reported by the student participants, which analyzes their computer literacy level. Overall, their responses denote that most are not novice computer users but are also not experts so we consider the group to be experienced computer users. This is evident by the amount of users who identified themselves as knowing how to install software as a personal computer and identified themselves as computer literate.

Question	Yes	No
Do you believe teaching K-12 should involve more online teaching tools as a method to supplement traditional classroom lessons?	71.90%	28.10%

Table 2: Educator perception of online educational tools

Table 2 represents whether teachers feel there is a place in education for online teaching tools to supplement traditional classroom education. This is an essential question to this study, if teachers already feel that there is no room for online educational environments they may have been less receptive to any online teaching method proposed to them. Luckily, the results are quite the

contrary with 71.90% saying that education should consist of more online educational tools to supplement the traditional classroom environment.

Question	Yes	No	Maybe
Would you use an online educational forum to teach lessons if it were available to you?	40.60%	21.90%	37.50%

Table 3: Educator reception to online educational forum

Table 3 is an integral component of the study; the table represents educator response as to whether teachers would use an educational forum if it were made available to them. The importance of this study is the amount of participants that answered “Maybe”. A response of maybe indicates that educators may be swayed, depending on the implementation of the service, to use an educational tool if it were made available to them. Essentially, this study can be considered successful if we are able to positively influence the majority of those who initially answered maybe to switch in the post-questionnaire to the yes category or rate the prototype environment as the better educational tool.

	0	1	2	3	4	5	6	7	8	9	Avg
Terrible/Wonderful	1	1	3	1	1	2	4	4	9	6	7.31
Difficult/Easy	1	0	2	3	0	1	3	4	9	9	7.78
Frustrating/Satisfying	0	1	2	3	0	1	3	7	7	8	7.69
Dull/Stimulating	0	1	0	5	0	1	1	6	11	7	7.88
Rigid/Flexible	1	0	4	1	0	0	2	4	11	9	7.88

*Data was collected using a 10 point scale 0 being the lowest and 9 the highest

Table 4: Post-Questionnaire Satisfaction Results

Table 4 shows the participants responded well to the KXNN forum style learning environment. On a scale of 0 to 9, the average rating in each of the satisfaction categories was nearly 8. Their response to the system was better than expected by the researchers; we anticipated that their response would be closer to the 5 or 6 satisfaction range. The researchers felt that their exclusion

of a tutorial for the system might actually affect the percentage of users that would satisfactorily navigate the site. The tutorial was intentionally left out of the study to gauge how intuitive the site would be without directions. Based on user response, the site proved to be very intuitive, even for novice users. This information can be used in later studies to gauge satisfaction of teachers if a tutorial was included. This information can also be used to contrast whether the same level of intuitive design is displayed with students when they begin to test the site. Rating amongst the highest averages were that of ease of system use, stimulating to use and flexible to use; which are key to engaging students and teachers as well as prolonged use of the system after deployment.

	unlikely						likely		
Rating Weight	1	2	3	4	5	6	7	Avg	
Using the system in my job would enable me to accomplish tasks more quickly	1	2	4	2	3	9	11	5.34	
Using the system would improve my job performance	0	1	4	3	2	12	10	5.56	
Using the system in my job would increase my productivity	0	3	4	0	5	10	10	5.41	
Using the system would enhance my effectiveness on the job	0	1	4	3	2	11	11	5.59	
Using the system would make it easier to do my job	0	2	4	2	4	11	9	5.41	
I would find the system useful in my job	0	4	1	2	4	9	12	5.53	
Learning to operate the system would be easy for me	0	1	6	1	4	11	9	5.41	
I would find it easy to get the system to do what I want it to do	0	3	4	0	4	13	8	5.38	
My interaction with the system would be clear and understandable	1	1	3	3	4	8	12	5.5	
I would find the system to be flexible to interact with	0	3	3	2	4	9	11	5.44	
It would be easy for me to become skillful at using the system	0	1	6	1	1	9	14	5.66	
I would find the system easy to use	0	2	4	1	2	7	16	5.75	

*Data was collected using a 7 point scale 1 being the lowest and 7 the highest

Table 5: Post-Questionnaire Usefulness Results

Table 5 represents how the teachers viewed the system in respect to how useful it would be in their job. Judging by how teachers rated the system we can see that most feel as if the system would assist them in doing their job. This is a key factor, as teachers see the usefulness in the system, they will be more inclined to use the system as it helps them with their daily tasks. With the average rating in excess of 5 in each area it is clear to see that the teachers find the system useful which will likely translate to teachers wanting to use the system in their classrooms. The highest rating of 5.75, I would find the system easy to use, is particularly key to the success of the system. If teachers do not find the system easy to use they will avoid using the system. We wanted teachers to feel that the system worked for them and not against them, which is the reason why we decided to use a forum style approach as it is less structured than traditional environments, it seems that teachers received this well.

