

**A Financial Literacy Tool: Utilizing a Content Management System to  
Develop Online Learning Communities  
Focusing on K-12 Education**

by

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## Abstract

In many schools and organizations, people are electronically linked, most of their time. However, the interface to communicate and interact with is quite rudimentary. To have good interaction with the interface, a better online social learning network has to be developed. A social environment is a place where people can interact with each other and is a good place to collaborate with others. People can continuously work together to exchange information on many common and interested topics.

This thesis mainly concentrates on students using online learning environments to develop their skill and knowledge. It talks about creation of such online learning environments using various design tools that allow students to interact among themselves. The topics in my thesis mainly focus on developing and designing an On-line Social Learning Educational Environment using a Content Management System (CMS) called WordPress. This learning environment is being developed for K-12 students to teach Financial Literacy, under FYFL – ‘For Youth, For Life,’ an open-learning community for 4-H youth. While interacting with such learning environments, students usually look for some attractive features like games; chat and discussion are where they can collaborate with other students, colors and images of the interface.

The online learning tool developed for K-12 students is named as “FYFL Financial Literacy using CMS.” This learning environment is a secure and collaborative interface where students can interact with others easily. It is very important to make sure that the developed online learning environment is secured, maintains integrity and are inhabited to the online world.

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# CHAPTER 1

## INTRODUCTION

The role of learning technology in the early childhood education is very important. Parents and educators both should have good concern about the potential benefits and harm towards their children. With the advancement and continuously evolving technology, many resources are available and within reach for this generation students. Wide range of technologies and learning tools, either at home or school, are available for children. Sensible usage of these tools by educators and parents help them to teach and make children understand easily. With the expansion of internet availability, every household has easy access to it. The parents could also play a major role in supporting and helping their children to use these resources for gaining knowledge. This improves their interest in learning and practicing knowledge and the media. According to the National Household Education Surveys Program (NHES), conducted by the U.S. Department of Education's National Center for Education Statistics (NCES), in 2007, gives the estimates of the number and the percentage of the homeschooled students in the United States. This data was collected for the students ages 5 through 17 and with a grade equivalent to kindergarten through 12<sup>th</sup> grade. The percentage of the homeschooled children increased from 2.2 percent to 2.9 percent, which shows that parents are showing interest in teaching their children [13].

Internet is widely used in many organizations, schools and universities. Now-a-days it has become completely impossible to work or operate without ubiquitous internet access. With

the advancements in the networks to 3G and 4G, the internet is accessible everywhere. Learning environments have become more popular with the extensive usage of internet. Researches are working hard to design more effective online learning environments, which can be used in teaching them in classrooms, and in informal places like science centers and after-school knowledge clubs. They can also be used as computer-based tutoring software. The online environments with interesting curricular materials also help teachers, to improve their knowledge and creating advanced educational software tools with collaborative activities. Learning science researchers are still investigating many other alternative models for students learning. These models particularly include the connections between the formal schooling and the other available learning methods like teaching institutions, after school clubs and online learning environments that can be accessed from home. Researches are also being focused on the collaboration between students and the working professionals. All these researches also prove that informal learning is also as important for students and in many cases is just as important as formal school learning. Parents and educators also contribute their support to in helping children and understand new concepts in detail [11].

## **1.1 Problem Statement**

There are numerous ways to keep the learners/children engaged in online environments. These online learning environments however focus on the concepts and support students of all ages. Many technologies are structured just for the high school students and this will cause younger generation to lose interest in learning with this environment. They may feel that it is too complicated and may feel overwhelmed by the content and presentations. This could lead them to miss the important concepts that are to be learned pertaining to their life and knowledge.

Formal schooling also involves regular standardized topics in their curriculum. The general topics however have to be taught to the students, but it doesn't specify few important topics that younger generation students should learn in their learning age. Those topics that involve mandatory lessons for students during their young age are usually not included in the student curriculum. The lack of technology usage in improving the systems makes the younger generation reluctant towards such topics. These kinds of problems also increase burden on parents and the educators in making their students understand the concepts physically. Even if some online learning communities are available, it is very important that they should be at the proper learning level based on the student's age. Due to the lack of utilization of technologies in developing such effective systems, parents and educators are also hassled to sit and teach their students and make them understand from the existing learning tools. Therefore, the main purpose of this research is to develop a student friendly and youth oriented online learning environment that increases the learning interest and ability of the younger generation.

## **1.2 Research Justification**

Increase in the rapid growth of internet usage by all kinds of generations also made it possible to use the learning social networks online. Development of online social networks has now converted all the information into the online learning systems that can be communicated easily to the teachers, students and the general public. They are also responsible to provide some sort of entertainment for the users, to work collaboratively and engage them. These social networks are also responsible for satisfying the needs of the people in meeting their interests and imaginations.

Acquiring education through online learning communities has now become a preferred modality for many traditional students who often enroll in online programs. Students have individualized ways of learning and acquiring knowledge. The differences in acquiring knowledge can be addressed through the social learning communities. Traditional classrooms tend to force students to learn, irrespective of their interests. Online learning communities provide such a good opportunity for students to learn topics of their interest.

The growth and utilization of the technology in developing these online learning communities have attracted the younger students to understand their learning capacity. There are various tools and features used, that are mainly responsible to increase the knowledge base of the younger generation. However, these learning communities become successful and open for wide usage only if these systems can support the educators as well as the learners in a way that they meet their expectations to keep them engaging, interactive and provide easy to use/understand options.

### **1.3 Research Purpose**

The primary goals and objectives of this research were:

- To develop an interactive online learning environment for K-12 children to acquire knowledge about the financial literacy, that is not being taught in the regular school curriculum.
- To develop an online learning system that is responsible for a user-friendly environment that keeps the learners engaged with various attractive and interesting colors and features.
- To develop an interactive learning system, that provides the educators and learners the ability to use the system easily through online sources. The current computer tools make



it easy for educators to understand, use and teach. The improved technology develops interest among students and engages them to use the online sources.

- To improve the quality of education for the K-12 students, with the proper usage of the technology. Embedding various audio, video and interactive materials keep them engaged every time through these online learning environments.
- To test the developed educational prototype with various users, to determine if it is effective for both educators as well as learners.

#### **1.4 Hypothesis**

The main hypothesis of the research is to create an application that supports financial literacy that provides more opportunities for interaction, understandable for educators and their students and to be easily used without any prior computer knowledge. We also want a system that is view as user friendly and more accessible when opposed to the classroom teaching methods. The second part of this hypothesis is to determine if students feel this system is much better, as is more engaging, user-friendly and easy to learn, compared to the traditional classroom environment and other online learning environments. And the last part of the hypothesis is to determine whether the informal online learning environment will be more attracted to students than the traditional classroom teaching of financial literacy and to see if it would have more number of learners and support more students when compared to the structural environments.

## **1.5 Document Review**

The rest of the thesis document is organized as follows:

Chapter 2 consists of literature review which discusses topics on Computer-Supported Cooperative Work (CSCW), their types, core dimensions and comparison of CSCW with other systems, their role in the online learning environments. This chapter gives an overview of online learning, the differences between traditional classroom teaching and online learning and some advantages of online learning. It also discusses in detail about For Youth, For Life (FYFL) learning network, Cooperative Extension System (CES), their Community of Practice (CoP) concepts and the content present in each of them. It gives an overview on social learning environments, statistics on the population using these environments and the security measures that has to be taken in protecting these systems.

Chapter 3 provides descriptions of eXtension and WordPress as Content Management Systems (CMS), problems that exist with the existing learning environments and the eXtension system, hypothesis, variables and developing criteria for online learning environments. It also discusses the software engineering process, UML diagrams with various scenarios from admin and student perspectives, the computer technologies used to develop the learning environments and the testing & experimenting procedures to test the finally developed environment.

Chapter 4 discusses details on how different Content Management Systems (CMSs) like WordPress work, the problem statement and the proposed system using WordPress. It explains in detail the WordPress tool, the implementation process of the learning environment using this tool and various features created and used in the product development.

Chapter 5 discusses about how the system is being tested using surveys, which are being conducted and taken by different participants of different ages. It also shows the results of these surveys in the form of tables, graphs and pie diagrams.

Chapter 6 concludes my thesis on the development of learning environments along with the future work that is yet to be done.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Computer-Supported Cooperative Work (CSCW)

##### 2.1.1 About CSCW

The term *Computer-Supported Cooperative Work (CSCW)* was first devised by Irene Greif and Paul M. Cashman in 1984 to consider how effectively computers are used by the people and researchers to support them in various tasks. According to Carstensen and Schmidt, CSCW addresses "how collaborative activities and their coordination can be supported by means of computer systems" [27]. CSCW is a community of researchers and system designers who work collaboratively to develop an online environment and mainly addresses the collaborative work that individuals or groups carry out to perform certain activities by means of computer technology.

From the study, it appears like the CSCW researchers adopted one of the two main viewpoints. One is **technology-centric** and the other is **work-centric**. Technology-centric emphasizes researchers on planning ways to design computer technology that supports the requirements of cooperative work. Work-centric focuses on work processes that design the computer systems so as to understand and support the cooperative work [28]. For example, Bannon and Schmidt [31] believe that "CSCW should be conceived as an endeavor to understand the nature of cooperative work as a foundation to designing information systems to support the work."

### 2.1.2 Types of CSCW:

CSCW is divided into two types called synchronous and asynchronous systems, based on time, space and their behaviors. Communicating at the same time refers to the synchronous or real-time collaboration and communication at different times refers to the asynchronous collaborative systems. There are three different categories of human behaviors: communication, information sharing and coordination with others. Each of these three categories has both synchronous and asynchronous collaboration making a two-dimensional collaboration framework of six different components.

**Table 2.1:** Two-dimensional collaboration framework [28]

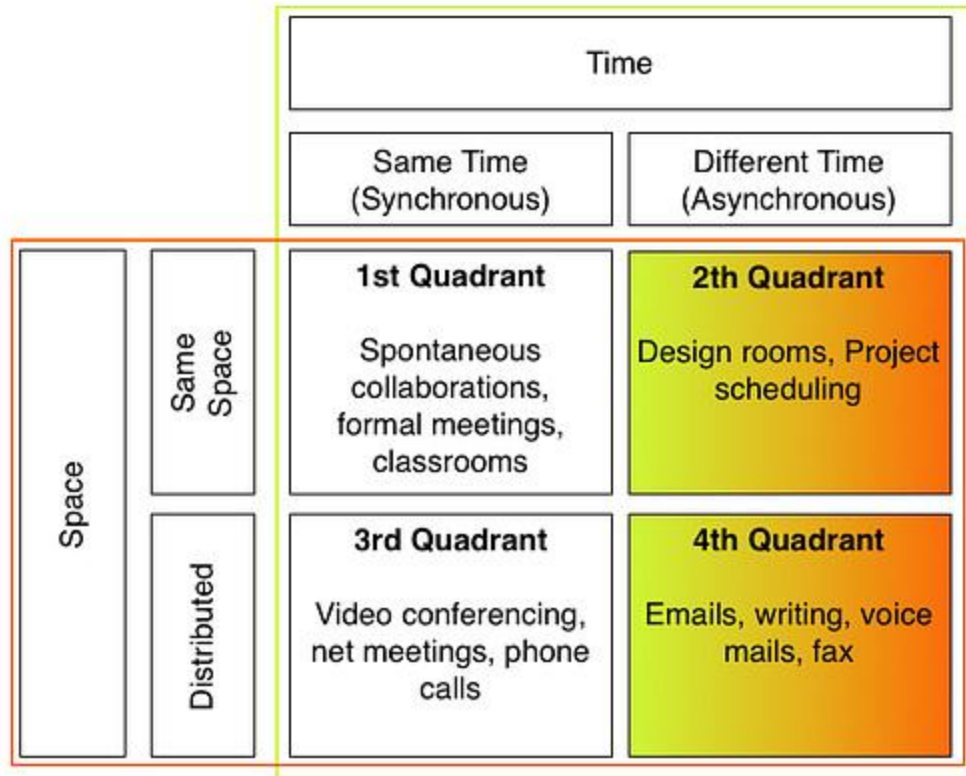
	<b>Real time</b>	<b>Asynchronous</b>
<b>Communication</b>	<ul style="list-style-type: none"> <li>» Telephone</li> <li>» Video conferencing</li> <li>» Instant messaging</li> <li>» Texting</li> </ul>	<ul style="list-style-type: none"> <li>» Email</li> <li>» Voice mail</li> <li>» Blogs</li> <li>» Social networking sites</li> </ul>
<b>Information sharing</b>	<ul style="list-style-type: none"> <li>» Whiteboards</li> <li>» Application sharing</li> <li>» Meeting facilitation</li> <li>» Virtual worlds</li> </ul>	<ul style="list-style-type: none"> <li>» Document repositories</li> <li>» Wikis</li> <li>» Web sites</li> <li>» Team workspaces</li> </ul>
<b>Coordination</b>	<ul style="list-style-type: none"> <li>» Floor control</li> <li>» Session management</li> <li>» Location tracking</li> </ul>	<ul style="list-style-type: none"> <li>» Workflow management</li> <li>» CASE tools</li> <li>» Project management</li> <li>» Calendar scheduling</li> </ul>

### **2.1.2.1 Synchronous CSCW Environments**

Synchronous environments are real-time and deal with real objects in the form of communication, coordination and information sharing. A synchronous system deals with activities happening at the same time. The communication with other individuals or groups can be done in real-time using telephone, video conferencing, instant messaging and texting. Similarly, the information with others can be shared directly using whiteboards in meetings, application sharing, meeting facilitation and virtual worlds using computer technologies. In the same way, real-time coordination can be done by using session management, floor control and also a location tracking system. The team members can either share the same space or distributed space. Same space can be coordinated and in sync with the spontaneous collaborations, formal meetings and classrooms. In contrast, when individuals are located at distributed places, they can communicate and coordinate using video conference calls, net meetings or direct phone calls.

### **2.1.2.2 Asynchronous CSCW Environments**

Asynchronous environment is a system where the individuals or groups communicate and coordinated at different times. Asynchronous system deals with activities that are not happening at the same time. In asynchronous environments, the communication with others is done through emails, voice mails, blogs and social networking sites. Similarly, the information is shared using the document repositories, websites, team workspaces and wikis. The coordination among them is also done asynchronously using workflow management, CASE tools, project management and calendar scheduling. When using asynchronous environments, the individuals share the same space communicate through the design rooms and project scheduling. While in the distributed spaces, as shown in the diagram below, individuals communicate via emails, writing, voice mails and fax.



**Figure 2.1:** Synchronous and asynchronous Computer-Supported Collaborative Work matrix [33]

## 2.2 Comparison of CSCW with Similar Software's

### 2.2.1 Groupware

Most of the people/researchers/authors often consider *groupware* and *CSCW* to similar terminologies. Groupware is considered as computer software that makes group of people to work cooperatively. Groupware mainly refers to the real-time computer based systems such as video-conferencing systems, electronic-mails, application sharing programs and some software that supports the viewing of collaboratively developed websites. Whereas, *CSCW* concentrates on the study of the tools and techniques that groupware uses.

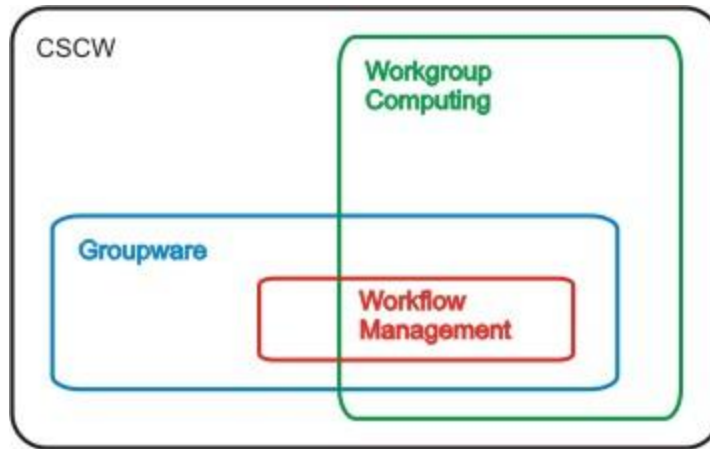
### 2.2.2 Workflow

*Workflow* is another term that is frequently used to refer to CSCW. Workflow mainly concentrates on the process of completing required work, though some pre-defined tasks with a set of people working collaboratively. Workflow software usually supports the formal work processes which is way different from groupware that deals with the software which supports the informal kind of work processes. From the above definitions it is clear that CSCW is similar to Work flow which involves collaborative work with people supporting each other in more formal way of work process, Groupware software.

### 2.2.3 Team/Workgroup Computing

The term, *team computing* or *workgroup computing*, is occasionally heard in the discussions of CSCW. This term, which was coined at Xerox PARC, talks about the collaborative systems that support group discussions and meetings. The collaboration of people and discussions of various topics in such meetings generally occur in face-to-face settings. *Electronic meeting* is another term recently being used in replacement to the *team computing* terminology. The meetings and group discussions according to *electronic meetings* (called as *e-meetings*) are conducted with the use of computer technologies, networks and new software through internet. A less frequently used term called *media spaces*, is occasionally used during such collaborations. According to *media spaces*, a virtual meeting setup is provided where the collaborators from distributed areas can assemble electronically to discuss and share their knowledge and accomplishments with other collaborators to gain advantages among them. This is a kind of informal meeting being setup within the same physical location.





**Figure 2.2:** Comparison of CSCW with other terminologies [33]

## 2.3 Core Dimensions of CSCW

CSCW researchers have derived few concepts and core dimensions in the field of cooperative work by doing researches and analysis on the existing systems, and the systems that are designed by them in the CSCW community. Below are the three core dimensions that have been identified by the researchers.

### 2.3.1 Awareness

CSCW *awareness* generally deals with an individual's ability to collaborate and work together with other individuals or groups to gain knowledge about each other's activities. Events to support such awareness among the individuals can be supported by the meetings and discussions. Such group meetings or interactions with other team members help individuals to share their knowledge and ideas about their activities. This helps them to get to know others easily, and can interact with them comfortably for any further collaboration.

### 2.3.2 Articulation Work

CSCW *articulation work* talks about dealing individuals in a team, to divide and share the work among them and integrate those tasks at the end. This element of articulating work

concentrates on individuals, grouping together for a project and managing to complete the tasks by dividing amongst themselves. Given a task, the team members must cooperate with others and divide the task into the number of work units among all the individuals in a team. Each individual must carry out their assigned activity and come up with the completion of their task. Once all the individual tasks are completed, they are then re-integrated to finish the whole module/project. This procedure must be done with very good cooperation and collaboration amongst the members in a team. There are some software tools, which are used to track the individual's progress, step-by-step completion of work, compilation and their participation during integration.

### **2.3.3 Appropriation or Tailorability**

*CSCW appropriation or tailorability* deals with how an individual or a group gets adapted to a new technology on their own in given circumstances. The technology can be assumed in such a manner that is understandable by the individuals or groups. They can adopt the technology completely as per their requirement, which could be unintended by the designers. The designed technology can be used for a different purpose, than for which it was originally designed. This may be completely appropriated and the designers might not even be aware of it.

## **2.4 Role of CSCW in Secure Online Learning Systems**

Computer-Supported Cooperative Work (CSCW) plays a vital role in today's collaborative development and learning world. In order for collaborative environments to grow, the designers must be able to cooperate and work collaboratively to develop the product. They must be able to deal with other members in their team with proper awareness in articulating the work, and appropriating the technologies to accomplish the goals. The projects and tools

developed in the past 15 years have been using the CSCW attributes and dimensions to deliver a successful product. This approach along with proper communication, coordination and information sharing with others, reduces project time and produces effective results.

Recent developments in the online learning environments have also been using CSCW terms and concepts. While developing online learning communities such as websites, storing the content of different areas, good communication and coordination among different developers of different modules in a team is very important. The sharing of data, tasks and code files are transferred through different modes of synchronous or asynchronous applications. The meetings and discussions on various topics can also be done by communicating through face-to-face sessions, phone calls, video conference calls and emails if located at distributed places. Less formal information can be shared through instant messaging, texting, blogs or voice mails. Hence the role of CSCW is very important in every small step in coordinating, communicating, developing, data sharing and integrating of small to huge work units and tasks, in the development life cycle of an online learning community site.

## **2.5 Online Learning/E-learning 1.0**

Online learning or e-learning includes all kinds of electronically supported learning and teaching systems. E-learning is knowledge and skills transferring system, enabled by a computer system and Internet. E-learning 1.0 is direct transfer of these skills by the educators or direct internet/computer into children's brain. E-learning is developed by creating a website or media files on a computer system. Content in these websites is collected from various sources like e-books, regular books, publications, articles, YouTube and WIKIs. This content is delivered to the end users via Internet, intranet, audio or video files, television, news, and CD-ROM. The media

and the content in these online learning environments can be of text, image, audio, video and animation formats. The online learning applications include web/internet-based learning/training (WBT/IBT), computer-based learning/training (CBT), learning through virtual education and digital collaboration [34].

Now-a-days, the younger generation students are attracted to the new technologies that strongly help them in quick education. Children ages 8 through 15 highly interact with systems that utilize new technologies, colorful themes, and new media like the animated stuff and engaging applications. Online learning can be self-explanatory or instructor-led. This kind of approach in learning either through self-learning or through parent/teacher instructing helps them in developing their knowledge, skills and the perception of the world [34].