Question	Yes	No
Were you successfully able to complete the set of tasks on the KXNN website	81.30%	18.80%
Based on your experiences using KXNN, which online educational tool would you prefer to teach K-12?		
Blackboard	18.80%	
Moodle	9.40%	
KXNN	71.90%	
SharePoint	0%	

Table 6: Post-Questionnaire Combined Results

Table 6 is a representation of 2 different questions and the participants' responses, respectively. The first question is in regards to whether they successfully completed the list of tasks that were given to them, this list of tasks can be found in Appendix D, over 80% responded by saying they could. This supports one of the goals of the research, which was to build a content management system that was intuitive, easy to use and easy to learn. It also shows that while setting a list of tasks to be completed without a tutorial was effective, the results could have been further

improved by including a tutorial to assist those that were not able to complete all the experimental tasks. The second question is a follow-up to the question originally asked in the pre-questionnaire regarding which teaching tool would be most effective for K-12. In the pre-questionnaire 40.6% of participants answered none, in the post-questionnaire 71.9% indicate the KXNN environment. This is a huge breakthrough for the researchers, not only did teachers like the system, but most switched for their original response to KXNN. This shows the appeal of the KXNN style tool is far reaching and has the potential to be used widespread.

If you could use a style similar to KXNN, which teaching style would it be?	
Synchronous	3.10%
Asynchronous	28.10%
Both	68.80%

Table 7: KXNN Method of Collaboration

Table 7 represents how teachers feel they could utilize the KXNN environment as it relates to the former communication with students. The researchers wanted to investigate if the environment could be used both synchronously as well as asynchronously, and it seems that teachers agreed with the researchers. The forum includes instant messenger chat functionality which can be used to chat with anyone online at the same time as well as instant updates of forums when a post is made, this makes collaboration seamless as users can take part of an active discussion or respond at their leisure.

5.3 STUDY PARTICIPANT COMMENTS

Some of our participants made specific comments, in regards to the system, in the comments section of the post-questionnaire; below are a few of their comments.

Anonymous Participant 1, “I’ve been on forums before but never have I seen them used with young students in mind, good idea for software often overlooked.”

Anonymous Participant 2, “I’ve seen these types of board before but never did I see them have interactive content in the pages like yours, which is really cool.”

Anonymous Participant 3, “The site functions very well but does need more visual elements.”

Anonymous Participant 4, “Design needs to be worked on to make it attractive to kids.”

CHAPTER 6: FUTURE WORK AND CONCLUSION

6.1 FUTURE WORK

As this project is still in its infancy, extensive future work needs to be done before school systems and students can robustly test the system. One aspect that needs to be addressed, which many teachers mentioned in the comments section of the post-questionnaire, is in regards to presentation or design of the site. For the initial project, the focus was on functionality rather than design. The design of the site uses a basic template theme that needs to be drastically improved to drive interaction with students.

Our goal, once we have a completed project, is to develop a template that can be used to quickly speed up the rapid deployment of this social educational forum for other uses. A home page also needs to be created for KXNN that can be used to facilitate information to transfer students. Currently the main page is the educational forum, and this is not how we envision the final site implementation. A tutorial needs to be created so that teachers will have a guide to follow, once that is created, a study should be done to test the teachers using the tutorial against the findings in the results section to verify whether teachers found the site easier to use. Another area for exploration is security and site administration; these are areas that need to be looked at in depth to find potential security concerns for teachers, students, administrators, parents and school systems. A vital component of this project is social structure, there is another side of this KXNN project that was not tested and that is the Elgg social network where users may upload

content and maintain their personal profile, add widgets to their pages invite friends, these issues are possible areas for future research.

6.2 CONCLUSION

We implemented a better tool for aiding teachers in K-12 environments, facilitating information to their students in a way that is interactive and engaging without losing the goal of education. This shows that there are uses for informal educational environments in the classrooms that serve as content management systems as well as incorporates some of the social networking community features that students are accustomed to today. Social networking has become the norm in regards to students and using social networking technology to provide more intrinsic motivation to educate them is beneficial to keeping their attention. Content management systems such as Blackboard are great tools for education, but their effectiveness diminishes outside of the professional and collegiate classroom settings thus an effective method of educating K-12 in a way that is not strictly static is necessary. While performing this research we found that many teachers believe that this technology would be most beneficial in high school where there is a separation of courses and content as well as more groups of students that can really push the limits of the educational forum, while taking advantage of the social aspects as well. The flexibility of the workspace was intriguing, teachers were open minded about using a new technology and once they found out they did not need to learn a new language unlike most wiki environments, they were more open to the idea of using this structure. Interactive content is key when developing for students and teachers, which is not an easy task to accomplish. We believe this tool balances the creation of interactive content to support both students and their teacher.

REFERENCES

1. Danielson, K (2008). "Distinguishing Cloud Computing from Utility Computing.
2. Gartner (2008). "Gartner Says Cloud Computing Will Be As Influential As E-business.
3. Gruman, Galen (2008-04-07). "What cloud computing really means". InfoWorld.
<http://www.infoworld.com/d/cloud-computing/what-cloud-computing-really-means-031>.
Retrieved 2010-04-02.
4. Grudin, J. (1994). "Computer-Supported Cooperative Work: History and Focus".
Computer 27 (5): 19–26.
5. Dourish, P.; Bellotti, V. (1992). "Awareness and coordination in shared workspaces".
Proceedings of the 1992 ACM conference on Computer-supported cooperative work. ACM Press
New York, NY, USA. pp. 107–114,. <http://portal.acm.org/citation.cfm?doid=143457.143468>.
6. Grudin, J. (1988). "Why CSCW applications fail: problems in the design and evaluation
of organization of organizational interfaces". Proceedings of the 1988 ACM conference on
Computer-supported cooperative work. ACM Press New York, NY, USA. pp. 85–93.
<http://portal.acm.org/citation.cfm?id=62266.62273>.
7. Neuwirth, C.M.; Kaufer, D.S.; Chandhok, R.; Morris, J.H. (1990). "Issues in the design
of computer support for co-authoring and commenting". Proceedings of the 1990 ACM
conference on Computer-supported cooperative work. ACM Press New York, NY, USA. pp.
183–195. <http://portal.acm.org/citation.cfm?id=99354>.

8. Shen, H.H.; Dewan, P. (1992). "Access control for collaborative environments". Proceedings of the 1992 ACM conference on Computer-supported cooperative work. ACM Press New York, NY, USA. pp. 51–58. <http://portal.acm.org/citation.cfm?id=143461>.
9. Wilson, P. (1991). Computer Supported Cooperative Work: An Introduction. Kluwer Academic Pub.
10. Baecker, R. M., Grudin, J., Buxton, W. A. S., Greenberg, S. 1995 "Readings in Human-Computer Interaction: Towards the Year 2000" (Second Edition) Morgan Kaufmann Publishers, Inc.
11. Dix, A., Finlay, J., Abowd, G., Beale, R. 1998 "Human-Computer Interaction" (Second Edition) Prentice Hall.
12. Johansen, R. 1988 "Groupware: Computer Support for Business Teams" The Free Press.
13. Mitchell, Scott (July, 2008). "Easy Wiki Hosting, Scott Hanselman's blog, and Snagging Screens". MSDN Magazine. <http://msdn.microsoft.com/en-us/magazine/cc700339.aspx>.
14. Ebersbach, Anja (2008), Wiki: Web Collaboration, Springer Science+Business Media, ISBN 3540351507
15. Murali, J. (2003-06-09). "A Squeak-based Wiki server". The Hindu. <http://www.hindu.com/thehindu/biz/2003/06/09/stories/2003060900110200.htm>. Retrieved 2010-03-23.
16. Linton Freeman, The Development of Social Network Analysis. Vancouver: Empirical Press, 2006.
17. Adler, P., & Kwon, S. (2002). Social capital: Prospects for a new concept. Academy of Management Review, 27 (1), 17-40.