### **2.5.1 K-12 Learning**

E-learning has also been utilized in K-12 education in United States. This E-learning takes place in regular classrooms, where teachers instruct the students in content material. Some of them allow students to do self-learning or attending classes from home, making them comfortable without travelling. Some other states also use web and virtual school platforms for E-learning. Virtual school platforms allow children to open the websites either synchronously or asynchronously, from anywhere with enabled internet connection. Some of the well-developed schools in United States are now providing technology kits to their students that includes computers/laptops, internet connection and other required infrastructure for home usage. Students have to use these systems only for their school work and submission of their assignments and homework [34].

### **2.5.2 Computer-Supported Collaborative Learning (CSCL)**

One of the promising innovations in recent times is the computer-supported collaborative learning (CSCL). The recent developments in CSCL include E-learning 2.0, which encourages students to work collaboratively, discuss the topics and perform tasks with group learning. E-learning 1.0 is termed to be a traditional direct transfer of knowledge that reflects computer-based learning systems (CBL), while E-learning 2.0 fully encourages collaborative learning, discussing ideas and promoting information using Web 2.0 tools. Some of the Web 2.0 network includes user-centered design, information sharing, and collaboration on the World Wide Web. Few examples of Web 2.0 applications are social networking sites, wikis, blogs, forums, video sharing sites and web applications [37]. The blogs, wikis and Google docs are some of the commonly used CSCL mediums for teaching. K-12 students are quick to learn. It is understood from their feedback that, once they get initial training on how to use these applications, they are very comfortable in using it with regular usage and gain lot of information and knowledge with these tools [34].

### **2.5.3 Technology-Enhanced Learning (TEL)**

The main goal and purpose of technology-enhanced learning (TEL), is to provide advanced socio-technical innovations for E-learning practices, both synchronously and asynchronously. These innovations also help in improving the efficiency and cost effectiveness of the system. This field hence supports all the E-learning activities involving technologies, in order to improve their effectiveness and efficiency [34].

### 2.5.4 Classroom Environment vs. Online Learning Environment for K-12 Students

Online learning helps you do many things, including all the regular classroom activities easily, comfortably and at convenient timings at any place, with just a computer and internet connectivity.

**Table 2.2:** Comparison between the regular Classroom Environments and Online Learning Environments [36]

<b>Classroom Environment</b>	<b>On-line Learning Environment</b>
Attend class to keep abreast of course information	Read course module notes Read e-mail messages and postings to discussion area Read course outline and review calendar information
Research and read specific information	Research and read specific information through the Internet
Participate in discussions	Participate in discussions: read, respond and post to discussion area or chat room
Collaborate with other students	Collaborate with other students: read, respond and post messages via e-mail, discussion topic, chat room, and/or whiteboard
Participate in role plays and case studies	Participate: read, respond and post messages via e-mail and/or discussion topic
Ask questions	Ask questions: send e-mail and/or post question in discussion area
Hand in assignments	Submit assignments via e-mail or the discussion topic with or without attachments
Complete quizzes and exams	Complete online self tests
Network / socialize with classmates	Network and socialize with classmates: read, respond and post messages via e-mail and/or discussion topic

### 2.5.5 On-line Learning Activities

The online learning activities can be accomplished in more detail. Below are some of the online learning activities that have to be done by the K-12 students [36].

- Attend classes asynchronously – access online course daily to check e-mails
- Read and research specific information in the form of links to websites and articles
- Participate in discussions through discussion forums
- Collaborate online with other students during group assignments
- Participate in role plays and case studies – solve problems through discussion forums
- Ask questions – communicate using e-mails or discussion topics with instructors or other classmates
- Socialize with other students – using e-mails, discussion areas or chat rooms

### 2.6 Advantages of Online Learning in K-12 Environment

K-12 environments provide wide range of benefits for middle and high school students. Few advantages are listed below [38]:

- **Helpful for students living in small towns:** Students who live in small town may not have quality schools and good education system. For such students, these online learning environments help them access easily from their home with just an internet connection to their computers. Such students could get quality education from well certified teachers who can instruct them and interact with various students from different locations. They can gain knowledge beyond their expectations and see beyond the perspective of their hometown.

- **Helpful for parents who want to homeschool their children:** Online learning environments are really helpful for those parents who want to homeschool their children or cannot send/drop their children at schools due to financial issues or busy schedules. There are some charter schools which allow this facility by providing the students with a technology kit, consisting of a laptop and an internet connection, to use it just for school purposes.
- **Helpful when schools do not have updated curricula:** Some schools do not have updated curriculum that has been updated regularly with the growing new technologies. For students who want to keep themselves updated with the new technologies, gain more knowledge and be more practical, these kind of online learning environments are helpful.
- **Helpful when school have fixed teaching pace and standard:** All students do not have same ability to pick immediately and keep up with the school's standard pace. These online learning environments are flexible enough and lessons can be completed at the student's pace. This flexibility is helpful for students who take more time in understanding and memorizing subject knowledge.
- **Helpful for students if they want to finish early:** On the other hand, there are some students who are quick to learn and memorize materials and instead of wasting their time in remediation that may be required for larger classes, the flexibility of online classes is a great benefit for this group. Instead, these kinds of students have the option to finish their high school in less time by taking fast track courses online.



## **2.7 For Youth, For Life (FYFL) Learning Network**

FYFL is a collaborative platform and a workspace for youth and also educators. It is a certified eXtension Community of Practice (CoP) which was initially named as “Youth SET for Life CoP.” FYFL is a safe and secure online learning environment for K-12 students and the adults/educators who serve them. This is an online learning area where, youth can keep themselves engaging in learning and gaining knowledge about science and technology, being healthy, living responsibly and serving others as a responsible member of the society.

### **2.7.1 eXtension**

The For Youth, For Life (FYFL) Learning Network has begun as an eXtension Community of Practice (CoP). This is mainly focused on the data and content pages related to the science, agriculture and technology. The faculty from across the country and various land-grant universities have collaboratively worked and contributed for the development of the eXtension system. They have contributed the learning content from a variety of areas to a common public portal. This comprehensive approach of providing best content, resources and information from different land-grant universities across is termed as eXtension (pronounced as “e-extension”). The concept for youth separately concentrates on the younger generations knowledge requirements and this youth oriented eXtension system has been named “For Youth, For Life.”

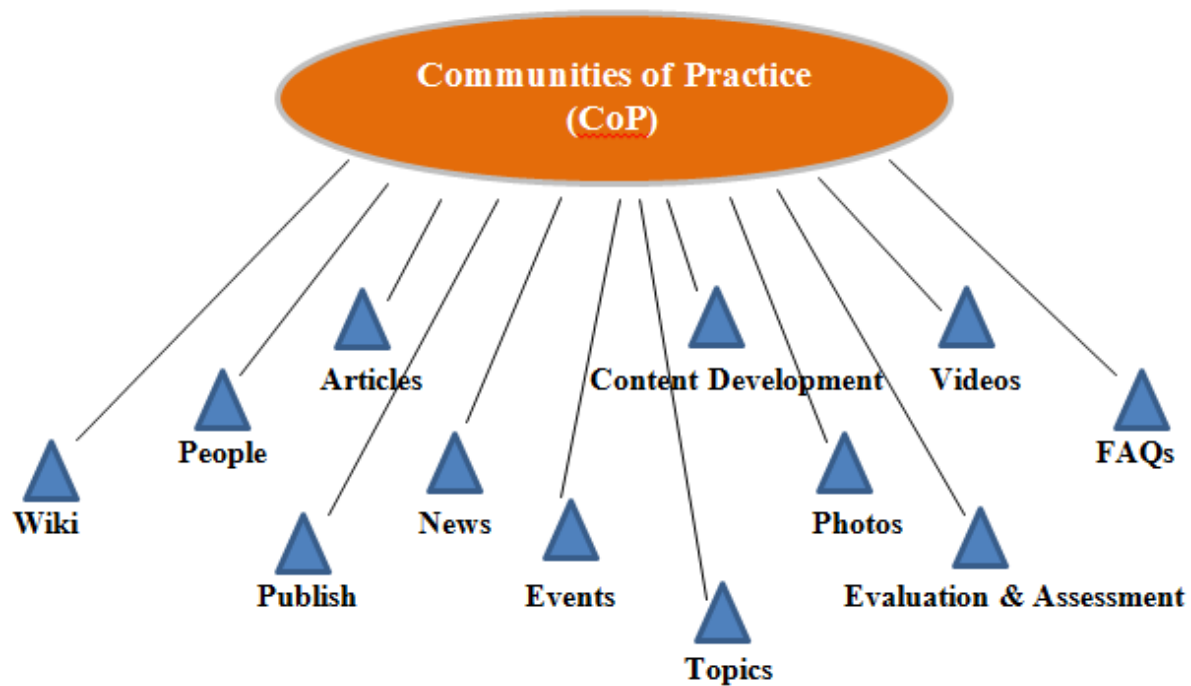
The content from the eXtension pages, which represents itself as Cooperative Extension (CES) and the knowledge from different specialists from land-grant universities (LGUs) mainly, serves as the source for FYFL. 4-H, another integral part of CES and LGUs, also focuses on the development of broad range content areas for the youth. The FYFL learning networks

encompass various applications created with different themes on different content areas. It includes large youth audience inclusive of 4-H school population and K-12 students.

### **2.7.2 eXtension Community of Practice (CoP)**

United States Department of Agriculture (USDA) has initially created a content area and site for “science, agriculture, engineering & technology.” One of the USDA councils has targeted to provide education and information on related fields to the farmers, woodlots and rancher owners through some national network. The NIFA and the Cooperative of Extension System (CES) has responded in providing an “eXtension” Internet-based system for the customers, where they can go and access the website anytime, anywhere to get education on wide range of topics. eXtension is nation’s first ever developed collaborative system for non-formal education through internet based information system and online learning community sites.

Cooperative eXtension, a vital mission of land-grant universities and USDA, is a cooperative system, which is organized into Communities of Practice (CoP). Each of these CoP has articles, news, events, topics, photos, videos, WIKI and frequently asked questions on various fields. The content is developed by the faculty specialists from around 104 land-grant universities (LGUs) and their staff experts. It undergoes many revisions before a CoP is published. Each CoP internally undergoes many peer reviews for changes and corrections on the content and the images. eXtension effectively delivers information and education nationwide to the public, including uneducated and young people, who are willing to learn new technologies.



**Figure 2.3:** eXtension Community of Practice (CoP) [24]

eXtension also provides information on decision support tools and certification programs. It helps people improve their lives by providing better information and knowledge on science, agriculture and technology related topics. eXtension now has better search optimization methods incorporated, which results in providing better and quicker results of eXtension pages on a Google search. It has been seen from years that eXtension is one among the best websites to look for content and is a place where one can go and learn something. eXtension has also collaborated with FYFL in the Fall of 2008, to develop the content pages and an online learning environment for youth. Figure 2.4 is one such published page developed as a content page for “For Youth, For Life.”



Science for Youth Home

## For Youth, For Life Information

Last Updated: June 20, 2012

Print

Share / Save

### What is For Youth, For Life?

For Youth, For Life is a community of learners interested in a variety of topics related to science, health, living responsibly, and service to others. This site is brought to you by a core team of members including university faculty, 4-H staff, and others who provide learning materials. Youth and adults can explore and learn together. Learners can also share their own experiences with other around their county or state and even around the country and world.

The site will help you explore many areas as it grows. Farming in the 21st Century is one. Water and Energy are two other areas. Coming later will be material on the Environment and Biotechnology. Geospatial Technology is coming too. Other topics will be Animals, Plants, Insects, Earth & Space, Robotics, and Rocketry. The topics are endless.

#### Welcome to this growing community of learners!

- For Youth, For Life Mission and Vision



This resource area was created by the: For Youth, For Life community

#### Resource Area Feeds

- Track all new content

#### In This Resource Area

- What is For Youth, For Life?
- Defining Science, Engineering, & Technology

#### Science Topics:

- All About Water
- Agricultural Sciences
- Energy
- Geospatial Technology
- Natural Environment
- 4-H Science
- Other Learning Opportunities for Youth

#### More Information

- Glossary Terms

Browse related Articles by tag: [science](#), [science for youth](#)

**Figure 2.4:** Published eXtension page for “For Youth, For Life” [16]

## 2.8 Statistics on the Audience of FYFL, Social Learning Environments

The audience from the younger generation for ‘For Youth, For Life’ using eXtension is approximately 56 million across the United States. Most of these audiences are those who browse and use internet connection for various purposes and to gain more knowledge. The population of the younger generation through 4-H Youth Development has been engaged in

learning that reaches approximately 6.0 million spread across the country as per USDA results, 2007. These 4-H students are the main targeted audience for FYFL. Many younger generation students and other members who choose to become the members of 4-H and eventually become the audience for the social learning environments and also contribute a vital role as a user community.

The *For Youth, For Life Learning Network* has a considerable potential to be a rich resource for young people throughout the United States and beyond. With an initial primary audience of 4-H members, there is a potential engagement of a significant portion of approximately 2.0 million youth. Targeting beyond 4-H to the general school age population, it becomes approximately 60 million school aged youth in the U.S.

## **2.9 FYFL: eXtension Learning Environment for Youth**

In the present era, entertaining the audience involving youth and adults has become a challenge in comparing various online learning environments. Recently developed learning environments for younger generations mainly focused on the features and applications in the systems that keep them involved and engaging in entertainment. Social learning environments like Facebook, Twitter, MySpace etc. are brought into the learning environments and used as one of the applications that makes them engaging, thus acquiring more knowledge and information.

The online learning environments are largely informal in nature, where in a user can learn and explore the system in a self-directed manner, without particulars instructions or directions. The learning systems that are more related to obtaining some sort of certification or a degree are deliberately made formal with instructions to the educational site. Any customer acceptance learning environment can be developed under FYFL CES system. A different approach with a

combination of both formal and informal system can also be developed. This approach called as a ‘Non-Formal Learning,’ involves few aspects of formal development and few other aspects of informal development. It also involves some experimental procedures and field studies which are predominant form of learning for youth in organizations such 4-H Youth Development and other youth organizations.

### **2.9.1 Content of “For Youth, For Life”**

The main content provider for ‘For Youth, For Life’ is eXtension that signifies both land-grant universities (LGUs) and Cooperative Extension systems (CESs). Figure 2.5 illustrates collaboration of FYFL network with the eXtension system along with the 4-H clover, representing the content for the 4-H Youth Organizations. Many online learning environments do not provide a certified educational specialist; its purpose is to help an individual to learn new things required for one’s life in broader content and to educate oneself. FYFL system certainly contributes to the enhancement of its systems towards formal sites, but currently the main focus is on the development of such individual learner informal or non-informal sites.



**Figure 2.5:** A logo for ‘For Youth, For Life’ in collaboration with eXtension and 4-H clover [17]

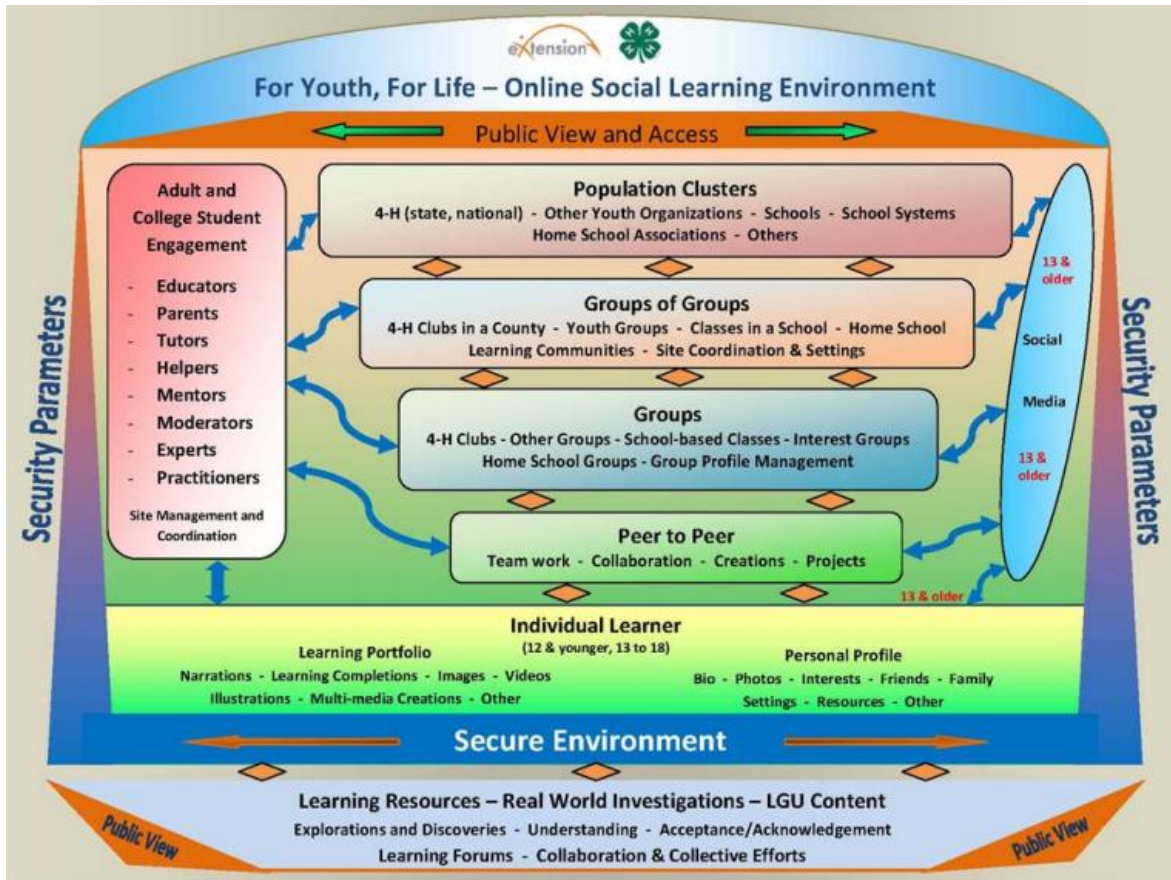
### **2.10 Social Learning Environments:**

Social interactions usually begin among peers or group of learners in a society, school, classroom or a social gathering where the interactions take place. Even in a large gathering such

as social communities or clubs where people meet, interactions takes place within small groups that function as communities. These groups may be a small group with 4-5 individuals, small groups interacting with other small groups or work within a cluster of groups, or even have interactions with very large population.

The social media apps like a Facebook, YouTube, Twitter, LinkedIn and MySpace are being incorporated in social learning environments. These social media enhance the learners acquiring fundamentals through the content pages provided. In the learning process, the social learning environments allow the learners to learn the basics through browsing and gathering information about a particular topic. In the later stages, learners can jump into the deeper understanding and engagement as a registered user.

Figure 2.6 illustrates how learners e.g. students, adults involving parents, educators, experts, and moderators interact within online social learning environments. It depicts the public view and access of the individual learners with the online learning networks. It also illustrates the collaboration among various groups, peer-to-peer, and groups of groups or within the population clusters. As per the following Figure 2.6, learning starts with an individual learner and continues as discussions with different groups and goes on with large populations and groups of groups. An individual learner can become a registered user and can have a learning portfolio and a personal profile for himself, when he has deep engagement with the learning environment.



**Figure 2.6:** For Youth, For Life – Social Learning Environment: copyright © 2009 Auburn University, Alabama Cooperative Extension System, All rights reserved. contact John A. (Tony) Cook

## 2.11 Content Flow and Quality Assurance of Social Learning Networks

### 2.11.1 Content Flow

The volume of the content available for young learners in learning environments is massive. The huge online content present can be explored and learned either online or offline. Further, the developers have to concentrate on the process of managing the content flow while designing to assure the system's efficiency and security. The important content related to news or advertisements may flow in the desired manner with regular checks for assuring system's accuracy. Other content like the events, articles, images, videos and frequently asked questions may flow as per the designer's choice, but maintain consistency throughout. Some content which



is extensive needs more revisions, peer reviews and testing the system for effectiveness, look and appearance, instructional design, and relevance to the appropriate academic and nation-wide standards.

### **2.11.2 Quality Assurance**

The system must be checked and tested repeatedly by the designers, peers, instructors, clients and the faculty advisors. A balance must be determined among the online learning experiences, offline learning experiences, and the process flow of the contents and their rigorous reviews to assure the quality of online learning environments. Quality, appearance, navigational ability and the usability are the important factors to be determined to maintain integrity of the learning environment. The accuracy and appropriateness of the content in the content pages would be addressed and assured within the CoP.

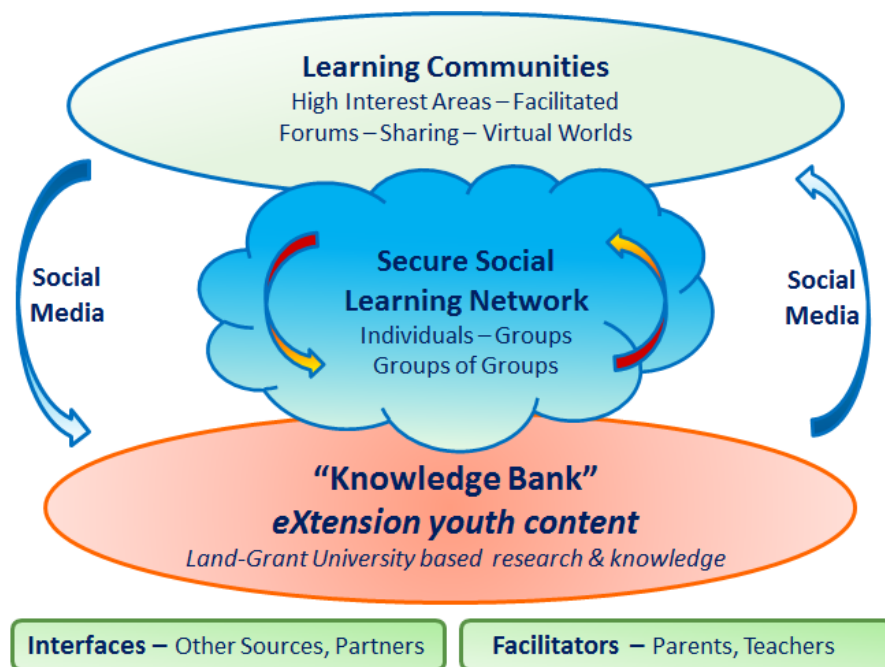
### **2.12 For Youth, For Life Community of Practice (FYFL CoP)**

A Community of Practice (CoP) called *“For Youth, For Life (FYFL)”* has been developed for the youth audience and the adult audience, who serve the youth. FYFL has been designed as an online learning network that provides content and information for the younger and older generations. For Youth, For Life online learning network is knowledge resource for the youth and general public.