18. "What Is Web 2.0". O'Reilly Network.
<http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>. Retrieved 2010-03-24.
19. "Twitter now has 75M users; most asleep at the mouse". ComputerWorld.
http://www.computerworld.com/s/article/9148878/Twitter_now_has_75M_users_most_asleep_at_the_mouse/
Retrieved 2010-03-24.
20. Lavalley, Andrew (2007-03-16). "Friends Swap Twitters, and Frustration". The Wall Street Journal. http://online.wsj.com/public/article/SB117373145818634482-ZwdoPQ0PqPrcFMDHDZLz_P6osnI_20080315.html. Retrieved 2010-03-24.
21. Weller, M. (2006), VLE 2.0 and future directions in learning environments, Proceedings of the first LAMS Conference, Sydney
22. "Technical Evaluation Report 37. Assistive Software for Disabled Learners".
<http://www.irrodl.org/index.php/irrodl/article/viewArticle/198/280>. Retrieved 2007-08-06. The International Review of Research in Open and Distance Learning, Vol 5, No 3 (2004), ISSN: 1492-3831
23. "Don't Tell Your Parents: Schools Embrace MySpace". Wired.
<http://www.wired.com/culture/education/news/2007/04/myspaceforschool> Retrieved 2010-03-29
24. "Cloud Computing: Clash of the clouds". The Economist. 2009-10-15.
http://www.economist.com/displaystory.cfm?story_id=14637206. Retrieved 2010-03-11.
25. Buyya, Rajkumar; Chee Shin Yeo, Srikumar Venugopal (PDF). Market-Oriented Cloud Computing: Vision, Hype, and Reality for Delivering IT Services as Computing Utilities. Department of Computer Science and Software Engineering, The University of Melbourne,

- Australia. pp. 9. http://www.gridbus.org/~raj/papers/hpcc2008_keynote_cloudcomputing.pdf. Retrieved 2010-02-31.
26. Wright, J.L., & D.D. Shade, eds. 1994. *Young children: Active learners in a technological age*. Washington, DC: NAEYC.
27. “Technology and Young Children—Ages 3 through 8”. Washington, DC: NAEYC. <http://www.naeyc.org/files/naeyc/file/positions/PSTECH98.PDF>
28. “Earl Miller says younger generation will be better multitaskers”. Earth Sky. <http://earthsky.org/health/earl-miller-says-younger-generation-will-be-better-multitaskers>
29. “Learning in the 21st Century: Research, Innovation and Policy. Optimising Learning: Implications of Learning Sciences Research”. Centre for Educational Research and Innovation. <http://www.oecd.org/dataoecd/39/52/40554221.pdf>

APPENDIX A

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMANSUBJECTS
RESEARCH PROTOCOL REVIEW **APPROVED**

For Information or help contact THE OFFICE OF HUMAN SUBJECTS RESEARCH, 307 Samford Hall, Auburn University
 Phone: 334-844-5966 e-mail: hsubject@auburn.edu Web Address: http://www.auburn.edu/research/vpr/ohs/

Complete this form using Adobe Acrobat Writer (versions 5.0 and greater). Hand written copies not accepted.

1. PROPOSED START DATE of STUDY: Apr 26, 2010
- PROPOSED REVIEW CATEGORY (Check one): FULL BOARD EXPEDITED EXEMPT
2. PROJECT TITLE: Social Networking Teaching Tools:
A Computer Supported Collaborative Interactive Learning Social Networking Environment for K-12
3. Cheryl D. Seals Associate Professor CSSE (334) 844-6319 sealscd@auburn.edu
 PRINCIPAL INVESTIGATOR TITLE DEPT PHONE AU E-MAIL
Shelby Center for Engineering Technology Suite 3101M (334) 844-6329
 MAILING ADDRESS FAX ALTERNATE E-MAIL
4. SOURCE OF FUNDING SUPPORT: Not Applicable Internal External Agency: _____ Pending Received
5. LIST ANY CONTRACTORS, SUB-CONTRACTORS, OTHER ENTITIES OR IRBs ASSOCIATED WITH THIS PROJECT:

6. GENERAL RESEARCH PROJECT CHARACTERISTICS

6A. Mandatory CITI Training	6B. Research Methodology
Names of key personnel who have completed CITI: <u>Curtis Cain</u> <u>Justus Nyagwencha</u> <u>Cheryl Seals</u>	Please check all descriptors that best apply to the research methodology. Data Source(s): <input checked="" type="checkbox"/> New Data <input type="checkbox"/> Existing Data Will data be recorded so that participants can be directly or indirectly identified? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Data collection will involve the use of: <input type="checkbox"/> Educational Tests (cognitive diagnostic, aptitude, etc.) <input type="checkbox"/> Interview / Observation <input checked="" type="checkbox"/> Surveys / Questionnaires <input type="checkbox"/> Physical / Physiological Measures or Specimens (see Section 6E.) <input checked="" type="checkbox"/> Internet / electronic <input type="checkbox"/> Private records or files <input type="checkbox"/> Audio / Video / Photos
CITI group completed for this study: <input checked="" type="checkbox"/> Social/Behavioral <input type="checkbox"/> Biomedical Protocol-Specific modules completed: <input type="checkbox"/> Genetic <input type="checkbox"/> Vet.'s Administration <input type="checkbox"/> International <input type="checkbox"/> Prisoner Research <input type="checkbox"/> Public School Students <input type="checkbox"/> Pregnant Women/Fetuses Other _____	6C. Participant Information Please check all descriptors that apply to the participant population. <input checked="" type="checkbox"/> Males <input checked="" type="checkbox"/> Females <input type="checkbox"/> AU students Vulnerable Populations <input type="checkbox"/> Pregnant Women/Fetuses <input type="checkbox"/> Children and/or Adolescents (under age 19 in AL) <input type="checkbox"/> Prisoners Persons with: <input type="checkbox"/> Economic Disadvantages <input type="checkbox"/> Physical Disabilities <input type="checkbox"/> Educational Disadvantages <input type="checkbox"/> Intellectual Disabilities Do you plan to compensate your participants? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
6D. Risks to Participants Please identify all risks that participants might encounter in this research. <input type="checkbox"/> Breach of Confidentiality* <input type="checkbox"/> Coercion <input type="checkbox"/> Deception <input type="checkbox"/> Physical <input type="checkbox"/> Psychological <input type="checkbox"/> Social <input checked="" type="checkbox"/> None <input type="checkbox"/> Other *Note that if the investigator is using or accessing confidential or identifiable data, breach of confidentiality is always a risk.	6E. Institutional Biosafety Approval Do you need IBC Approval for this study? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes - BUA # _____ Expiration date _____

The Auburn University Institutional Review Board has approved this document for use from 5/19/10 to 5/18/11 Protocol # 10-125 EX 1005



FOR OHSR OFFICE USE ONLY

DATE RECEIVED IN OHSR: original 4-23-10 by BK PROTOCOL # 10-125 EX 1005

DATE OF IRB REVIEW: 5/19/10 by Elisor APPROVAL CATEGORY: 45 CFR 46.101(b)(2)