A network called **“FYFLnet”** has been developed by Auburn University IT service staff, with support from the office of the Vice President for Research. It mainly focuses to serve the developing online social learning environments on a single network. It is a platform and infrastructure that primarily supports the learning communities and secure environment functions for the youth learning networks. FYFLnet system has many servers and is currently located in

the College of Engineering. It has huge capacity to accommodate a number of software installations. FYFLnet is built on a network which is not exclusively for 4-H service, but incorporates all other installations of software required for youth audiences, education, science, technology and other youth organizations. The FYFLnet consists of the following areas:

- A **Knowledge Bank** of content pages and information designed for youth
- **Learning Community Sites** and pages within
- A **Secure Online Social Learning Network**, and
- An **Interface with Social Media** that connects the knowledge bank and the learning communities



**Figure 2.7:** Illustration of FYFLnet Learning Network developed for Youth: copyright © 2012 Auburn University, Alabama Cooperative Extension System, All rights reserved. contact John A. (Tony) Cook

Figure 2.7 illustrates how the content pages in the knowledge bank are embedded in secure online learning environments accessed by various kinds of audience, interfaced with the social media. Each of these sections is described in detail as shown below:

### **2.12.1 Knowledge Bank**

A ‘knowledge bank’ is a set of content pages from eXtension or from an external input that serves as a default knowledge source for the youth. This is developed focusing youth with the information and content related to them that is more engaging and entertaining. The ‘knowledge bank’ with the content pages in it serves as the default learning resource for the youth. These content pages comprising of information on various topics were developed by different content teams. Content teams include the faculty specialists and faculty experts from land-grant universities, the people from Cooperative Extension System and other partner organizations. Content may involve basic and direct information about a topic or more detailed learning module. Before the content is published, it is tested and peer reviewed.

### **2.12.2 Learning Community Sites**

Learning community sites have to be engaging and dynamic for the youth audience and at the same time relate to the topic and their interest areas. Such sites provide an opportunity to share what is learned from others. They can also contribute the acquired knowledge to a larger community and network. They also serve as a gateway to various resources and methods of learning from credible sources.

Learning communities are facilitated by *practitioners* who are experts or educators in a particular field and have an interest in contributing in certain areas. They may often serve as facilitators for forums, webinars, and other interactive components. In an environment through which online learning community is fostered, youth and adults are engaged in *sharing and*

*interacting with each other* in an appropriate and safe manner. User generated content is openly shared.

### **2.12.3 Secure Online Social Learning Networks**

A *social learning network* provides learners with a personal learning space to load their activities and accomplishments. It is a *secure networking* component that mainly focuses on providing space for individual learners, groups of learners and groups of groups like the educators (parents or teachers) who serve them. It also provides the content teams (faculty and other staff) to collaboratively work in such workspace.

## **2.13 Safety and Security in Social Learning Environments**

In addition to maintaining clear guidelines and good communications, another important factor necessary for any social learning network is its safety and security. Unlike Facebook, this environment must be safe and secure as a learning environment for youth. The users and the learning environments have to be protected from unauthorized access. The members profile should be kept relatively safe from illegal entrees. Following are the key features to be taken into consideration while creating a social learning network [41].

### **2.13.1 Transparency**

Communications needs to be public to everyone and has to be shared with all available authorized users. This implies that features like open chat has to be incorporated to make sure that each person in the group receives the message when any member posts, instead of private messaging. Open chat features do not allow inappropriate access to the system.

### **2.13.2 Membership Monitoring**

The members of the group should have some functionality such as the ability to create and manage the user groups, ability to create custom groups for professional learning communities and the ability to have control on what groups are formed, who the moderator of the group is and who the members of the group are, in order to monitor unauthorized access.

### **2.13.3 Data Encryption**

The social learning environments should have adequate infrastructure that provides a way to encrypt the confidential data like the login details, student's personal information that is passed over Internet. These kinds of encryptions prevent students from being exposed to inappropriate content on the web pages.

### **2.13.4 Admin Control**

The administrators of the learning environment must have administrative control to manage users and their information, access various settings, monitor all the activities over network, and apply appropriate filters to the content and data to make sure that all networking is productive, safe and transparent. The admins should view the system and user activity logs, performance of the system, how the system is being used on regular intervals and always has all the privileges to change the permissions of the members.

In regard to safety and privacy, the children aged twelve and under need to have a private connection with other individuals who usually serve them. They need to be moderated by the adult groups. The data and the content have to be assured to make them secure by following some standards. Adults have to approve for the children aged twelve and under. A standard protocol for adult moderator's approval must be established and followed everywhere to maintain consistency. This may vary somewhat from one land-grant University to other.

However, following an established standard protocol is recommended as FYFLnet is anticipated to be used nationwide. Adult moderators are anticipated to come from other institutions and professions as well.

A good example of a secure online learning system is a WIKI that maintains confidentiality, integrity and is available to everyone with information on every small topic. It is an interactive website, driven by a specific web server, delivers dynamic and up-to-date content pages. They provide users with an efficient and user friendly environment.

## **2.14 Existing Content Management Systems (CMS)**

Most of the websites are now being built using various content management systems. The popularity of these content management systems are now being grown in the technology area are by the developers and users. As the need for the website development increases, the demand for such developing technologies also increases.

There are a wide range of CMS options available today. The decision in deciding which CMS has to be chosen in developing a website depends on many factors. These include the type of the website being developed, which CMS has best options to develop such kind of website, stability and available resources. These factors have to be considered before making a decision. Some of the popular content managements are described below.

### **2.14.1 WordPress**

WordPress is considered as the most popularly used open source CMS by designers on internet. It allows developers an opportunity to build any type of website on its system. The standard WordPress installation provides most of the features with plenty of themes, plugins and widgets. These features bring added functionality to the websites.



**Figure 2.8:** WordPress Content Management System [62]

### 2.14.2 Drupal

Another leading content management system is Drupal. Large communities of users use Drupal to build various multi-author sites, blogs and community-driven websites.



**Figure 2.9:** Drupal Content Management System [62]

It is a preferred choice for many communities of users because there are many modules and resources readily available to make use of.

### 2.14.3 Expression Engine



**Figure 2.10:** Expression Engine Content Management System [62]

Expression Engine is mainly used for commercial purposes that is powerful and offers various features. The Expression Engine costs \$100 for developing personal websites, while it costs \$250 for developing a professional one. It offers a long list of easy to use flexible templates, customizable area to fit the data using custom fields, a dedicated and flexible technical support makes the system reliable and vibrant active community helps in installing add-ons. It is more suitable for commercial related websites.

### 2.14.4 Joomla

Joomla is originated from Mambo. Joomla is a mixture of all the features from other open source CM systems. It also has large mixture of opinions when compared to other CM systems.



It allows developers to build all kinds of websites including e-commerce, online magazines and corporate ones.



**Figure 2.11:** Joomla Content Management System [62]

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Using eXtension as Content Management System**

eXtension is an internet and content-based collaborative environment where different providers like the land-grant University content providers exchange their materials and the research-based knowledge in order to solve many real time challenges. It is an interactive learning environment, which delivers the best and current researched knowledge from the great minds of land-grant university experts.

eXtension is not like any other search engine. It is a place where the university content providers gather all the information and new educational resources on a wide-variety of topics. It provides information in solving various real-life problems in real time. It is widely available to students, professors/educators, researchers, as well as the general public through Internet access at any time. Content experts have unique skills and educational experience in a wide range of interesting content areas. eXtension leaders and members can collaborate with other consumers and colleagues to expand the work and to solve challenging problems.

Content can be easily stored in systems like eXtension where it provides informative knowledge on a wide range of topics. It connects different knowledge consumers with different knowledge providers. eXtension offers reliable results based on the depth of the search, and provides great connections with intelligent people from different American Universities. The

content provided here is trustworthy and field-tested data. Users also find dynamic, relevant and timely answers.

### **3.2 Problems with eXtension for Interactive Systems**

eXtension supports all kind of data entry and works as a great tool for managing the entire content. However, it fails when you have to develop more interactive system for various generations with different purposes for each. The current design is highly supportive of mature audiences, but provides little support or developed application for K-12 audience. eXtension provides a basic level content managing system where every published topic/page has a similar layout and structure. It is delivered and acceptable to a specific age group, as it looks very professional and is not very interactive in nature. Usage of eXtension for youth learners becomes problematic based on limited interactivity.

### **3.3 Developing Criteria for Online Learning Environments**

The development of the online educational sites must address the transition of the topic structure to the on-line learning environment. Online teaching can be done at school, taught by the educators or can be learned from home, where parents will be responsible for teaching their children. Research in such development mainly concentrates on quality issues, especially if that is for distance learning. The research is conducted with surveys taken from different graduate students and K-12 students. From the study, it was shown that there is a great importance of the potential quality indicators in online learning systems. The establishment of these online learning communities seems to be a significant feature in online education today [42].

The study mainly focuses on the students' interests that makes software engaging and reaches their levels of expectations. Student's interest should play a vital role in the education of younger students. The following are the significant quality-indicator factors to be taken into consideration while developing a secure online learning environment.

### **3.3.1 Quality-Indicator Factors**

Some of the quality indicator factors are [49]:

- Ability to create highly interactive environments for students
- Ability to encourage the students to participate in discussion blogs
- Ability to involve students in participating to reply to post and forums
- Ability to re-use the resources of all the communities for future students
- Meet the expectations of the students and instructors
- Ease of use i.e., the system should be easy to navigate and understand
- Easy to learn i.e., the system should be easily be learned by all K-12 grade students
- System should be enabled in a student-centered teaching approach
- Enhancing student-to-student communication with the implementation of forums and discussion blogs
- User friendly i.e., the system should be easy for K-12 students to adapt to

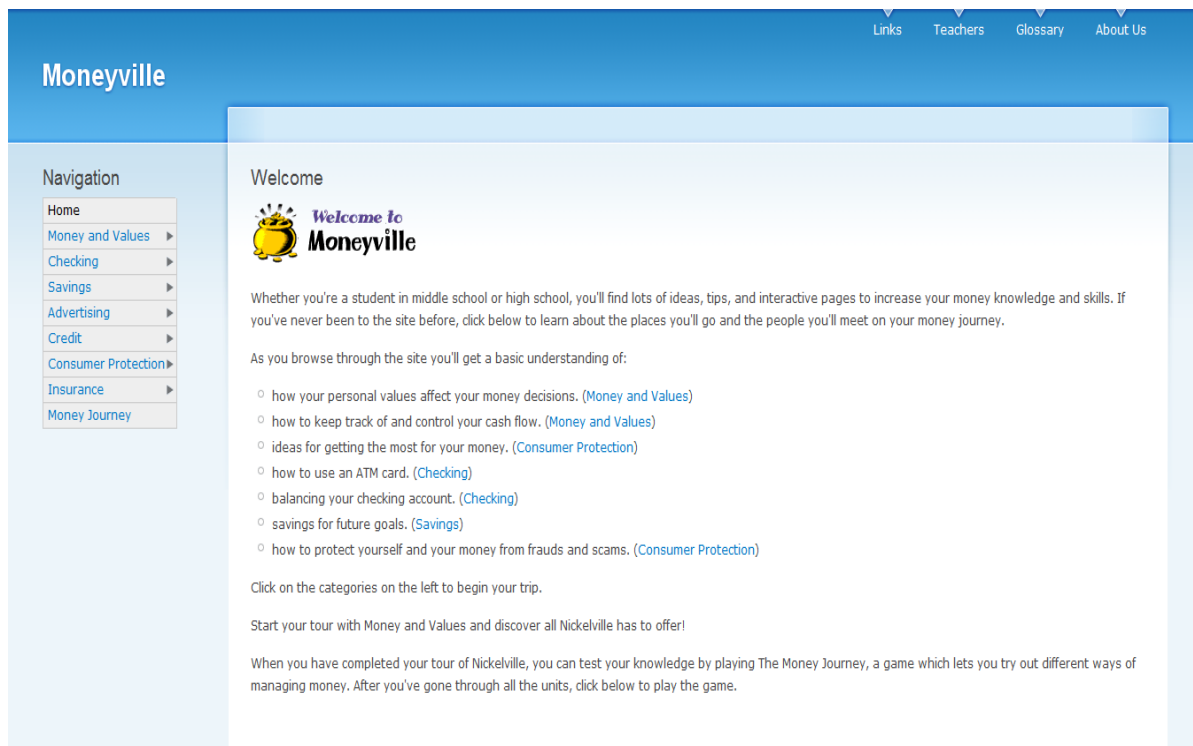
### **3.3.2 Principles while designing Online Learning Communities**

The significant principles while designing online learning communities are [43]:

- Online learning communities needs to be grown, instead of built
- They need more learners
- Personal narrative is more important and plays a vital role in online learning communities

The environment plays a very important role while developing the online learning communities. According to Foster, the environment that includes both the technical infrastructure and the user interface provides proper means to communicate the social cues and other information in the development of a vibrant online learning community.

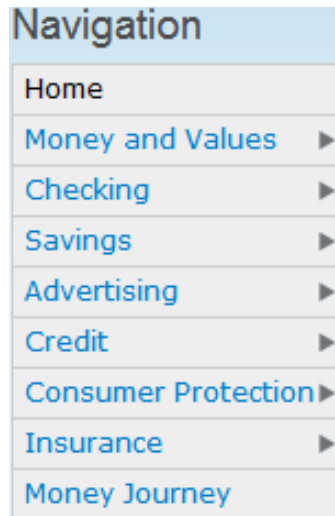
### 3.4 Existing Environments



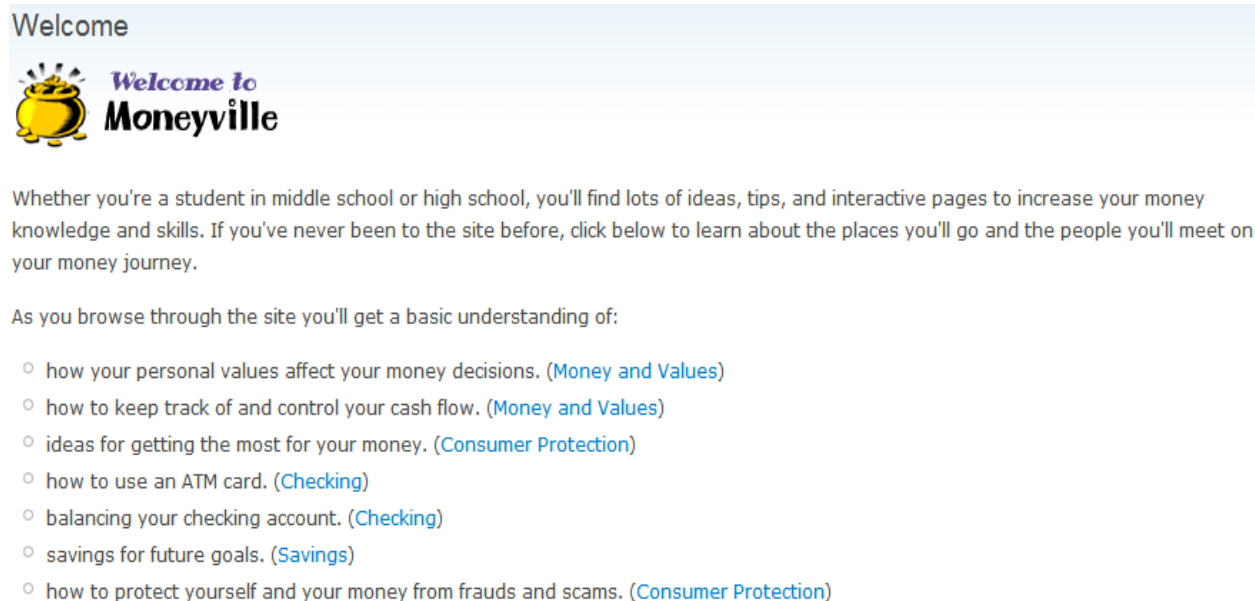
**Figure 3.1:** Moneyville home page [64]

The existing learning environments have all the static pages that have no functionality, just content, and do not seem to be very interesting. Most of the current learning communities help us in determining what the website is intended for. It is very important for developers design from a user's point of view and concentrate on their requirements while developing. The final product of the web content management system should be easy to use and understand. One

of the existing prototypes called Moneyville was developed by Cornell University to help the youth get better understanding of financial literacy in their lives. This site has a lot of information, based on different financial areas, that gives good financial education to K-12 students. However, this site has all static pages with plain text and images. It has lot of issues and complaints with its poor usability, navigation and unappealing look & feel.



**Figure 3.2:** Unappealing navigation toolbar of existing system [64]



**Figure 3.3:** Unappealing look and feel of Moneyville, with all text based static pages [64]

The second prototype “Add It Up” was developed for K-12 students for financial literacy in the cloud network. This was developed to overcome the pitfalls of the previous prototype, “Moneyville.” The navigation and connection to social media were addressed in this prototype, but the main intention behind developing the online learning environments for K-12 students was not given priority while developing this. The website is missing attractive features like video files, discussion forums etc., that attract younger generations, though it has an appealing interface. The main issue in this prototype is that every user/student should have access rights to view the learning environment. Every user who wants to view the website has to be registered and have login details. Logging into the cloud network every time, may cause discomfort for the users when interacting with the learning community environment.



Figure 3.4: ‘Add It Up’ prototype [57]

### **3.5 Software Development Process of Financial Literacy using CMS**

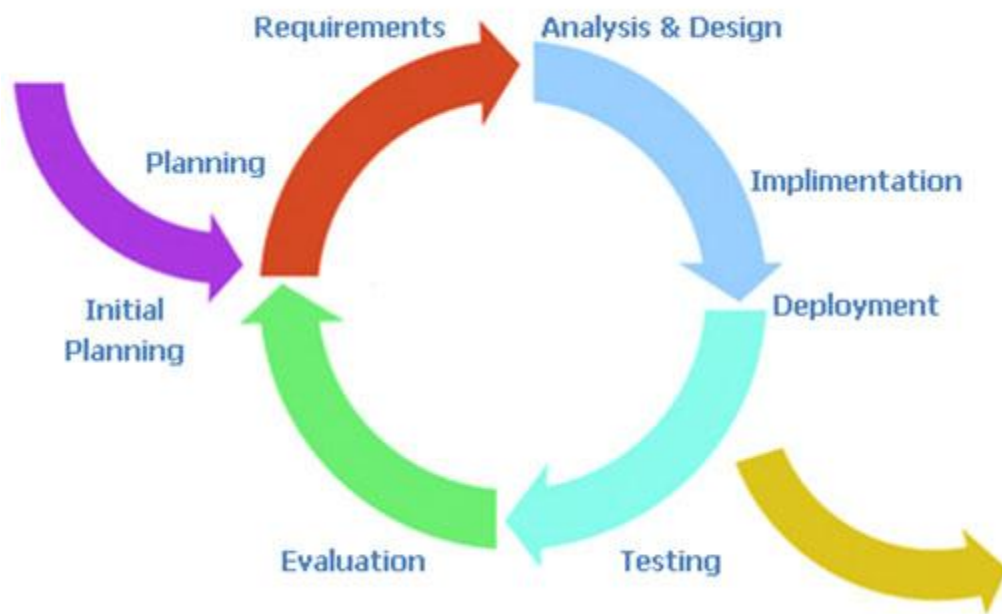
#### **Iterative model**

I have employed the iterative lifecycle model to build a very robust and reliable system in a structured manner. In this model, all the specifications of the requirements were not specified in the beginning of product development. Instead the design and development specifications were iteratively improved throughout the design and development process. This portion of the system that has been developed was reviewed many times by the clients to make sure it meets their requirements. This kind of approach was also helpful during development because the developed portion of the system can be reviewed repeatedly to identify further refined requirements. Once the new requirements or changes to the existing system are identified, the entire process is then repeated to produce an improved version of each portion of the entire system. This whole process is done in each cycle of the process model [45].

One advantage of the iterative process model is that it is flexible and can easily accommodate the implementation of new features and components that the developer/client wants in a particular module, with minimal understanding/knowledge of the whole system. This model allows early adjustments in the system during the development phase, rather than finding the problem at the end, when it is too late to make any modifications or add features. With such an approach, a lot of money and time can be saved, instead of spending more time and cost at the end for making changes. Another advantage is that, at every stage, the outcome of each module can be shown to the customers and developers can make appropriate changes, if necessary. Every stage in this iterative model is considered as a vital phase in the developmental cycle and every module is developed with the approach of completeness.



Finally, the system grows iteratively and incrementally, with all the refinements and new functionalities incorporated. Furthermore, the time taken to test each unit or entire system can also be lessened as they will be tested and checked at each stage during development [46]. The main advantage is that the user group can be actively involved in getting feedback while using the system and making the appropriate changes. Configuration Management will be employed for all the changes that have to be made through the Configuration Control Board (CCB) team and new requirements will be updated, recoded and re-tested for the newly made changes.