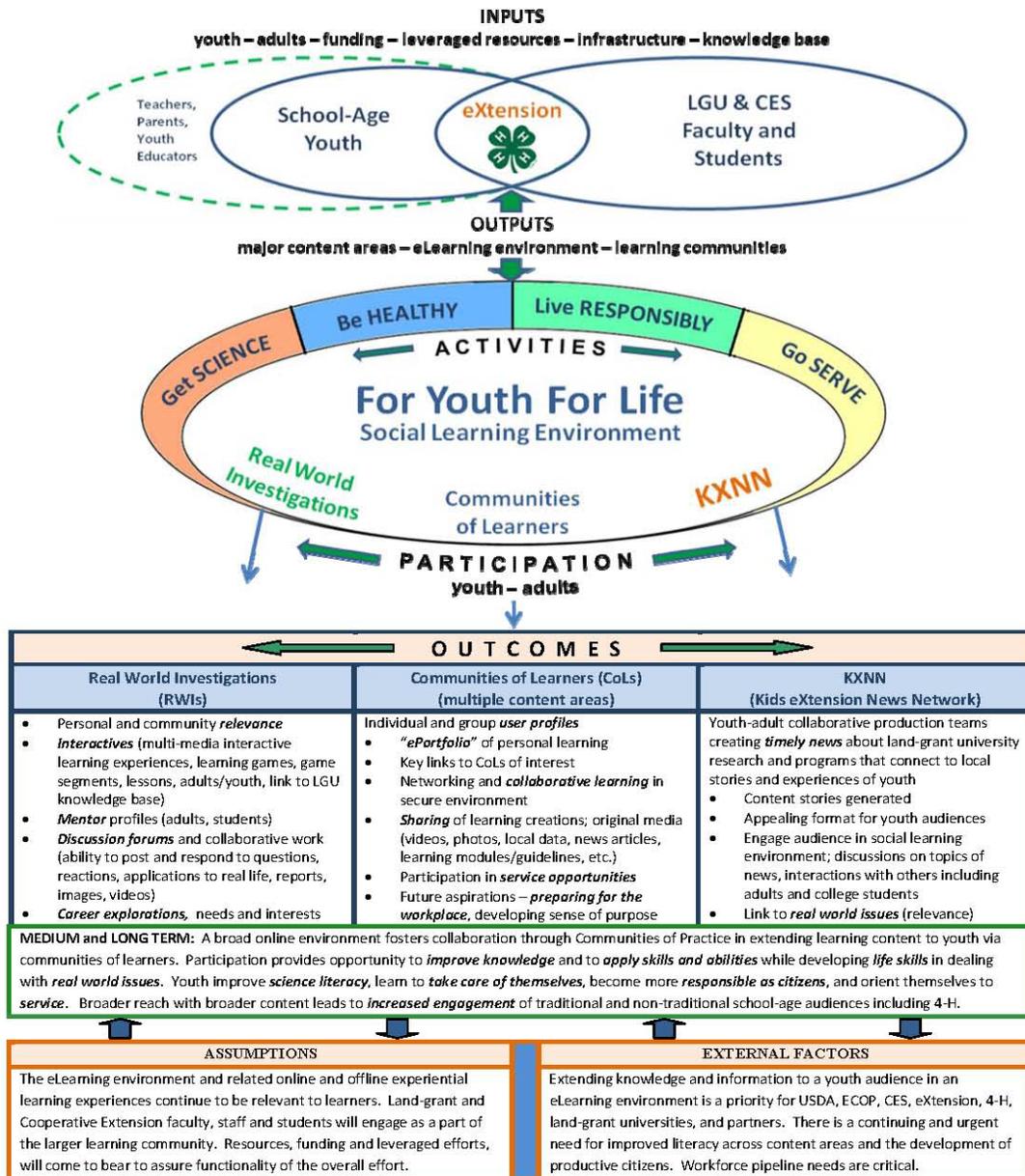
DATE OF IRB APPROVAL: _____ by _____ INTERVAL FOR CONTINUING REVIEW: _____

COMMENTS: revisions received 5/12/10; in-office review

APPENDIX B

For Youth For Life: A Logic Model

SITUATION: Youth in today's society are faced with many present and future issues that will require an advanced understanding of: their world in regard to science and technology, their personal well being, how they interact as a citizen within society, and what they can do to help each other in times of need. To that end, and through online and offline learning environments, land-grant universities broaden their reach to a larger youth audience and: **Engage** youth with cutting-edge, research-based knowledge available at land-grant universities; Provide **explorations** in career choices and guidance for preparing to be workplace ready; **Extend** learning opportunities to youth through online social learning environments; **Empower** youth to use communication technologies to share and teach others; **Encourage** collaborative interactions around real world issues.



Copyright © 2009 Auburn University, Alabama Cooperative Extension System. All rights reserved. Available for distribution in any manner by written permission only. Use in any manner for generating revenue is prohibited. Contact John A. (Tony) Cook, cookja1@auburn.edu

APPENDIX C



SAMUEL GINN COLLEGE OF ENGINEERING

Department of Computer Science and Software Engineering

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN IRB APPROVAL STAMP WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)

INFORMATION LETTER
for a Research Study entitled

Social Networking Teaching Tools: A Computer Supported Collaborative Interactive Learning Social Networking Environment for K-12

You are invited to participate in a research study to explore you past experiences with online educational tools and introduce you to a prototype educational tool that could be used in K-12 environments and to compare discuss the prototype environment to your past experiences with other educational tools. The study is being conducted by Curtis Cain as part of his thesis work, under the direction of Dr. Cheryl D. Seals in the Auburn University Department of Computer Science and Software Engineering. You were selected as a possible participant because you are college graduate with a career or pursuing a career in teaching.

What will be involved if you participate? Your participation is completely voluntary. The study will be conducted in three parts. If you decide to participate in this research study, you will be first asked to fill out a questionnaire. The purpose of the questionnaire is to obtain demographic information and some basic information regarding experience with social networking sites and online educational tools. Your total time commitment for part one will be approximately 5 minutes. At the end of the questionnaire you will be presented with a task-list and link to the prototype environment. The time to accomplish part two the task-list for guided exploration is 15 minutes. The purpose of the task-list will be to introduce you to the prototype environment. After completion of the task-list, successfully or unsuccessfully, you will be given a link to the final questionnaire. Your total time commitment to part three will be approximately 10 minutes.

Are there any risks or discomforts? There are no perceived risks associated with this study.

Are there any benefits to yourself or others? Information collected during this study will help us identify how effective and intuitive the prototype environment is and how it rates in comparison to other educational tools as well as how it may be used in conjunction with K-12 environments.

Will you receive compensation for participating? No compensation for participation will be given.

Are there any costs? There no costs associated with participating.



SAMUEL GINN COLLEGE OF ENGINEERING

Department of Computer Science and Software Engineering

If you change your mind about participating, you can withdraw at any time during the study by simply closing your browser. Once you've submitted anonymous data, it cannot be withdrawn since it will be unidentifiable. Your decision about whether or not to participate, or to stop participating, will not jeopardize your future relations with Auburn University, Department of Computer Science and Software Engineering.

Any data obtained in connection with this study will remain anonymous. The data in this study will be anonymous. Data will be collected through a questionnaire. Your name, email and others identifiers are not collected during the survey will not will not be associate with the data provide. Information collected through your participation may be used to publish in a professional journal, conference submissions, theses and dissertations and/or presented at professional meetings.

If you have questions about this study, please ask them now or contact Curtis Cain at caincc@auburn.edu (213.537.5632) or Dr. Cheryl D. Seals at sealscd@auburn.edu (334.844.6319).

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

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH STUDY. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

Curtis Cain 05.11.2010
Investigator Date

The Auburn University Institutional Review Board has approved this document for use from May 9, 2010 to May 8, 2011. Protocol #10-125 EX 1005.

To begin the study please visit the link below.

<https://www.surveymonkey.com/s/7L2RY6V>

APPENDIX D

2. Demographics

*** 2. Identify your gender**

- Male
- Female

*** 3. What is your age group?**

- 20 - 25
- 25 - 30
- 30 - 40
- > 40

*** 4. What is your highest level of education?**

- Bachelors Degree
- Masters Degree
- Doctoral Degree

*** 5. What field did you gain your degree?**

- Biological Sciences
- Computer Science
- Education
- Health
- History
- Liberal Studies
- Mathematics
- Other

3. Demographics

*** 6. Are you certified to teach in your district?**

- Yes
- No, but I will be in less than 3 months
- No

7. Rate your experience with online educational tools

	None	Very Little	Moderate	Extensive
Blackboard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moodle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WebCT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharepoint	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Based on your previous response which educational tool do you believe is most effective for K-12?

4. Demographics

*** 9. Do you use online social networks?**

- Yes
- No

10. If you answered yes to the previous question, which do you use?

- Facebook
- MySpace
- Twitter
- LinkedIn
- Digg
- Other

5. Computer Understanding and Experience

*** 11. I frequently read computer magazines or other sources of information that describe new computer technology**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

*** 12. I know how to recover deleted or lost data on a computer or PC**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

*** 13. I know what a LAN is**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

*** 14. I know what an operating system is**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

*** 15. I know how to install software on a personal computer**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

*** 16. I know what a database is**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

*** 17. I am computer literate**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Computer Understanding and Experience	<input type="radio"/>				

6. Teaching Style

*** 18. Do you believe teaching K-12 should involve more online teaching tools as a method to supplement traditional classroom lessons?**

Yes

No

*** 19. Would you use an online educational forum to teach lessons if it were available to you?**

Yes

No

Maybe

APPENDIX E

7. Part 2 - Prototype Task List

Thank you for choosing to participate in the educational environment study for effectiveness and usability as well as successfully completing the pre-questionnaire for this study. Below you will find a task list that you should complete in order, afterwards visit <https://www.surveymonkey.com/s/7LSW652> to complete the post-questionnaire

KXNN Task List

1. Visit <http://kxnnetwork.org>
2. Visit any of the open learning forums
3. Make a new post inside of a forum of your choice
4. Delete the post you just made
5. View any of the available YouTube Clips
6. View any of the Flash based learning lessons
7. Send a message using the embedded chat function
8. Delete the message that you sent

That completes the required tasks on the site, please visit <https://www.surveymonkey.com/s/7LSW652> to complete the post-questionnaire.

APPENDIX F

1. User Interface Satisfaction

*** 1. What were your overall reactions to the system?**

Overall reaction to software terrible wonderful N/A

*** 2. What were your overall reactions to the system?**

Overall reaction to the software difficult easy N/A

*** 3. What were your overall reactions to the system?**

Overall reaction to the software frustrating satisfying N/A

*** 4. What were your overall reactions to the system?**

Overall reaction to the software dull stimulating N/A

*** 5. What were your overall reactions to the system?**

Overall reaction to the software rigid flexible N/A

2. Usefulness

* 6. Usefulness

	unlikely						likely	N/A
Using the system in my job would enable me to accomplish tasks more quickly	<input type="radio"/>							

* 7. Usefulness

	unlikely						likely	N/A
Using the system would improve my job performance	<input type="radio"/>							

* 8. Usefulness

	unlikely						likely	N/A
Using the system in my job would increase my productivity	<input type="radio"/>							

* 9. Usefulness

	unlikely						likely	N/A
Using the system would enhance my effectiveness on the job	<input type="radio"/>							

* 10. Usefulness

	unlikely						likely	N/A
Using the system would make it easier to do my job	<input type="radio"/>							

* 11. Usefulness

	unlikely						likely	N/A
I would find the system useful in my job	<input type="radio"/>							