**Figure 3.5:** Iterative process model of FYFL system development [45]

### Phases of Product Life Cycle

The iterative life cycle model is used in the development of the Financial Literacy system using a Content Management System (CMS). This development process is repetitive and is comprised of these following phases in sequence:

### **3.5.1 Requirements Phase**

This is the phase in which the requirements for the CMS system are gathered. All the requirements are gathered for the CMS system from the previous existing systems, i.e. *'Moneyville'* and *'Add It Up.'* Additional requirements and changes to the existing ones are gathered in this phase. The new requirements, like the discussion boards, forums, video contents and understandable data along with graphical features, are the core requirements that are being implemented in the new Financial Literacy system.

### **3.5.2 Analysis Phase**

Requirements that are gathered from the above phase are being defined and analyzed in this phase. The developer will get an overview of how the system has to be developed and what features are to be implemented in the system. These resources are being used by students who can get financial knowledge from this system and teachers/educators can utilize this environment to clearly structure and provide materials for future work.

### **3.5.3 Design Phase**

This is the phase in which the software solution is designed and implemented. The new *'Financial Literacy'* system is the design of the extension of an existing system, *'Moneyville'* and *'Add It Up.'* This solution that has been designed fulfills all the requirements and meets all the expectations from the previous systems. Some of the new requirements include improving the look and feel of the system to make it more attractive to students, making it more user-friendly and making the system easier to navigate. It also includes more functionality like discussion boards, forums, animated images, flash movies, video files, login pages etc., being embedded in the new design of the CMS financial literacy website.

### **3.5.4 Implementation Phase**

This is a very important phase in the software development life cycle, which includes the main implementation of the code of a product. The system software is implemented in PHP, MySQL for database, HTML 5 and CSS 3. When the coding is completed, all the modules and the units have been integrated and implemented. The implementation will support system use on the following devices: desktop systems, laptops, mobile phones with windows, Linux and iOS.

### **3.5.5 Testing Phase**

After the code has been integrated and implemented, it will be tested. Every unit and the modules were tested for correctness to see if they meet the expected requirements. The unit test, system test and the integrated test are conducted to validate the whole system. It is considered a robust system if the system passes all these tests. The system is also tested with the end users like students, teachers and parents to make sure that the system works correctly. Changes are made to the modules and the system, if required, from verbal feedback of the end users and the test results. Usability testing will be performed using pre-questionnaire and post-questionnaire surveys collected with an online survey system called '*survey monkey*'. The survey link is sent to the end users through an online invitation link, and the survey results will be used to compare the existing and the present system and also to make any modifications, if needed. These surveys are also used to test the usability and user experiences with the system. Their valuable feedback is considered.

### **3.5.6 Maintenance/Evaluation/Review Phase**

Once the CMS financial literacy system is delivered to the clients, the maintenance phase begins. This is a crucial phase that provides a mechanism to report and address failures or issues with the system after delivery for a specific time period is very important. The system also

should be well maintained while delivering it to the customers, by maintaining good documentation and notes provides information that helps novices easily understand the system. Usable technologies and good user interface design help support a successful system. The current requirements are reviewed and the system is evaluated to make sure that it has met all those requirements. If not, the additional changes will be proposed as iterative refinements and will be added to the system in the iterative process of the system development life cycle [45].

### **3.6 UML Diagrams and Scenarios - Financial Literacy using CMS**

The use–case scenarios are diagrammed using the Unified Modeling Language (UML) that is used to demonstrate the Object-Oriented Analysis and Design (OOAD) concepts. It is used for standardized language that can be used for Object Modeling. UML is the graphical language that can be used for modeling, visualizing, specifying, constructing and also documenting all the artifacts of the modules of the system, or the whole system itself. The main purpose of the UML diagrams is to present the system functionality in a graphical/diagrammatical overview, in terms of actors, their goals which are represented as elements of the model or use cases or behaviors and the dependencies between those elements.

#### **3.6.1 Scenario I**

A. Administrator

**Name:** User and Administrator perspective of the FYFL CMS Financial Literacy system

**Primary Actor:** Administrator/user/parent/student/teacher

**Secondary Actor:** None

**Description:** The below use case diagram represents the system as a whole. This scenario is for users like learners or students including children and also for the administrator. The entire

learner group utilizes similar features as the other users (students). It shows activities from viewing all the pages of the system, logging into the forum, making required changes to the system, and replying to the discussions & posts and choosing the required topic from the provided list of topics or material provided.

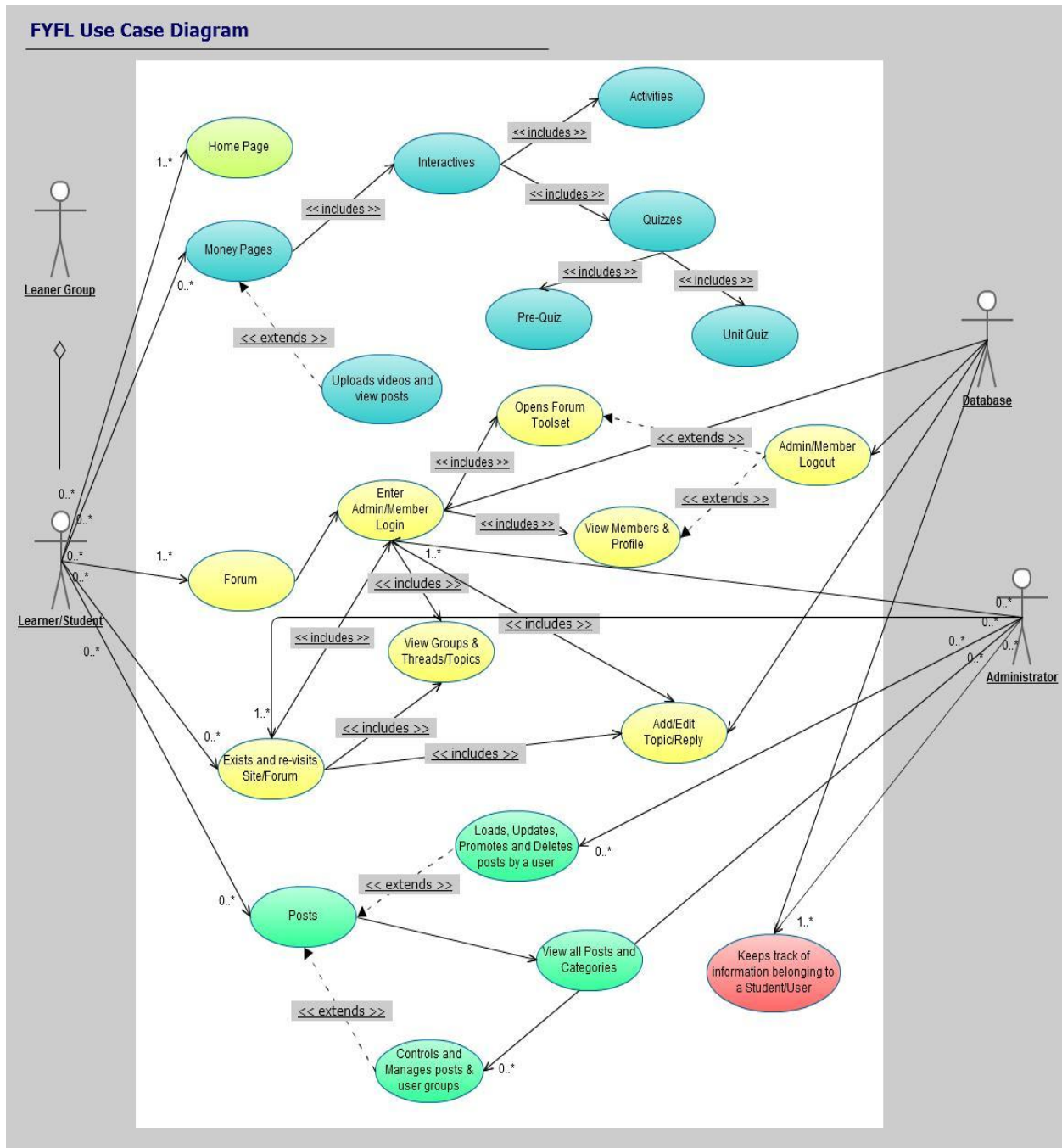


Figure 3.6: Use-Case diagram of FYFL Financial Literacy system using CMS

**Scope:** CMS Server System

**Level:** User and Administrator level

**Stakeholder Roles:**

- 1. User/Parent/Student/Teacher Role:** The users can view the home page as well as the financial related pages like the money, savings, checking etc. They can interact with the system by playing flash games that have been created to engage young students. These interactivities include the activities and quizzes which implicitly include a pre-quiz and a unit quiz. The users can also access the discussion board like posts and forums. They can enter into these and add posts, comments and reply to each of these. There are more functionalities also included in the system like profile viewing, editing user profile etc.
- 2. Administrator Role:** The administrator can also upload videos and can view/edit posts. Administrators can also login into the system to have more access/privileges to the system. These activities are controlled by the database admin.

**Pre-Conditions:** The user should have a desktop/laptop/mobile phone in working condition with internet connection to the above mentioned devices. The administrators should have valid login details to enter into the forum system.

**Post Conditions:** A list of registered users, list of posts, topics and discussions are displayed. Even the replies to each of them are displayed as a result of the scenario.

**Basic Flow:**

- The users usually do not require a login to view the system/site.
- Only the administrators require registration and login details to enter into the system to have more privileges.
- The admin signs up for an account to get full access with the system and forum.

- The user can view all the pages/topics of the site, discussions in the forum, the posts and reply to all the above without any login access.
- The system displays a list of all the topics to the user from the main menu, like the money values, checking, savings, advertising, credit, consumer and insurance.
- The user can select one of these topics of his interest.
- User can get financial knowledge based on the figures and content on each selected page.
- Users can also play interactive flash games related to each category to get better understanding of each.
- They also have a pre-quiz for each of these categories, to test their current knowledge before learning anything.
- Once they get complete understanding of each of these terms and values, they can take the unit quiz to test their expertise.
- Users can post topics under posts or add a topic to the existing discussion under forum.
- They can also reply to these posts or discussions going on in the posts or forums about the system and their acquired knowledge.
- The system saves all the details and displays the chain of posts and discussions of the forum and posts once users submit.
- Admins can logout from the system once they are done with admin rights and actions.

### **3.6.2 Scenario II**

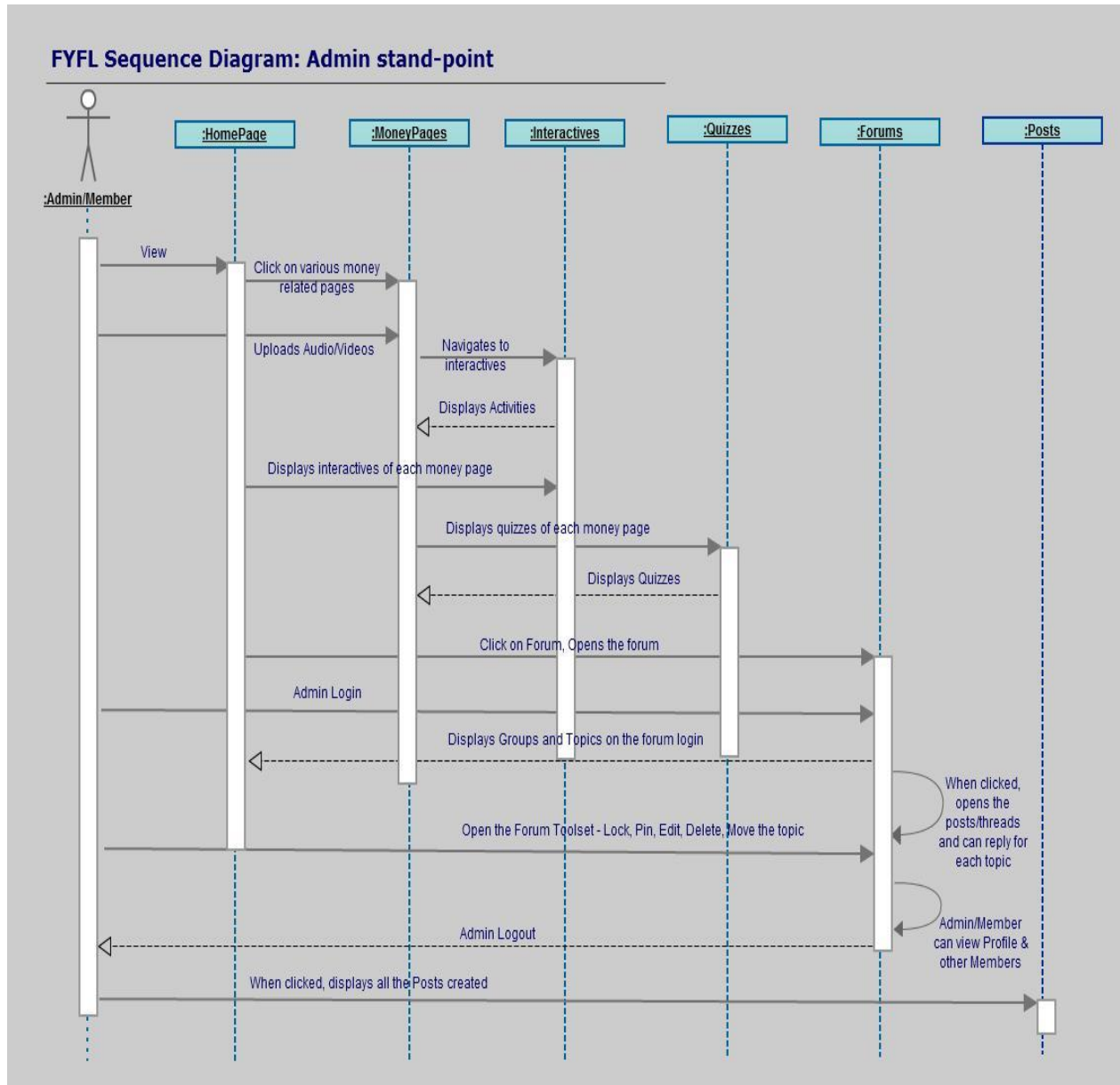
B. Administrator

*Name:* Administrator role in the FYFL CMS Financial Literacy system

*Primary Actor:* Administrator

*Secondary Actor:* None

**Description:** The below sequence diagram represents the system from the admin point of view. Admin has a few additional privileges in the system, along with the standard user rights. This scenario is only for admins who can access the database and whole system. The admins have a separate login for each to make any modifications from the backend. They have all access and permissions to make changes to the system through WordPress interface and code.



**Figure 3.7:** Sequence diagram from admin perspective – FYFL Financial Literacy system



**Scope:** CMS Server System

**Level:** Administrator level

**Stakeholder Roles:**

1. **Administrator Role:** The administrator can also upload videos and can view/edit posts. Administrators can also login into the system to have more access/privileges to the system. These activities are controlled by the database admin. They can view all the pages such as the home page, money & values, checking, savings, advertising, credit, customer and insurance pages like any other user. In addition to this, they can also upload the audio and video files on these pages. They have access to add/view/edit the interactive items like the flash games and the quizzes.

The administrators have permissions to login to the forum and the discussion boards like posts. They can login either from the final product of the website or can login from the backend database system. With this kind of access they can make many changes to the entire system. The look, appearance of the forum, system; the themes selection, implementation of plugins, access of user profiles, adding attractive widgets are all the important activities of an administrator. They will also have the permission to initiate group discussions which have further have more topics added to it by the users.

**Pre-Conditions:** The admin should have a desktop/laptop/mobile phone in working condition with internet connection to the above mentioned devices. They should also have valid login details to the whole system through WordPress.

**Post Conditions:** A list of registered users, list of discussions, user profiles, and changes in layout, colors, themes and content are displayed.

### ***Basic Flow:***

- The administrators require registration and login details to enter into the system to have access to the entire system.
- The admin signs up for an account to get full access with the system and forum.
- He logs into the system through WordPress interface.
- He can view the dashboard and the admin section on the interface.
- To add new code or make changes to the existing code, he needs to go to the network admin section.
- The admins can create new posts, add media like the audio or the video files, create new pages, and make changes to the appearance of the entire system.
- In changing the appearance of the site, he has the access rights to add/change the themes, widgets, plugins, and main menus, colors of the background & header and layout of the entire system.
- In the forum section, the admin will create the groups to start the new discussion. More than one topic can be added below each discussion by admins or users and more than one discussion can be added under each group by the admin.
- In the system after login, the admins can view and open the forum toolset under specific topic in a discussion forum.
- In the toolset, admins have the permission to lock a topic, pin a topic, edit the topic title, delete a topic, move a topic and view the properties of each topic. The properties include the IDs and titles of the group, forum and the topic.
- Admins can also view the profile of all the users of the system and insert/update/delete the records of them accordingly from the database.

- An administrator can also create/edit the posts in the system, on a separate tab.
- Once all the admin activities are completed, he logs out of the system.

### 3.6.3 Scenario III

#### C. Users

**Name:** User perspective of the FYFL CMS Financial Literacy system

**Primary Actor:** Users such as parents/students/teachers

**Secondary Actor:** None

**Description:** The below UML diagram represents the sequence diagram of the FYFL Content Management System Financial Literacy site. This scenario is from user's point of view where they can perform various functions from the front end of the system. The functionalities include viewing all the pages of the system, viewing the forum or discussion board, making required changes to the system, replying to the discussions & posts and choosing the required topic from the provided list of topics or material provided.

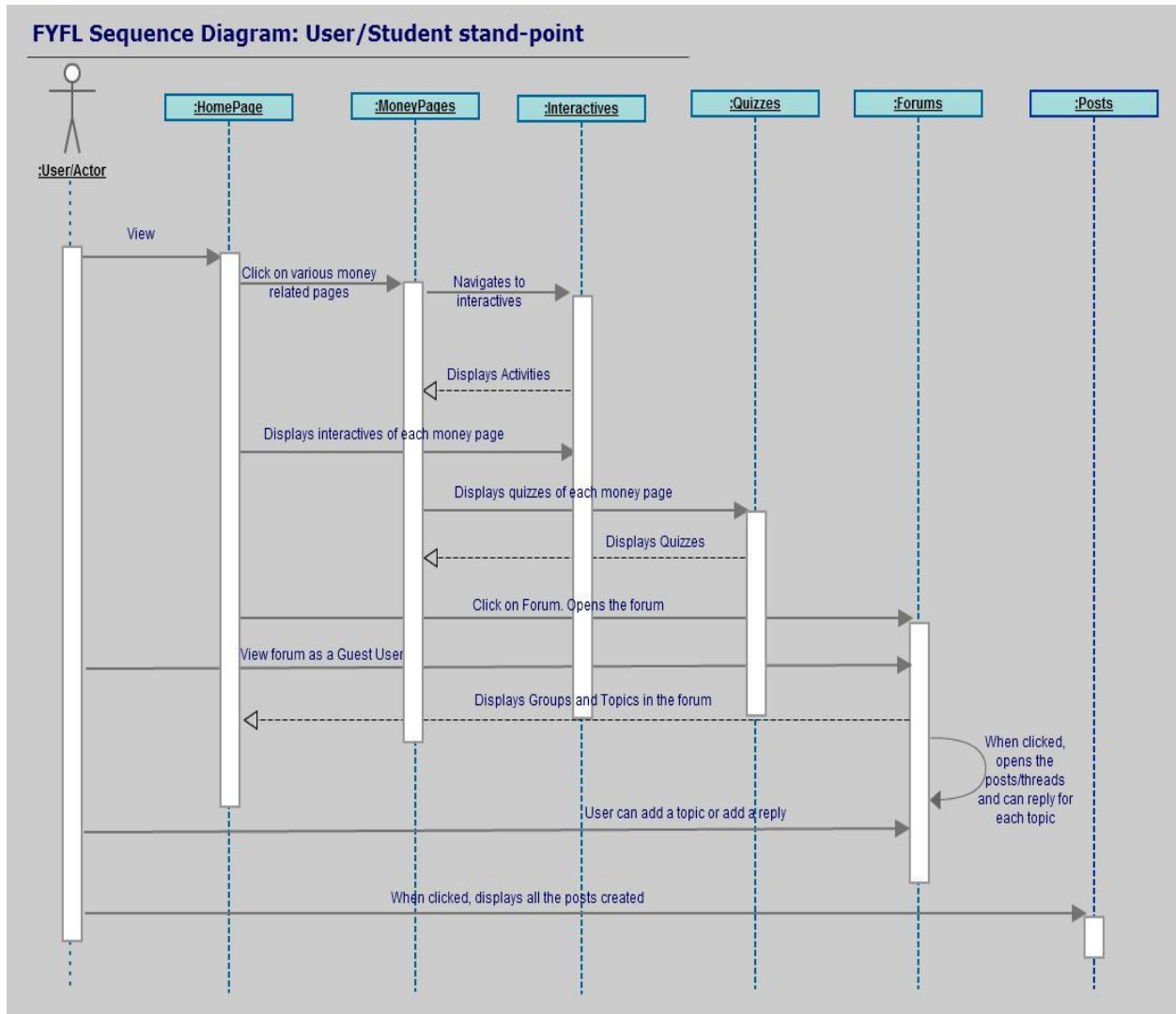
**Scope:** CMS Server System

**Level:** User level

#### **Stakeholder Roles:**

1. **User/Parent/Student/Teacher Role:** The users can view the home page; view all the financial related pages like the money, savings, checking, insurance etc. They can interact with the system by playing the flash games that have been created to engage the K-12 students. These interactive items include the activities and quizzes which implicitly include pre-quiz and unit quiz. They can open all the pages even by clicking the sliding images that are rolling on the top of the site. These sliding images look more attractive and engaging for the students as well. The users can also access the discussion board like

posts and forums. They can enter into these and add posts, comments and reply to each of these. There are more functionalities also included in the system like the profile viewing, editing user profile etc.