3. Ease of Use

* 12. Ease of Use

Learning to operate the system would be easy for me	unlikely	<input type="radio"/>	likely	N/A					
---	----------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------	-----

* 13. Ease of Use

I would find it easy to get the system to do what I want it to do	unlikely	<input type="radio"/>	likely	N/A					
---	----------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------	-----

* 14. Ease of Use

My interaction with the system would be clear and understandable	unlikely	<input type="radio"/>	likely	N/A					
--	----------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------	-----

* 15. Ease of Use

I would find the system to be flexible to interact with	unlikely	<input type="radio"/>	likely	N/A					
---	----------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------	-----

* 16. Ease of Use

It would be easy for me to become skillful at using the system	unlikely	<input type="radio"/>	likely	N/A					
--	----------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------	-----

* 17. Ease of Use

I would find the system easy to use	unlikely	<input type="radio"/>	likely	N/A					
-------------------------------------	----------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	--------	-----

4. Default Section

18. Were you successfully able to complete the set of tasks on the KXNN website

- Yes
 No

*** 19. Based on your experiences using KXNN, which online educational tool would you prefer to teach K-12?**

- Blackboard
 Moodle
 KXNN
 Sharepoint

*** 20. If you could use a style similar to KXNN, which teaching style would it be?**

- Synchronous
 Asynchronous
 Both

21. Please rate your experience with KXNN

	Strongly Disagree	Disagree	Agree	Strongly Agree
Easy to Use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Please supply the researchers with any additional information regarding your experience with KXNN

APPENDIX G



KXNN
KIDS EXTENSION NEWS NETWORK

KXNN: Kids eXtension News Network

[Search](#)
[Advanced search](#)

[Board index](#)
v A ^

[User Control Panel \(0 new messages\)](#) • [View your posts](#)
[FAQ](#) [Chat](#) [Members](#) [Logout \[caincc \]](#)

It is currently May 28th, 2010, 11:33 pm
Last visit was: May 28th, 2010, 5:15 pm
[Moderator Control Panel]

[View unanswered posts](#) • [View unread posts](#) • [View new posts](#) • [View active topics](#)
[Mark forums read](#)

KIDS EXTENSION NEWS NETWORK	TOPICS	POSTS	LAST POST
FYFL - Be HEALTHY	0	0	No posts
FYFL - Get SCIENCE	10	10	by caincc March 3rd, 2010, 4:46 pm
FYFL - Go SERVE	0	0	No posts
FYFL - Live RESPONSIBLY	0	0	No posts

WMA TO OUR IRE

APPENDIX H

Precipitation

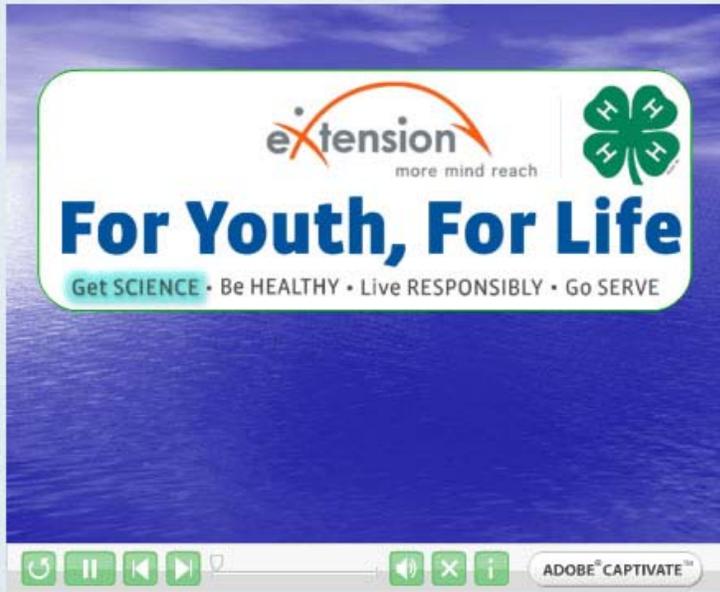
POSTREPLY ↩ Search

Precipitation

* EDIT ✖ ⚠ ? “QUOTE

by **caincc** » March 3rd, 2010, 4:45 pm

Precipitation



POSTREPLY ↩

APPENDIX I

POST A NEW TOPIC

Subject:

B *i* u Quote Code List List= [*] Img URL Flash Normal Font color GoogleVid SWF YouTube

Smilies

BBCode is *ON*
[img] is *ON*
[flash] is *ON*
[url] is *ON*
Smilies are *ON*

Load Save **Preview** Submit