**Figure 3.8:** Sequence diagram from student perspective – FYFL Financial Literacy system

**Pre-Conditions:** The user should have a desktop/laptop/mobile phone in working condition with internet connection to the above mentioned devices. The administrators should have valid login details to enter into the forum system.

**Post Conditions:** A list of registered users, list of posts, topics and discussion are displayed. Even the replies to each of them are displayed as a result of the scenario.

### ***Basic Flow***

- The most advantageous part of this site from users' perspective is that the users do not require to login to the system/forum to view the pages or the on-going discussions.
- The user can view all the pages/topics of the site, discussions in the forum, the posts and reply to all the above without any login access.
- The system displays a list of all the topics to the user from the main menu, like the money values, checking, savings, advertising, credit, consumer and insurance.
- The user can select one of these topics of his interest and view all the related information.
- One can get financial knowledge based on the figures and content on each selected page.
- Users can also play interactive flash games related to each category to get better understanding of each.
- They also have pre-quiz for each of these categories, to test their current knowledge before learning anything.
- Once they get complete understanding of each of these terms and values, they can take the unit quiz to test their expertise.
- Users can post topics under posts or add a topic to the existing discussion under forum.
- They can also reply to these posts or on-going discussions in the posts or forums about the system and their acquired knowledge.
- The system saves all the details and displays the chain of posts and discussions of the forum and posts once users submit.

### **3.7 How the Online Educational Environment will be tested?**

The CMS Financial literacy system tested through an online survey created using the survey monkey site, which is used to create surveys for various purposes. This survey will be taken by graduate students with usability or software engineering expertise and who has taken the CITI training at Auburn University in the CSSE department. This survey will be completed by novice users and also with experienced users, who have experience with online educational tools. They will compare the existing environments with the newly developed educational environment to compare the results and these results will be illustrated through graphs and models. These illustrations, along with the graphical charts, will be discussed in detail in chapters 5.

### **3.8 Hypertext Preprocessor (PHP)**

This research work was fulfilled by researching which online educational tool is best suited for financial literacy site. It should have all the features embedded in it and should also be engaging for K-12 children. To develop such an environment, the code is written in PHP, HTML 5, CSS 3 and MySQL. PHP is a server side scripting language that is embedded in HTML. This language was originally created by Rasmus Lerdorf in 1995. It was originally called the “Personal Home Page,” but now is called the “Hypertext Preprocessor,” a recursive acronym. The code written in PHP is mainly helpful for the developers to develop the websites by writing server side scripts and dynamically generating those web pages. This code is then interpreted by a PHP processor web server that generates the resulting web page.

In this development of the online educational environment, the PHP code has been written and edited for the themes of the pages, the layout, the functionality and the plugins that

are embedded in the widget area. Each project folder has many PHP files, along with a CSS file that is used for styling, colors and appearance of the entire system.

### **3.9 Initial Study Description of the System**

The main goals of this study are

- To decide which learning tool and environment best suits K-12 students
- To make them aware of the online educational learning environments
- To let students learn or understand the familiarity of computer usage
- To teach users the importance of financial literacy in their life
- To show the differences between the previous environments and the present developed environment with completely new look and features
- To test the usability features of the new environment ‘FYFL CMS Financial Literacy’ when compared to ‘Add It Up’ and ‘Moneyville’

Prior to this study, data has been researched and collected from various testing groups. A detailed analysis has been made from the of previous surveys results and from the result of this study as shown in chapter 2. A wide range of questions has been prepared for testing participants, called as ‘*pre-questionnaire.*’ A set of questions were also made that have to be answered after the participants have seen the site and compared the existing and the previous one. These questions are called the post-questionnaire.

A series of tasks like the pre-questionnaire, the site visit & comparison and the post-questionnaire will be given to the testing participants. These tasks will be given to the participants after the development has been completed and the entire system is shown to the

clients to get their sign-off. Once all the requirements have been fulfilled as per the client, the site goes for testing.

### **3.10 Testing and Experimenting the Site Developed using Content Management System**

Students were given traditional online lectures in a classroom environment before the online educational system evolved. For younger generations, the structured classroom teaching does not keep them engaged and entertained. This might reduce their interest in learning new concepts. Their interests automatically boosts if there are some practical implementations of each concept in their studies. Few online learning environments existed, but they were all designed for the older generations and are comprised of just the plain text with few images. Children would obviously look for something that catches their eyes and keeps them involved in the system. Such things also increase the interests in learning things. Therefore, the newly developed system has been designed with all such attractive features, along with new colors and images that attract one's attention.

As discussed above, once all the requirements have been fulfilled as per the client, the environment will be sent for testing by the researcher. The secured data required for testing is collected from the sites and loaded into the survey monkey electronically. Once the participants get the link to do the survey, they will be asked to complete a series of steps as required. The testing steps include:

- Pre-Questionnaire – Has to be done before viewing or accessing the system
- Visit the WordPress site: <http://www.fyflnetwork.org>
  - Access various links related to the financial terms
  - Watch the videos related to them



- Play the interactive games for each of them like the money, savings, checking, advertising, credit, consumer and insurance
- Take the quiz for each of them after playing the interactive games, to understand their knowledge (Each individual has different level of acquiring skills. Based on their capabilities, they could take the quiz as many times as needed)
- Login to the Forum and view the existing topics in the forum
- Participants have to create, edit, reply and delete the posts in the forum
- View and access various widgets and attracting plugins on the site
- Post-Questionnaire – Answer a few questions related to the system usability, information and interaction quality of the site.

### **3.11 Hypothesis**

The main hypothesis of this study is to investigate the usability and interaction quality of the online learning environment for Financial Literacy using WordPress. The educators and students should feel that the site provides more opportunities for student engagement and interactivity and can be used very easily without any prior technical knowledge. The development experts and clients should feel that this system is much better compared to the previous Moneyville and Add It Up environments, as it is more engaging, user-friendly and easy to learn, as they have features like plugins, discussion boards and forums to keep creating posts and replying to them. Another hypothesis is that the informal online learning environment has the opportunity for scaling upward to supports more students when compared to the traditional classroom environment.

There are many new modules and features that have been added to this new environment that make it much more usable and user friendly to young audiences. These features include forums and discussion boards, plugins developed, and interactive games. We will assess feedback to evaluate the user population that will be collected through surveys and tests. There are also interactive quizzes and tutorials that are available in this site as new features that will also add to the positive interaction quality of the application, based on iterative refinement of requirements from our clients.

To test the hypothesis, we use the pre and post questionnaire that have Likert type Scale with 1-5 ratings to test the look, feel, accessibility and appearance of the system. A Likert Scale is a psychometric scale that is commonly used in various types of surveys and psychometric questionnaires. A typical Likert Scale item takes the following format from 1 through 5 [48]:

1. Strongly Disagree
2. Disagree
3. Neither Agree Nor Disagree
4. Agree
5. Strongly Agree

The types of surveys created using Survey Monkey for the participants are mainly to check the user-experience, computer accessing and understanding, usefulness, usability, ease of use and the user interaction satisfaction. There are also surveys related to the Information quality of the site.

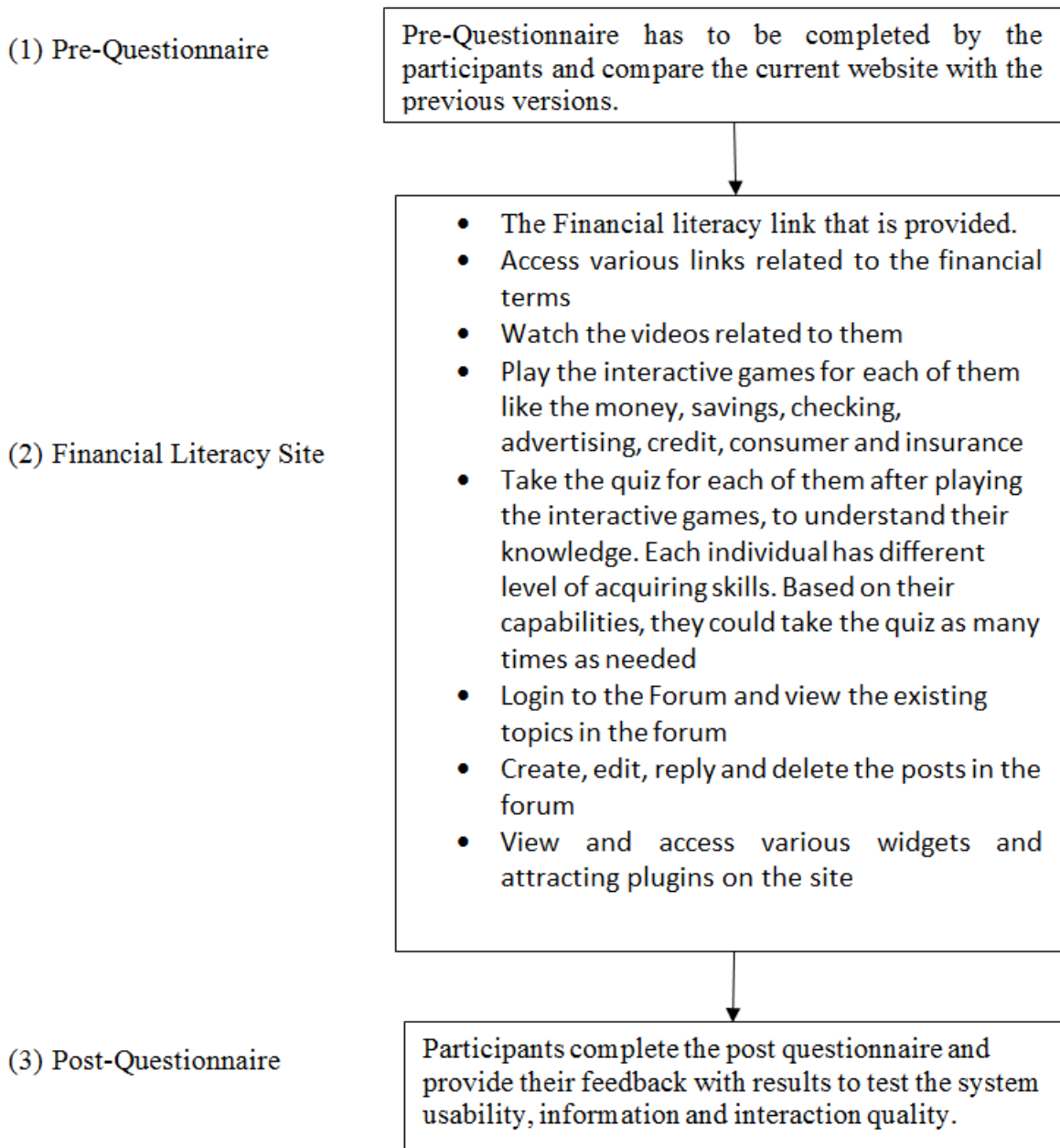
### 3.12 Experimental Procedure

There are a few steps that have to be followed by the researcher to conduct the experiment with the participants. They are:

- The participants are sent an email regarding the surveys and their links
- The emails have links to the pre-questionnaire, the Financial Literacy website and the post-questionnaire
- The participants have to answer a few set of questions in the pre-questionnaire, before looking at the site
- Open the newly developed Financial Literacy Prototype and compare it with the previous versions, Moneyville and Add It Up
- Now, the participants have to answer the set of questions from the post-questionnaire

It takes about 15-20 minutes to do all the above mentioned steps. There is a limited time period given to the participants. They can spend some of their leisure time to answer these questions, if they wish to take longer than the given time in order to explore and understand the whole prototype.

**Table 3.1:** Financial Literacy survey flowchart



## **CHAPTER 4**

### **IMPLEMENTATION**

#### **4.1 Implementation of the FYFL Financial Literacy using Content Management System (CMS)**

This chapter details the development of FYFL Financial Literacy System utilizing WordPress, a Content Management System. The existing systems have poor usability and unsophisticated appearance. This work will improve the user interface and user interaction of the system and its overall usability. A content management system provides a development platform that will produce a professional system interface, interaction, and enhanced usability to better maintain student motivation and explore the provided financial literacy content.

##### **4.1.1 What is a Content Management System (CMS)?**

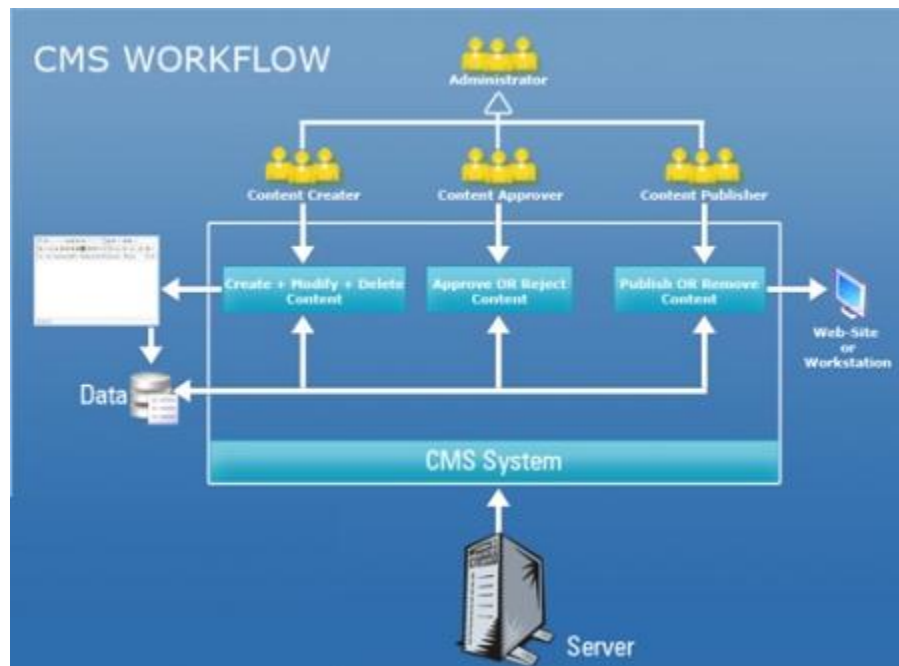
A Content Management System is a web based tool that allows creating, editing, modifying and publishing the content in a website. It has a central management system that maintains and manages the site from a central page. There are a set of procedures that are used to manage the flow of the system in a collaborative environment. There are many features in the CMS systems that vary from system to the system. Some of them are [55]:

- It allows people to share and contribute to the stored data.
- Role based authentication can be employed using CMS where the data can be accessed by different users differently.
- It facilitates the storage and retrieval of data.

- Improves the communication among the users.
- Data can be defined as videos, images, articles, games etc.

CMS mainly acts as a central repository that is frequently used for storing, controlling, managing, revising and publishing the documentation.

#### 4.1.2 How CMS Works?



**Figure 4.1:** CMS workflow

There is an administrator who manages the entire CMS system, including the data access and manipulations, server transactions and the publications of the content to the websites. The administrator has all the access rights to perform any kind of changes/modifications to the system. Below are the three main roles whose act in the CMS workflow is very critical.

- **Content Creator:** His role includes the creation, modification and deletion of the data on the content pages.

- **Content Approver:** The content approver can either approve or reject the created content on the pages, before publishing.
- **Content Publisher:** His main role is to publish or remove the approved content. If these pages are approved by the content approver, the content publisher will publish them on the website to the public. Otherwise, they are removed from the system.

#### 4.1.3 Types of Content Management Systems

There are three types of content management systems [55]:

1. **Enterprise Content Management System (ECM):** An ECM organizes all the enterprise or a commercial organization related documents, content, data and the records. It is responsible to manage the organization's unstructured content. This can be achieved by maintaining the integrity, improving security to the system and eliminating the bottlenecks.
2. **Web Content Management System (WCM):** This is a stand-alone application that is used to create, modify, manage, deploy and publish the content on various sites. Web content includes many ways to interact with the users like the text, audio files, video files, graphics, images and code for wide range of applications.
3. **Component Content Management System (CCM):** This is a specialized form of CMS that is designed to enable the documents creation from component parts. This is helpful in system development where the content needs to be consistent across the entire system.

#### 4.2 Problem Statement

There are multiple ways to keep the users engaged in online learning environments. The existing online learning systems are focused mainly on the older students and are not very

engaging and interactive. Younger students expect the environment that they interact with to be more colorful, informative, provide different activities, and have good usability. Moneyville has lot of information regarding finance and money terms, but it has many usability design issues. The look and feel of this site is not very appealing and has only static webpages. Add It Up was developed as an improved version of Moneyville, which has resolved some usability issues, but the functionality of Add It Up was not fully functional. It provides a basic web page with images and acceptable navigation.

### **4.3 Proposed System**

To overcome this problem, we have provided an improved solution. The planned educational environment is a learning environment developed in **WordPress, a Content Management System**, that is completely based on user interaction and appeal. The developed educational environment for Financial Literacy has resolved all the discrepancies by adding new features that are engaging and attractive as well.

### **4.4 WordPress as Content Management System**

WordPress is a free open source web based dynamic content management system. WordPress is based upon PHP and MySQL. It has many features including the themes, plugins, templates, widgets and different tools. WordPress is a very popular Content Management System used by many people on the Internet.

In WordPress, a presentation layer is present that displays the content of the website to site visitors and users. This layer is managed with a set of templates and is comprised of all the application developed front end pages. Most of the CMS systems use the **server side caching** to



improve the performance of the site [54]. WordPress has much functionality embedded within the system. It has a web template system that uses the template processor and the following are briefly described features of WordPress:

#### **4.4.1 Themes**

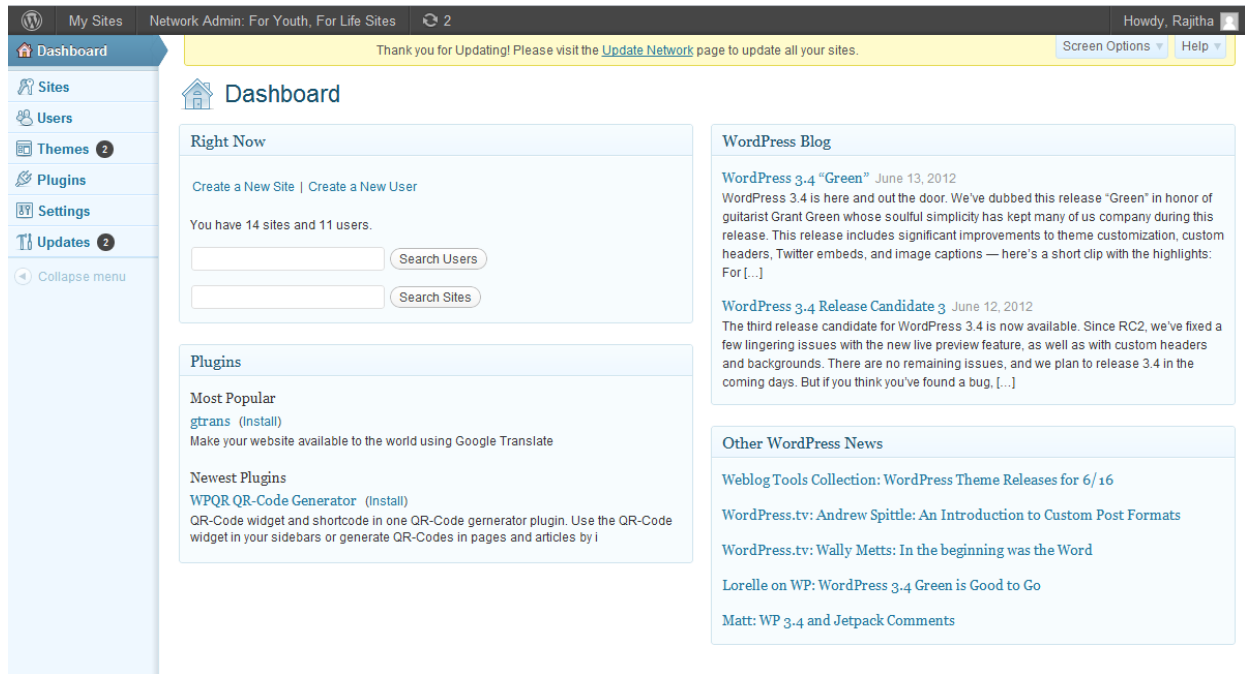
There are a wide range of downloadable themes to provide the web developer many alternatives to support the preferences of the target user population. These themes can be downloaded and installed from the ‘Themes’ section from the Network Administration tool in the WordPress dashboard. They can also be uploaded using the .zip file from the themes folder using an FTP connection. The HTML and PHP code can also be edited and modified according to the requirement for more advanced customizations. The images and layout of the theme can also be modified by editing the code using admin rights. The theme is applied to the website using the themes tab from the appearance section in the site dashboard. The header, background, the title and the menus of the current can also be customized.

#### **4.4.2 Plugins**

The most popular feature of WordPress is its plugin architecture. This allows the developers and other users to extend the available functionality beyond the existing features. WordPress has a collection of around 18,000 plugins in its database. It has a directory of all the plugins that have the most popular tags.

#### **4.4.3 Widgets**

Widgets are small components that add additional functionality to the website. The widgets can be dragged and dropped in the sidebars of the site. Some of the most common widgets are the calendar, categories, and comments section.



**Figure 4.2:** Network Admin dashboard of WordPress

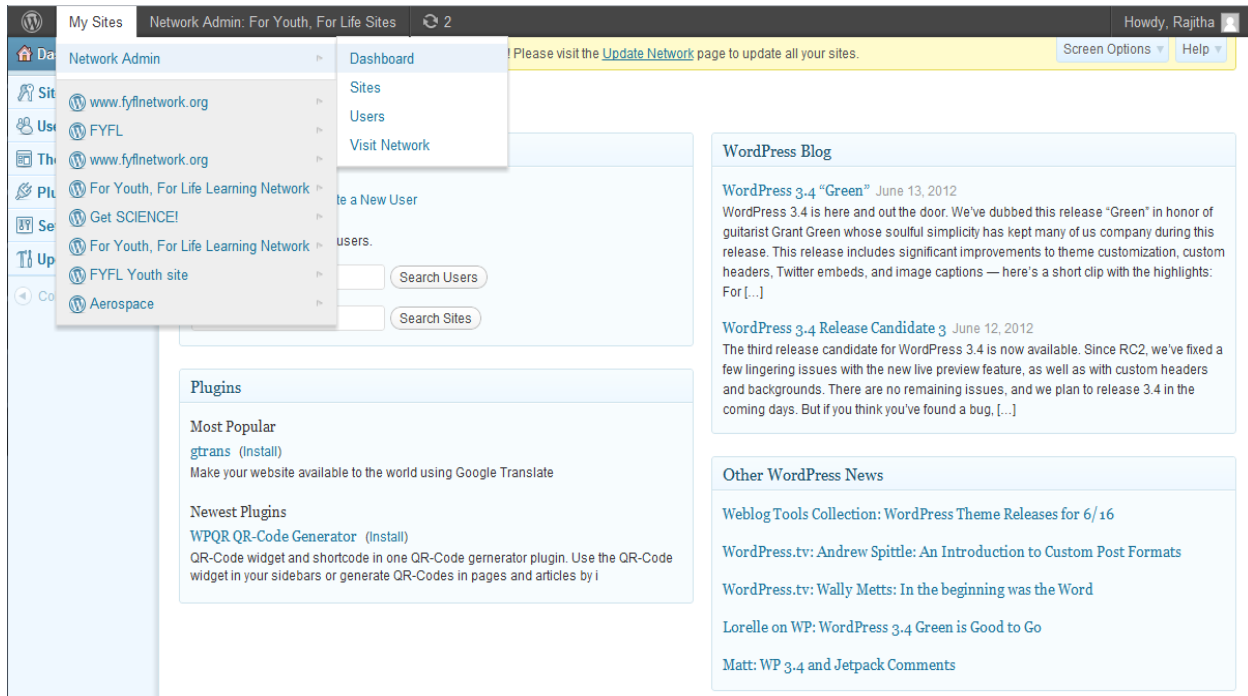
#### 4.4.4 Multi-User and Multi-Blogging

WordPress supports just one blog per one installation prior to Wordpress 3.0. Now it allows creation of multiple sites/blogs and accesses all of them concurrently. These can be run from different directories and access different database tables. Multiple users can be registered within a single WordPress installation. It has a centralized administrator who maintains multiples users and blogs of WordPress. WordPress Multi-User (WP MU) makes it possible to control and moderate all these blogs from a single dashboard and it adds eight new database tables for the creation of each new website.

#### 4.4.5 Mobiles

Websites created using WordPress can be accessed from any mobile devices like the iOS (iPhone, iPad, iPod Touch), Android, WebOS, Windows Phone 7 and Blackberry. All the applications and features like the plugins and widgets can also be accessed from these phones.

These mobile devices also provide access to the Wordpress regular dashboard and the Network Admin panel to work with the development and deployment of the sites [56].



**Figure 4.3:** WordPress dashboard with Network Admin panel

#### 4.5 Design and Model of the System using WordPress

The functionality of the website is also completed in addition to adding new features like registration, forums, posts and discussion boards. It has other features like various plugins and widgets on the sidebars that stand as the master page for all the webpages in the site. It also has sliding images on the top, which redirect to their respective menus items and is also included in the master page. This new Financial Literacy website also has features like the videos, interactive flash games, maps to locate where they are sending the messages from and where they are located, and also a chat window to keep users always in contact with the other users or students

using the site. This supports users in learning functionality more easily and clarifies their doubts immediately with their user group.



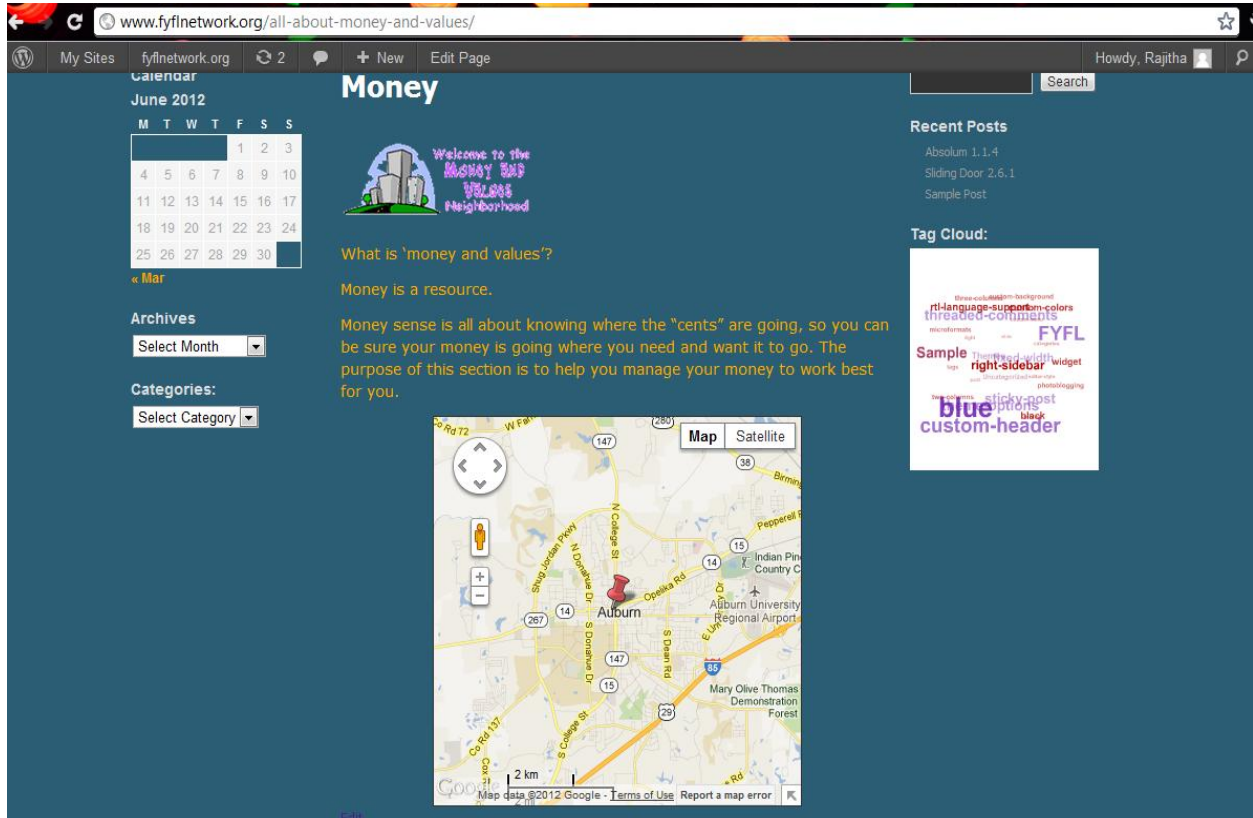
**Figure 4.4:** FYFL network home page

The proposed system has been developed in WordPress using PHP, HTML 5, CSS 3 and SQL languages. It has an administrator panel and a registered user's panel. The admin panel has options to make changes to the themes, plugins and widgets. We have made changes to the layout, functionalities, adding/removing sidebars, adding/removing the images and colors in the themes and made changes to the plugins to appear as per the requirement using PHP, HTML 5 and CSS 3 languages. A forum or a discussion board has also been developed to provide opportunities for more engagement and social networking of the group.

## 4.6 Descriptions of the Modules of FYFL Financial Literacy

### Features included in Money and Values Page

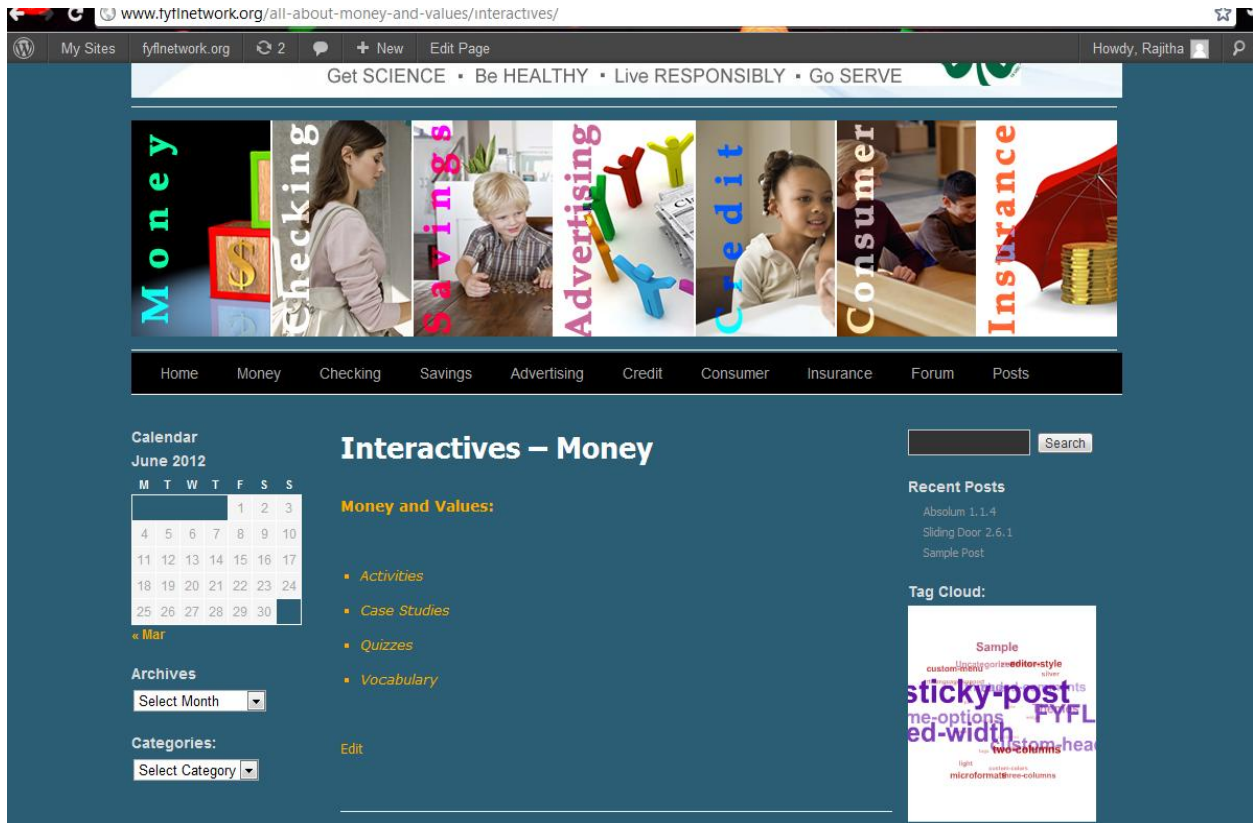
Features include the calendar, various categories, the map and the tag cloud in this money and values page. This page talks about what money as a resource is and how students should use the money. It also describes about the importance of money in their regular lives.



**Figure 4.5:** The Money and Values page of FYFL Financial Literacy

The entire website has a 'Tag Cloud' embedded in it where the tags and categories of various posts and data are rotating and revolving continuously. This is a very interesting new feature we have added to website that provides the K-12 students more opportunities for interaction and engagement. It acts as a search toolbar, where the tags and the categories are visible for selection. They have to just click on one of the desired tags or the categories and they are redirected to their desired page.

## 4.6.1 Interactive Pages



**Figure 4.6:** Displays the interactivities of the Money and Values page

Figure 4.6 illustrates all the categories of content that are available in the system. There are interactive games and activities that provide additional support for all content areas. There are also interactive activities, case studies, quizzes and vocabulary created for every financial page. The financial pages include Money, Checking, Savings, Advertising, Credit, Consumer and Insurance. A *Search* toolbar is also located on every page to search for the required items. Each of these siding images shown in the Figure 4.6 are also redirected to their respective financial pages as written on each image and are directly related to the menu items below each of them.

## 4.6.2 Activities included under each of the Interactivities

As mentioned above, each financial page has Activities, Case Studies, Quizzes and Vocabulary. Each of these activities is divided into variety of interactive flash games. The flash games are divided as per the description of each financial page.



**Figure 4.7:** Flash games under the Activities section of each financial activities page

For example, the activities of the Consumer page are shown below which includes few flash games like the Bubble Gram, Hangman, Word Search and Pattern Matching. These games provide to encourage student interest with a greater frequency of play; students will learn lots of information related to financial literacy including terms and important processes. With this environment, kids are the consumers. They will be introduced to the following concepts: why do they go to banks, and what kind of terminology bankers generally speak? There are flash games are different for different financial pages. They vary according to the finance terminology.

### 4.6.3 Activities under each Financial Page

There are multiple flash games present under each section of the financial literacy. One of the games called the Bubble Gram game is shown in Figure 4.8.

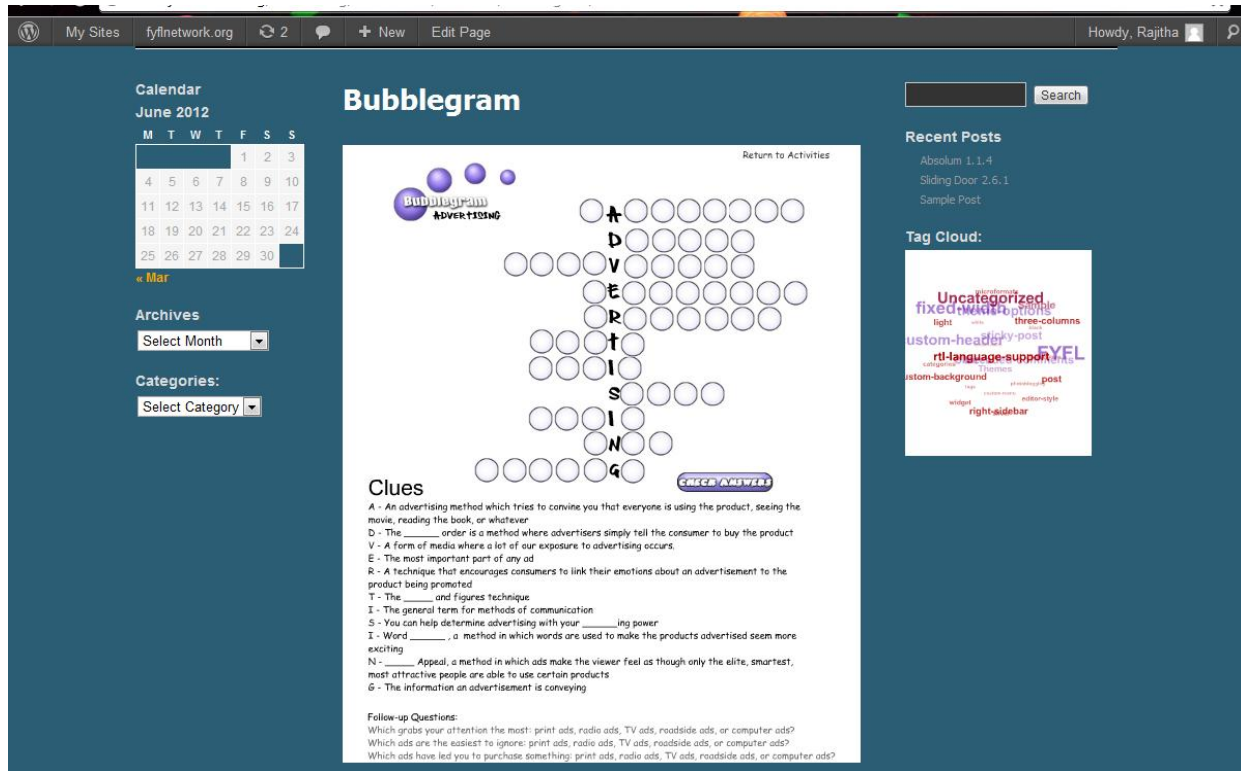


Figure 4.8: Bubble Gram game under Advertising page

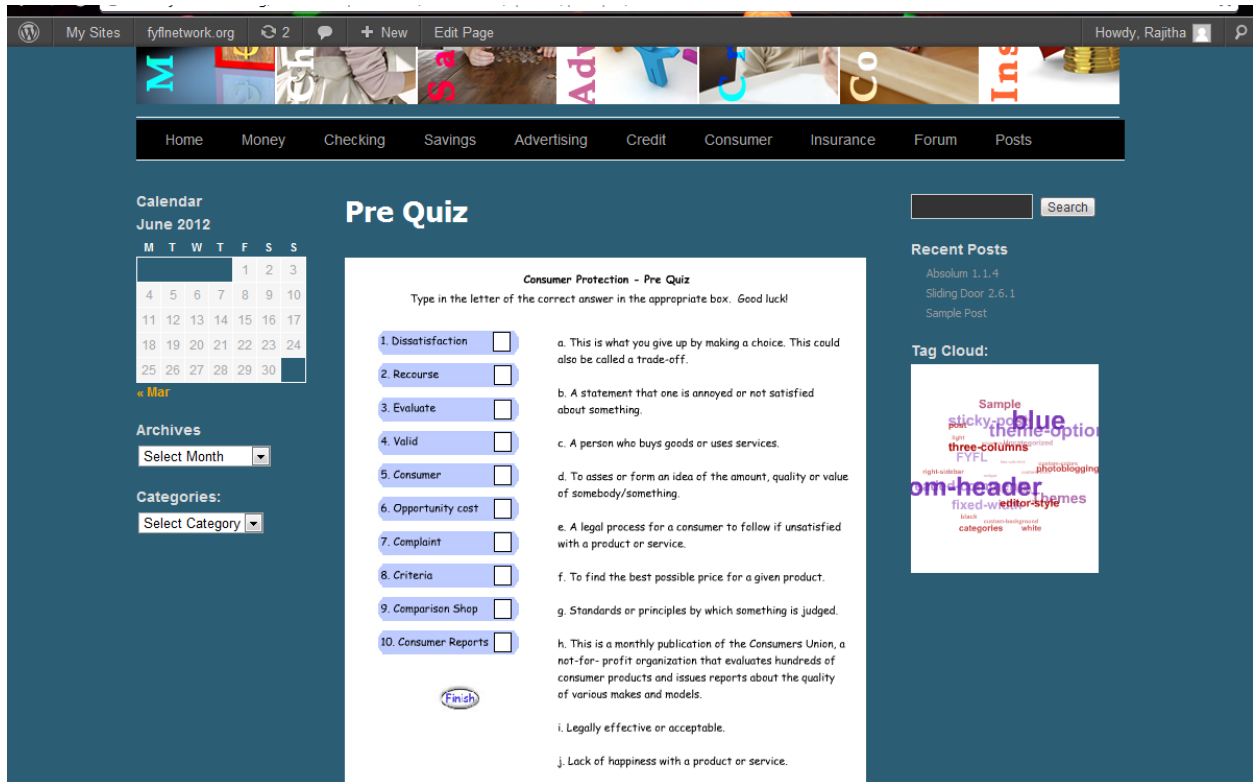
Each game is provided with instructions, which are easily understandable for the students before attempting to play the game. Some of the common activities included are the Hangman, Bubble Gram, the Pyramid Game, the Bean Game, Virtual ATM Machine, Inflation Calculator, the Word Search, Crossword and many more.

### 4.6.4 Quizzes

Each financial page like the Money, Checking, Savings, Advertising, Credit, Consumer and Insurance has a Quiz section provided for reinforcement. Each of these quizzes is comprised



of a Pre-Quiz and a Unit Quiz. These quizzes are taken by the children, students and other users before and after playing the interactive flash games.



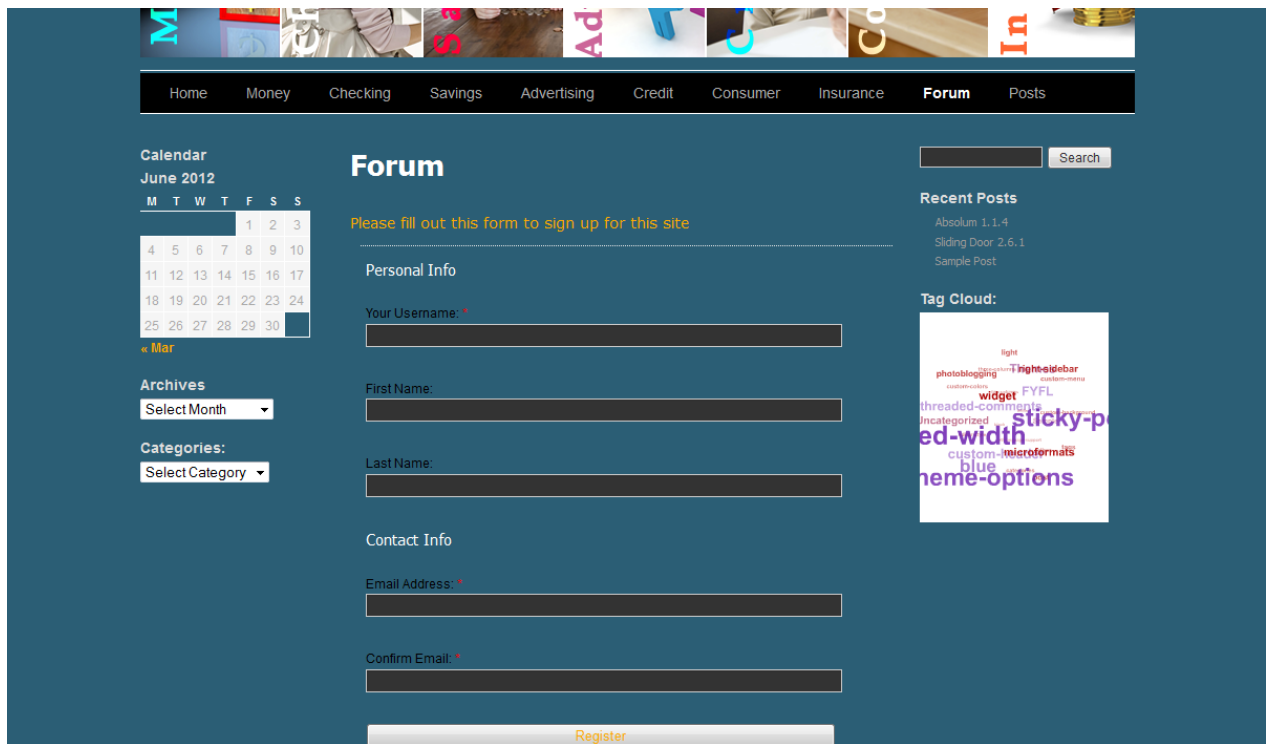
**Figure 4.9:** Pre-Quiz section under Consumer Protection page

These quizzes are mainly to check the caliber of each and test their ability in learning the materials. Pre-Quiz is usually taken before playing and acquiring the knowledge while the Unit Quizzes are played after they get the knowledge from repetitive playing. These quizzes help the students to learn more from their mistakes and get better knowledge by testing themselves. The Figure 4.9 illustrates an example of a Pre-Quiz of Consumer Protection. The other Pre and Unit quizzes are also of the same pattern. The quizzes are user friendly to navigate and understand. They have the links connected from the top menu item, links directed from each Quiz main page

too. Figure 4.9 illustrates that the Financial Literacy system has good navigation and is very user-friendly.

#### 4.6.5 Forum

This is the main and important feature that has been implemented in this Financial Literacy Online Learning Environment. This is the forum or the discussion board where people can talk, discuss on various topics. This is one such feature that keeps the users really engaging while interacting with others which has not been implemented in any of the previous prototypes.



**Figure 4.10:** Registration form for the Forum

If the users are not in the database list or not a registered, he gets a registration page for the first time he logs in to the Forum Page. This is a one-time activity. Once registered, the user can login every time he/she accesses the Forum. The user session ends every time he/she closes the browser and needs to login to the Forum network for each new session. Figure 4.10 shows

the User Registration Page which is very simple and straight forward. User needs to enter only his Username, and email address as mandate fields. To maintain the password security, the password is sent to the email and he could change the password after his first login to the network.

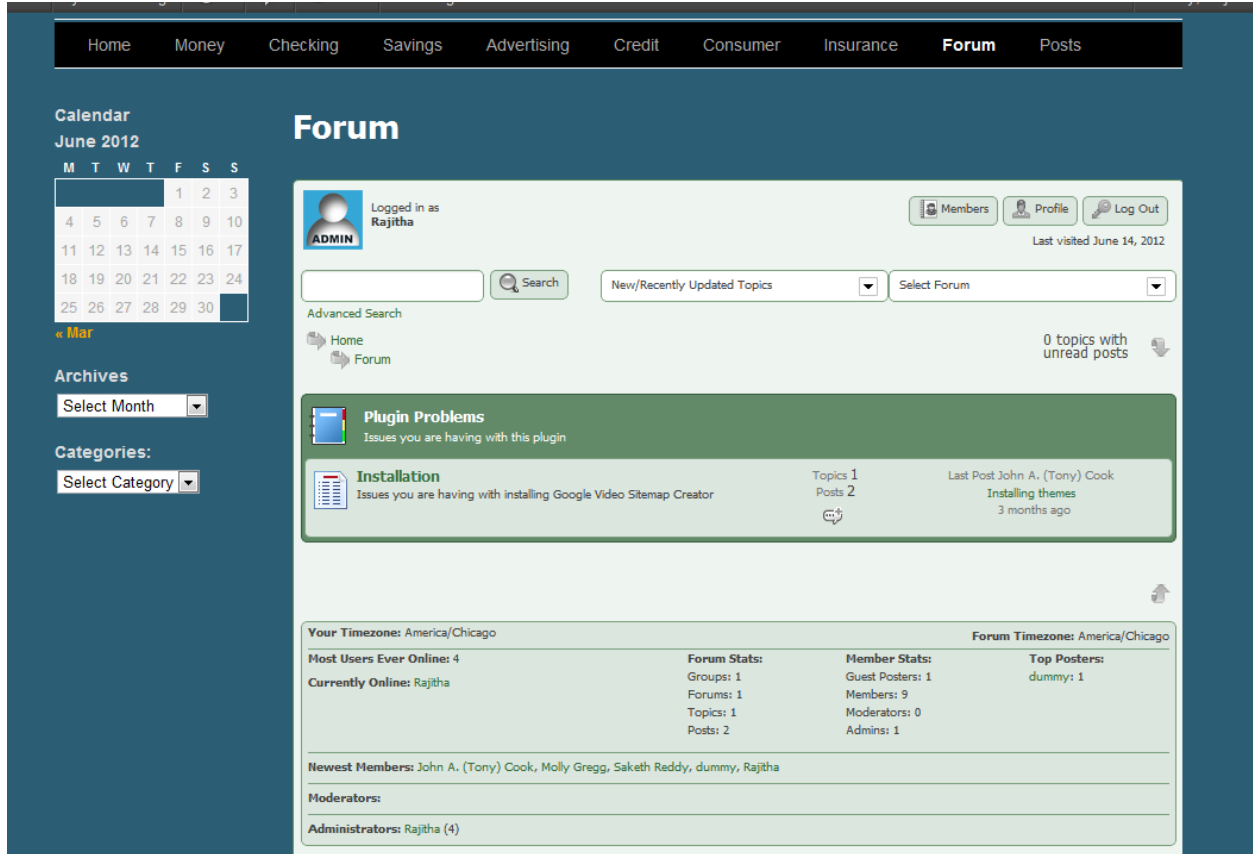
#### **4.6.5.1 Forum after Login**

Once the new user registers with username and email address, he/she will be redirected to the forum screen where he/she can login with their username and password, which will be received by email. Below is the screenshot of the forum after login. If the user is not registered, he/she can just view all the topics and their related posts. User cannot make any changes/additions to the posts or the topics.

A registered user, not logged in as an administrator, can add a new topic to the existing forum. This user has all kinds of permissions like the editing, locking and pinning their own topic. They can also edit the timestamp of their topic in the forum. The registered users have access to add new topics or add a reply to the existing topics in the forum. They can just post a reply but cannot edit the previous posts/replies nor topics.

The admin with full administrator access can add a new topic, edit the existing topics or replies, add a reply to the current topic and can also add a completely new forum. As an Admin, one can open the Forum Toolset for a particular topic. This Forum Toolset has different options such as Lock the current topic, Pin the topic, Reverse sort of the forum, Edit the topic title, Delete the current topic, Move the topic and View properties of the topic.

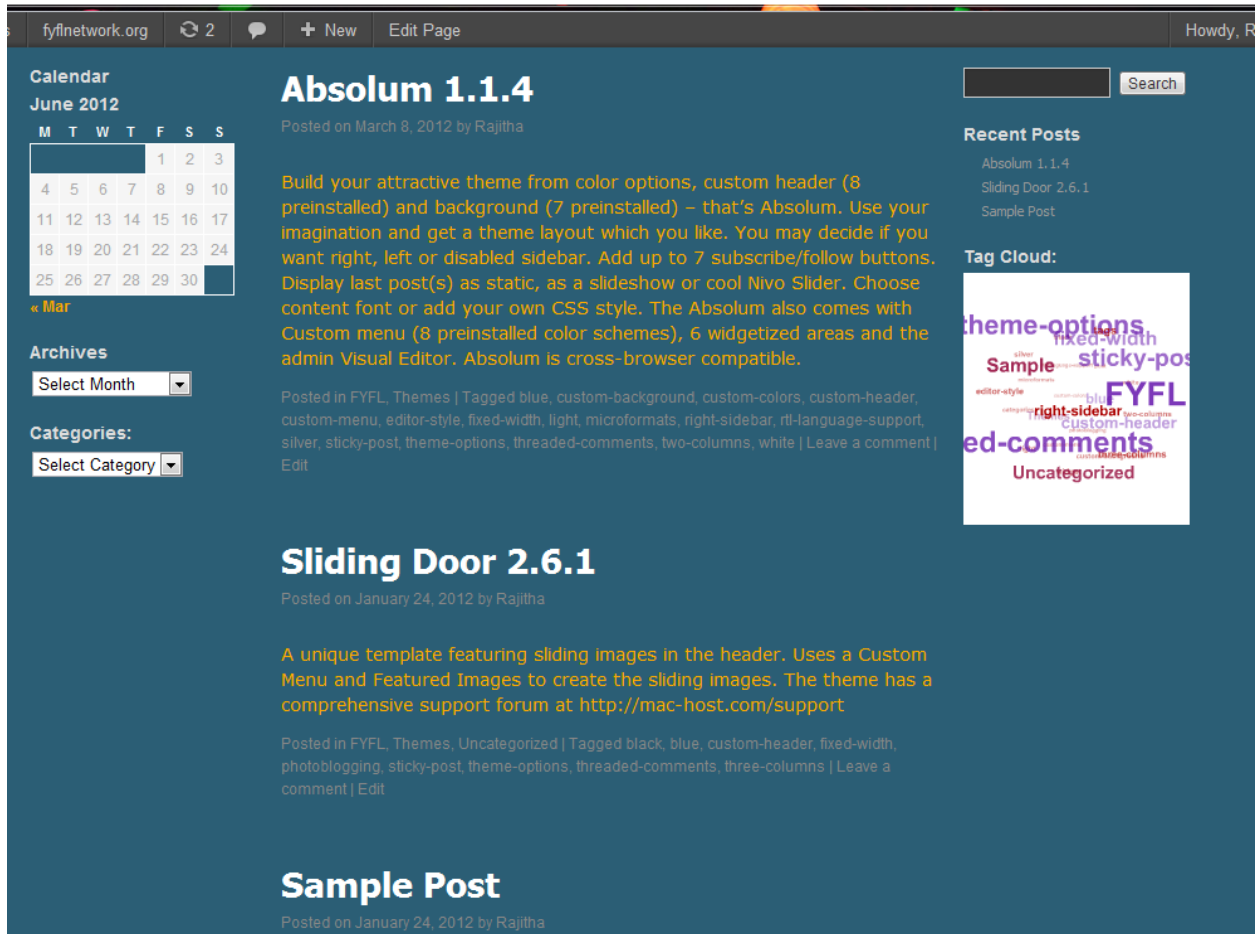
There are lot of information present in the forum that displays members profile, other registered members in the forum, a search toolbar and a logout option. It also shows many stats, time zone, recently added members, moderators and administrator's information at the bottom.



**Figure 4.11:** Forum/Discussion Board of FYFL system

#### 4.6.6 Posts

The last feature that has been created in the Financial Literacy site using WordPress is the “Posts”. These posts are not related to any particular discussion, as in the forum. They are treated separately outside the forum, as general discussion topics. An admin creates the first post and all the visitors or the users who want to continue discussion on that post would reply and go forward. These posts have the tags and categories specified and hence can be easily searched from the Tag Cloud.



**Figure 4.12:** Posts page from the website

## **CHAPTER 5**

### **RESULTS AND ANALYSIS**

#### **5.1 Objectives and Goals of Learning Environment**

As mentioned in chapter 1, the primary objectives of this thesis were to address the following design goals:

- Design an interactive online learning environment for K-12 students to acquire knowledge about the financial literacy which is not being taught in the regular school curricular.
- Design a learning environment which provides the ability to use the online system that is interactive and is responsible for a user-friendly environment that keeps the learners engaging with various attractive and interesting colors and features.
- Investigate existing learning environments and design a prototype that address the issues and provides the educators and learners the ability to use the system easily through online sources. The FYFL Financial Literacy learning environment developed thus makes it easy to understand and teach for the educators and generates interest among younger generation students.
- Determine if the educational learning environment improves the quality of education to the students, with the proper usage of the technology, embedding various audio, video

and interactive materials that keep them engaging every time through these online learning environments.

- Test the developed educational environment with various users and participants to determine if it is effective for both educators as well as learners.

To develop the learning environment and to make it successful, a few research questions have to be answered. Some of them are the following:

*Research Question 1:* Are the online learning environments suitable for K-12 education?

*Research Question 2:* Will the developed FYFL Financial Literacy tool support and meet the requirements of the clients?

*Research Question 3:* Does it meet the expectations of K-12 students in providing knowledge on financial literacy?

*Research Question 4:* Does FYFL Financial Literacy tool have good user interface?

*Research Question 5:* Is the learning environment effective and provide required information?

To answer such questions, we have conducted a few surveys at Auburn University. Participants include students from Auburn University and other colleges. It is not a surprise that all the participants understood computer usage and email. The participants have good knowledge of how the user interfaces have to be used as they have taken required courses on these concepts. The online learning environment termed “FYFL Financial Literacy” was developed using PHP, HTML 5, MySQL and CSS 3.

## **5.2 Information Gathered from Pre-Questionnaire**

Participants involve students from high school, under-graduate to graduate students. Based on the information taken from surveys, participants, aged in between 16 and 24, knew

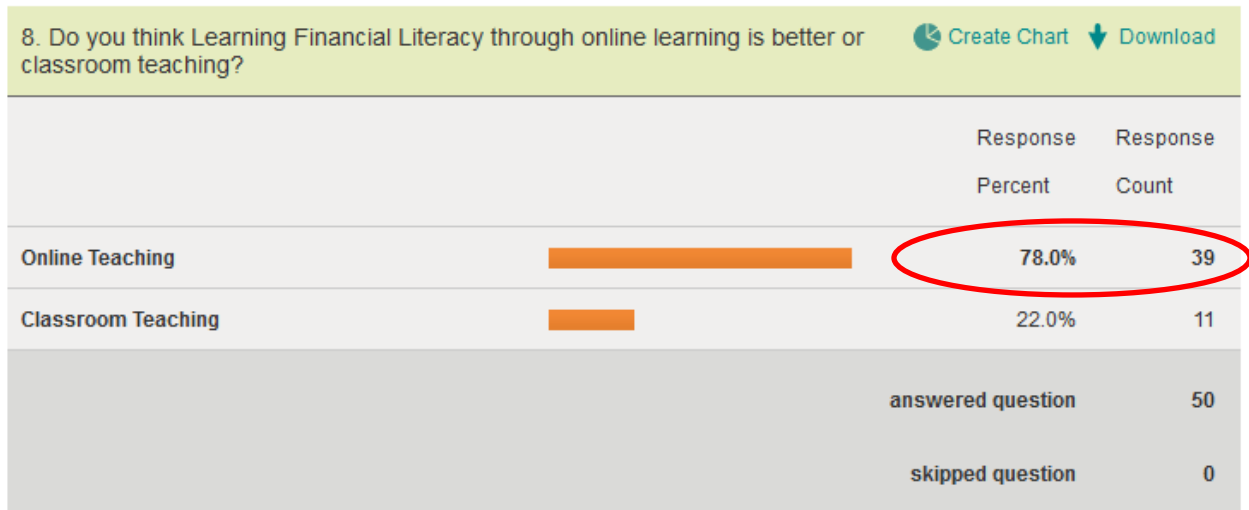
some basic information that is related to using computers. Some of them are still considered computer novices, but can understand most of the computer terminology. About 80% of the participants have very good computer knowledge and were mostly high school and university students. Most of the participants have good computer experience and knowledge on how to use computer and the Internet. About 91.2% believe that K-12 teaching should involve online learning tools as a method to supplement the traditional classroom lessons. Though most of the participants do not have much experience with the online educational tools, 78% of the participants think that financial literacy would be better if it's taught online, rather than the traditional classroom teaching. Our belief is that having the material with them all the time and available for study at any time they wish to, is of great belief to students.

Among the participants, 76% students hold either Masters or Bachelor's degree and remaining 24% are the high school students. Among the high school students, about 87% students have basic computer knowledge. The remaining students are still in the early stages of their computer education, but still understood most of the computer terms required for the survey. While considering the university students, there is almost an equal distribution of participants from Bachelors and Master's degree. Students from Master's Degree comprises of 34%, while the students from Bachelor's Degree comprises of 42%. From the pre-questionnaire surveys, it is determined that few students have good subject knowledge as well as good exposure to the online learning environments. About 79.6% of the participants have good knowledge on usage with online learning tools.

In the social networking world, it is very common and important to interact with others. 96.4% students who use Facebook and 34.7% who use other social networking sites like Twitter, LinkedIn, MySpace, Google+ believe that K-12 learning networks should also be utilizing online



learning tools. In a survey 87.5% said ‘yes’ or ‘may be’ to use live chat and online educational forum to communicate and interact with other students, if they are available. Figure 5.1 illustrates the percentage of the participants preferring learning financial education through online teaching to classroom teaching.



**Figure 5.1:** Pre-Survey results of Classroom Teaching vs. Online Learning

### 5.2.1 Pre-Questionnaire Results

The total number of participants from all categories participated in the survey were around 50 students of which 12 were high school students and 38 were under-graduate and graduate students. Table 5.1 illustrates the summary of the data collected from the student participants. From the results, it is clear that none of the participants are novice users to computers. They have good computer knowledge and good computer experience. However, some of them do not have good knowledge on online learning environments.

**Table 5.1:** Pre-Questionnaire results

QUESTIONS	% of RESPONSE COUNT	
	YES	NO
Do you have good Computer Knowledge and Experience?	92% (46 count)	8% (4 count)
Have you ever used Online Financial Literacy Learning Tools?	79.6% (39 count)	20.4% (10 count)
Do you believe teaching K-12 should involve more online teaching tools as a method to supplement traditional classroom lessons?	91.8% (45 count)	8.2% (4 count)
Do you think Learning Financial Literacy through online learning is better or classroom teaching?	78% (39 count)	22% (11 count)
Do you think Online Financial Literacy tools are useful?	94.2% (47 count)	5.8% (3 count)

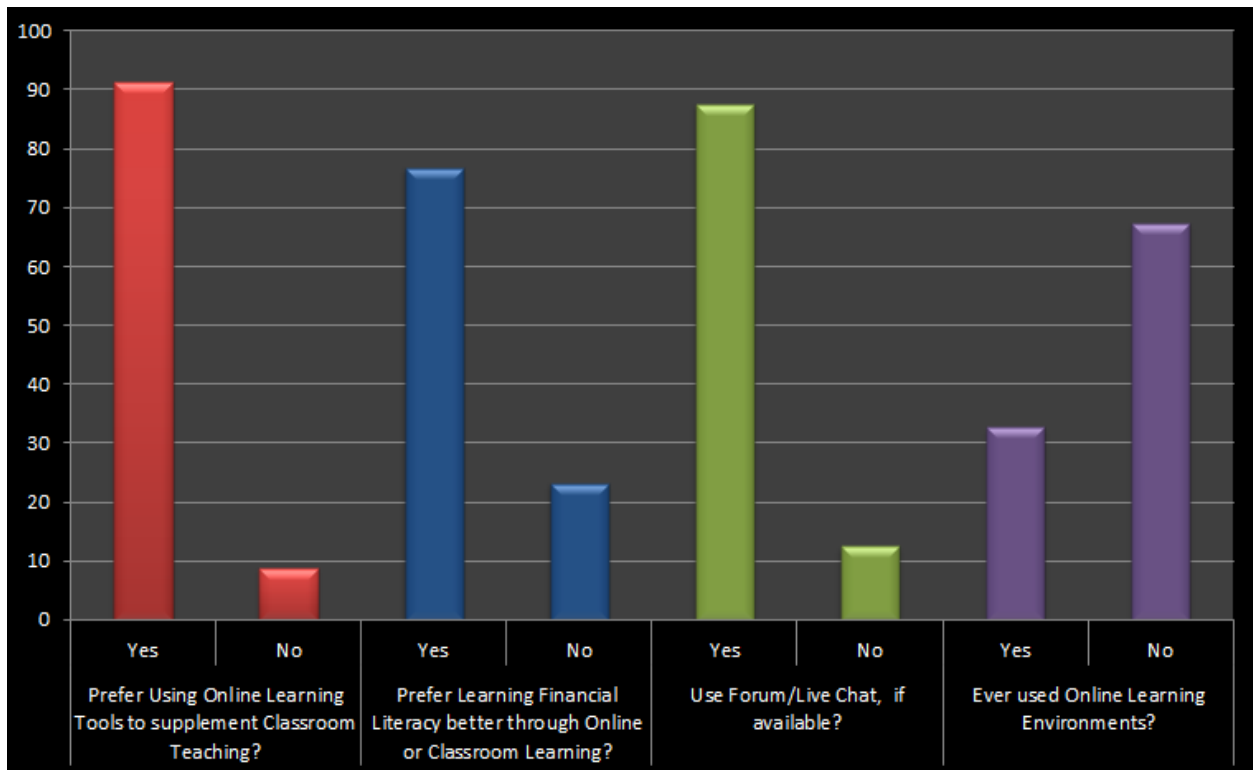
The questions such as above, helps to understand student's perception on online education tools. This survey also helps them understand if online education for financial literacy is essential to supplement traditional classroom teaching. From the results above, it can be seen that students gave good feedback of about 76.8% acceptance on implementing the online learning environments by replacing the traditional teaching.

Table 5.2 illustrates participant’s perception on some interactive tools involving online educational forum and live chat. Such interactive features can be embedded into the online learning environments to make the students engaging and interacting.

**Table 5.2:** Students perception on interactive tools like Forum and Live Chat

QUESTION	YES	NO	MAY BE
Would you use online educational forum or live chat if available?	58.2%	12.5%	29.3%

The developed online learning environment for financial literacy is said to be successful, if the participants who have answered ‘may be’ in the pre-questionnaire switches to ‘yes’ in the post-questionnaire, after viewing the forum and the chat features and rate the prototype environment as a better educational tool.



**Figure 5.2:** Illustrates graphical representation of pre-questionnaire survey responses

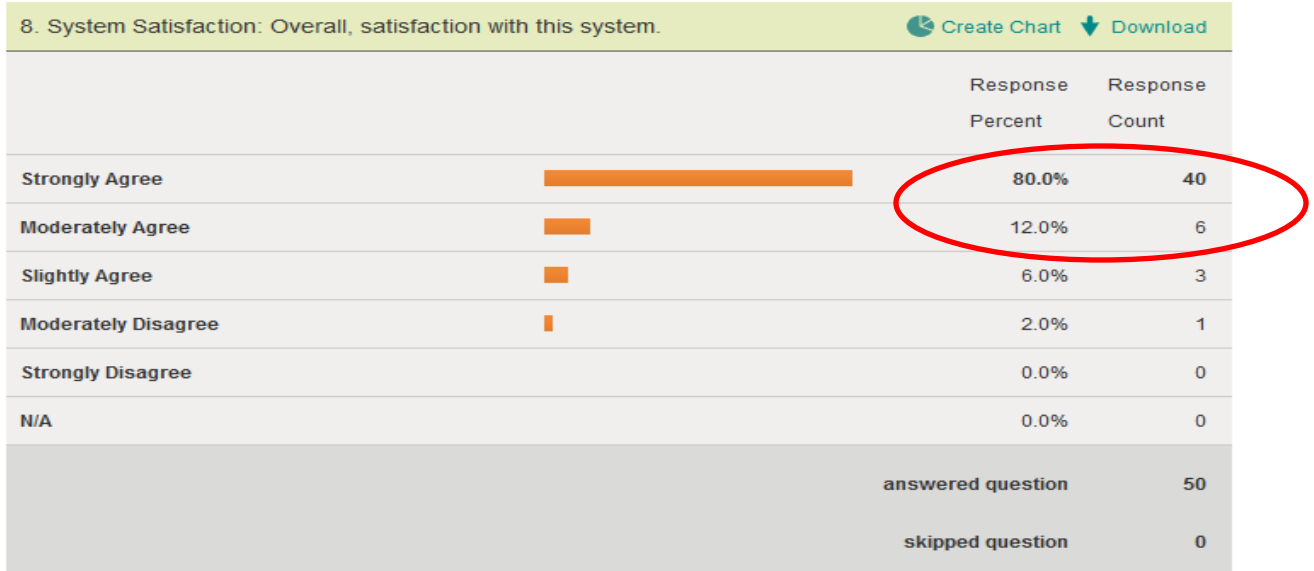
Figure 5.2 illustrates the graphical representation of responses of the participants for all the pre-questionnaire survey responses, involving a 'Yes' or 'No' option. The data collected from each of these questions tells us if the students have interest in online learning environments and learning financial literacy through it.

### **5.3 Information Gathered from Post-Questionnaire**

According to the results of pre-questionnaire, all of the participants are comfortable with basic computer usage. Additionally, the focus of this study is to consider the significant quality-indicator factors in developing the secure online learning environment. Some of the significant quality-indicators include the development of highly interactive learning environments with forums, chat and discussion blogs, meet the expectations of students and other learners and develop a user-friendly environment that is easy to learn and use.

Post-questionnaire information is gathered after testing and exploring the learning environment. Two surveys are conducted to test the experience of the participants with the system. One of the surveys is related to the quality of the information and content related to course and the other survey is related to system usability and interaction quality.

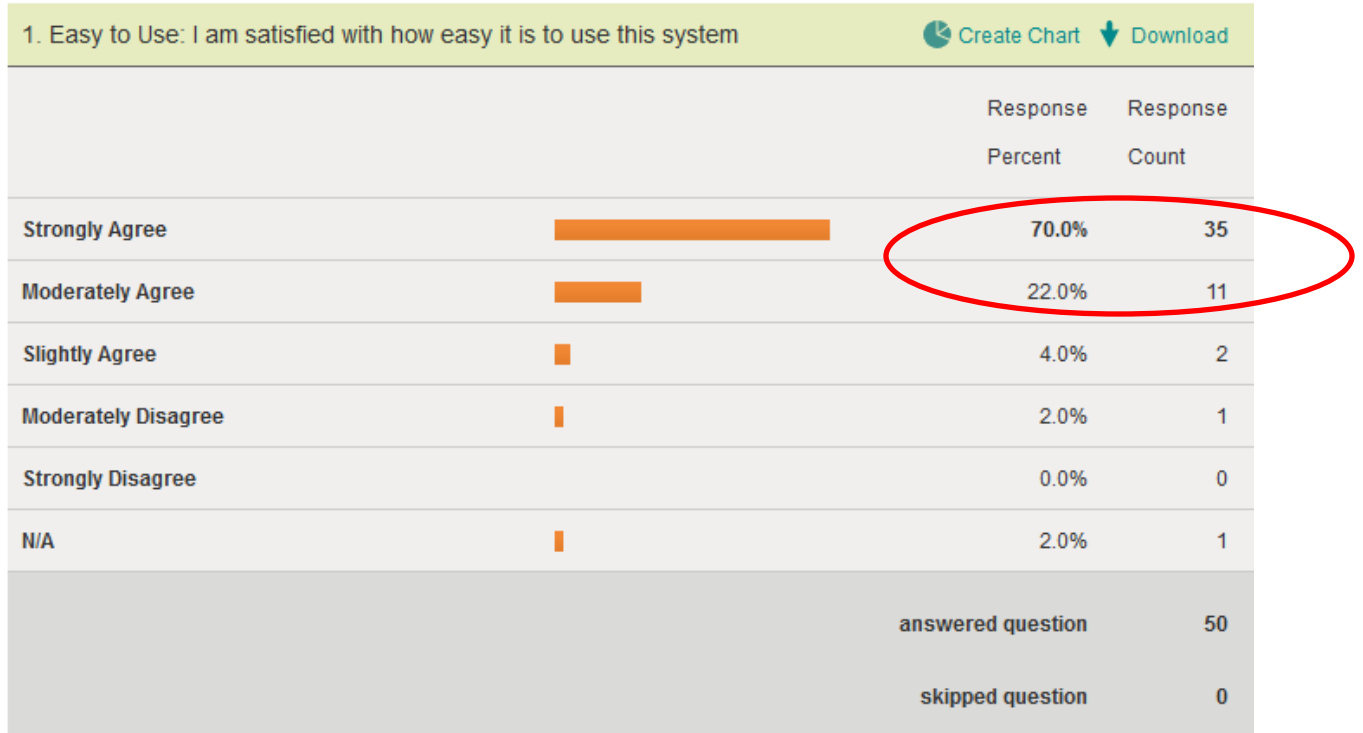
Figure 5.3 illustrates the responses from the participants, which are better than the expected ratings. It is very important to know the students' view of the interface and the entire system. From the response shown in the Figure 5.3, it is clearly stated that 92% of the participants strongly and moderately agree with the overall satisfaction of the system. The responses to each question from the surveys on information, usability and interaction quality are listed in the below tables.



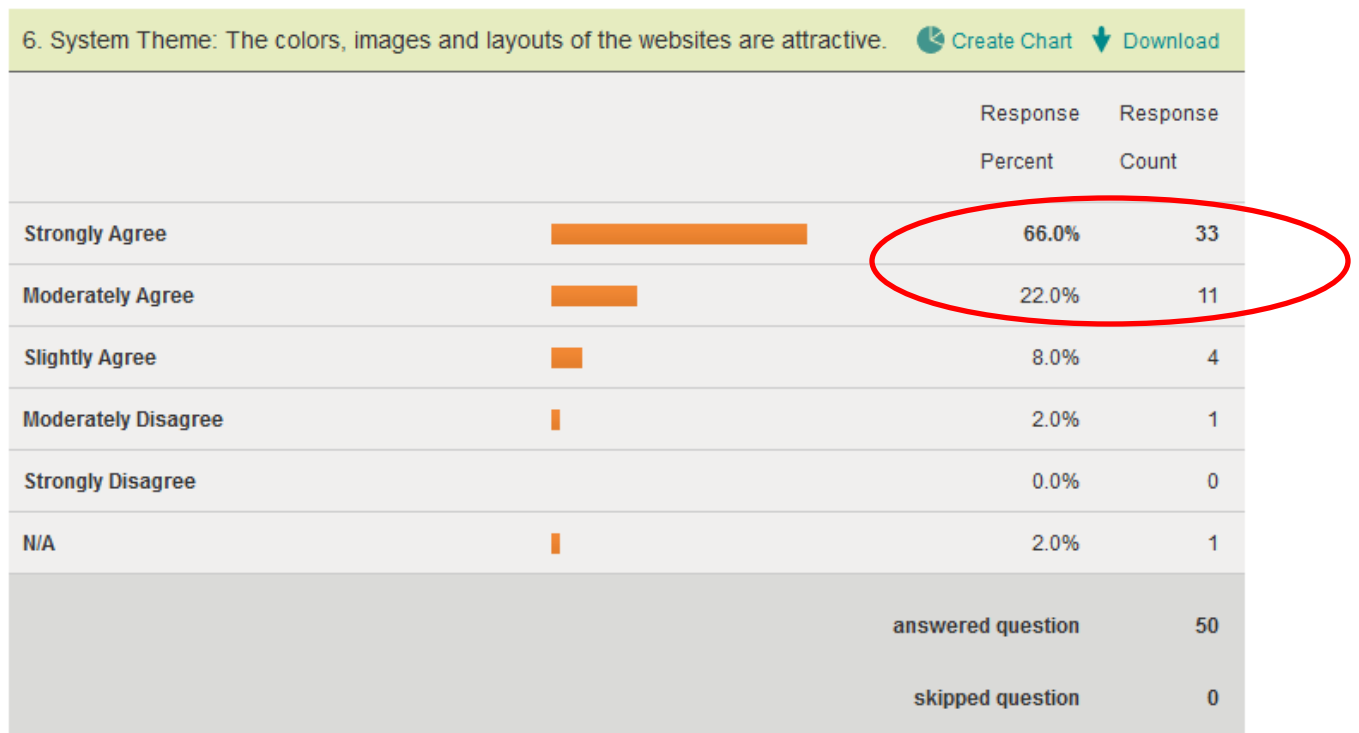
**Figure 5.3:** Post-Survey results of overall system satisfaction

It is also crucial to know the participants view on system’s ease of use, navigation, colors, images, themes and layout, which are key factors in engaging students for prolonged use. If they do not find the system easy to use, this will impact the adoption of the system for learning financial concepts. Features like forums, live chat and discussion boards helps students to interactively collaborate by sending messages through posts or chat.

Figures 5.4 and 5.5 illustrate the participants experience and thoughts on the system’s usability, interface, colors, menu navigations and layouts. They show the percentage of the responses of the participants, along with the response count.

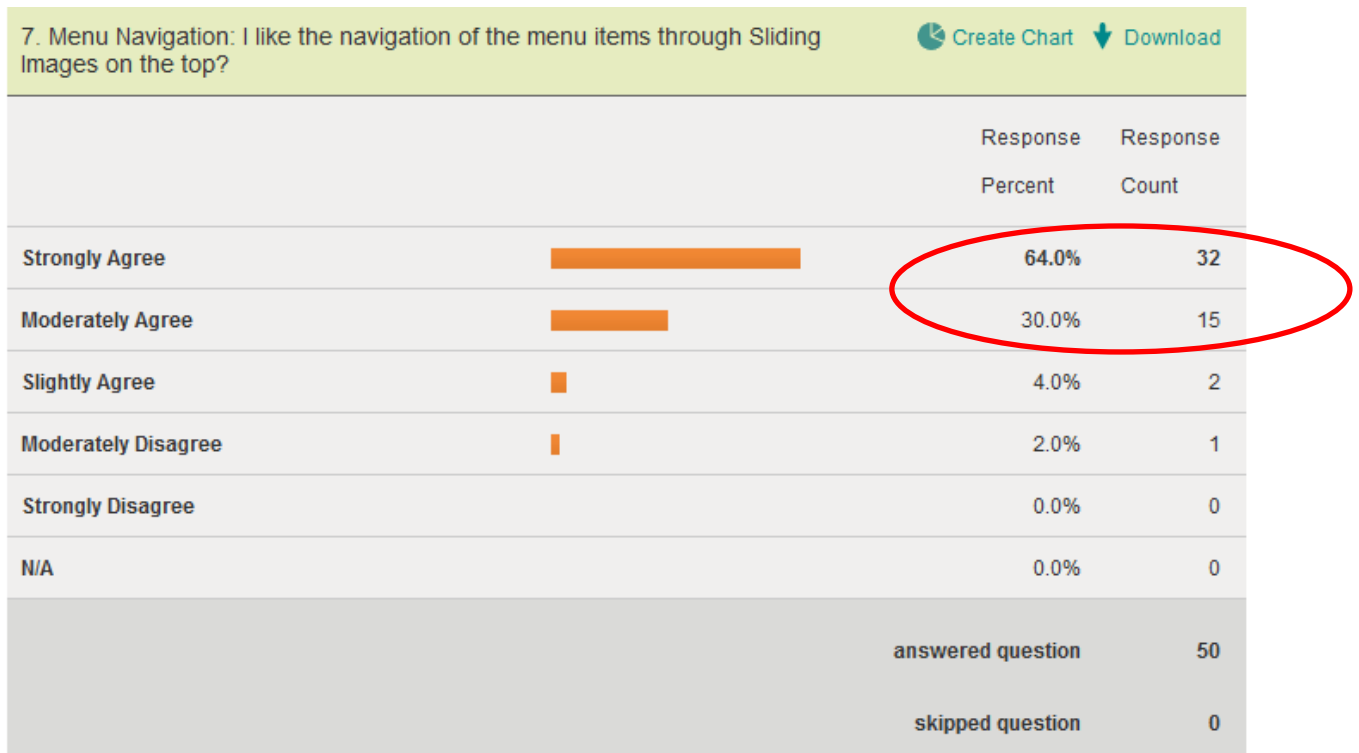


**Figure 5.4:** Post-Survey ratings on system’s usability



**Figure 5.5:** Post-Survey ratings on system’s colors, images, layout and appearance

It is also important to rate the system’s effectiveness by assigning different tasks to follow before taking the post survey. This can be either self-paced or by following the given task list. If the participants were able to complete all the given tasks easily, without any guidance or issues, it can be proved that the learning environment is very effective and met the audience’s expectations. Figure 5.6 illustrates the survey results of the navigation through the sliding images.



**Figure 5.6:** Post-Survey ratings on system’s navigation

### 5.3.1 Post-Questionnaire Results

Based on the collected data from pre-questionnaire, most of the participants indicated that they have sufficient computer usage knowledge. Also, majority of the participants perceived themselves as comfortable with computers and have positive attitudes towards newly developed technologies.

**Table 5.3:** Post-Questionnaire results for Information Quality

	<b>Strongly Agree</b>					<b>Strongly Disagree</b>	
<b>Rating Weight</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>N/A</b>	
Was the system informative?	41	9	0	0	0	0	
The information provided by the system is easy to understand.	27	22	0	1	0	0	
The information is effective in helping me to complete the tasks, activities and scenarios.	31	17	1	1	0	0	
The organization of data on the system screens is clear.	28	18	3	1	0	0	
Does the learning environment look as a professional website?	42	8	0	0	0	0	

Table 5.3 illustrates the responses for all the questions of the post-questionnaires. It shows the responses for information quality of the system as well as the usability and interaction quality of the interface. Table 5.3 describes the ratings that participants have given to rate the information content present in the system. It asks the participants if system has the required information and how it is organized. It also asks whether it was easy to understand and effective in completing the given tasks. As shown in the Table 5.3, about 78.6% of the participants ‘strongly agree’ and ‘agree’ to the questions asked.



Table 5.4 shows the results of the survey of the post-questionnaire that includes questions on system usability and interactivity. It discusses about the user satisfaction, ease and simplicity to learn the system, the navigation, sliding menus, regular menus, colors, themes, images and layout. Once the ratings for all these are taken, the overall system satisfaction rating is also taken from the participants. These surveys are taken on a scale of 1 to 5 where 1 refers to strongly agree and 5 refers to strongly disagree. Most of the participants have rated 1 and 2 for their system satisfaction, which is definitely better than the expected result.

These responses show that the Financial Literacy learning environment has the potential to support multiple audiences and to be used widespread by many populations. The students can utilize the FYFL Financial Literacy tool in their regular life to educate themselves by self-paced instruction and providing a financial literacy community with other students. They can extend their communication with others using the forum style learning, by chatting and discussing the topics and by sending posts and replies to their colleagues.

The communication can be done either synchronously or asynchronously using the instant messenger chat that can be used to chat with anyone at the same time instantly. Also, the forum updates when a post is made lets the students communicate asynchronously.

**Table 5.4:** Post-Questionnaire results for System and Interaction Quality

Rating Weight	Strongly Agree				Strongly Disagree	
	1	2	3	4	5	N/A
I am satisfied with how easy it is to use this system.	35	11	2	1	0	1
It was simple to use this system.	26	22	0	1	1	0
The interface of the system is pleasant.	32	13	2	3	1	0
The system has good navigation in the home page and in all other pages.	30	17	1	2	0	0
This system has all the required features and functionalities I expect it to have.	27	18	5	0	0	0
The colors, images and layouts of the websites are attractive.	33	11	4	1	0	1
I like the navigation of the menu items through Sliding Images on the top?	32	15	2	1	0	0
Overall, satisfaction with this system.	40	6	3	1	0	0
<b>Please give us your reflections on learning while using the system.</b>	<b>Very Easy</b>	<b>Easy</b>	<b>Avg</b>	<b>Diffi -cult</b>	<b>Very Difficult</b>	<b>N/A</b>
○ Getting Started	20	25	5	0	0	0
○ Learning Advanced Features like	22	26	1	0	1	0

## 5.4 Participant's Comments

Some of our student participants have made some specific comments in regards to the system in the comment section of the post-questionnaire. Few other comments were made in the 'good features of the system' section provided at the bottom. Some of the comments included in the 'good features' pertaining to the system are listed as below:

- Instant Messaging Chat
- Layout
- Topics
- Visuals
- Matching Games
- Sliding Menus/Top Navigation
- Sliding images
- Forums
- Interactive Games
- Whole Interface
- Word Search and Virtual ATM Machine games
- Buttons
- Activities
- Tag Cloud

*Anonymous Participant 1:* "Very clean website. It did run a tad slow however that just could have been the internet connection. Only other thing is that the tag cloud sometimes blocked view of the dropdown bars on the menu."

*Anonymous Participant 2:* "This site teaches well on the practice on how to spend wisely."

*Anonymous Participant 3:* “I have found very good information with nice examples for each on the learning environment.”

*Anonymous Participant 4:* “There are wide options of categories with nice activities and examples.”

*Anonymous Participant 5:* “The environment has great learning with good usage, navigation, look and simplicity.”

*Anonymous Participant 6:* “The system is very easy to use with good information on financial terms.”

*Anonymous Participant 7:* “I like the forum and the chat and is a very good idea to implement them.”

Some of the comments that participants have responded in the negative features section are listed below.

*Anonymous Participant 1:* “The system and the chat get slow down when many students are using it simultaneously.”

*Anonymous Participant 2:* “Sometimes it is hard to click on the interactive links, which is may be because of the system slowness or internet connectivity.”

*Anonymous Participant 3:* “Tag cloud and other ads sometimes block menus.”

*Anonymous Participant 4:* “There is small print on some of the games, which is not very clear.”

## **5.5 Evaluation of the Study**

In the beginning of this chapter, the objectives and goals of the thesis were presented. Keeping the goals in mind, a learning environment has been developed that meets all the requirements of the clients and expectations of the students. It includes many features like

interactive games, activities, quizzes etc. that increases student’s interaction and engagement. Additionally, it includes a forum/discussion board and a live chat to communicate and collaborate simultaneously with others.

Based upon the new features and functionality that have been added to the new environment, the following Table 5.5 compares the features, functionalities, appearance, effectiveness and efficiency among three online learning environments (i.e. Moneyville, Add It Up and FYFL Financial Literacy).

**Table 5.5:** Comparison among three Financial Literacy environments

<u>S.No.</u>	Features/Functionalities	<u>Moneyville</u>	Add It Up	FYFL Financial Literacy
1.	Financial Literacy Topic	X	X	X
2.	Pleasant Interface			X
3.	Interactive Games/Activities	X	X	X
4.	Videos			X
5.	Quizzes	X	X	X
6.	Attractive Images			X
7.	Decent Layout	X		X
8.	Colors			X
9.	Good System Navigation throughout		X	X
10.	Easy to Use		X	X
11.	System Efficiency/Speed			X
12.	Main Menu Item’s Navigation		X	X
13.	Flash Games	X	X	X

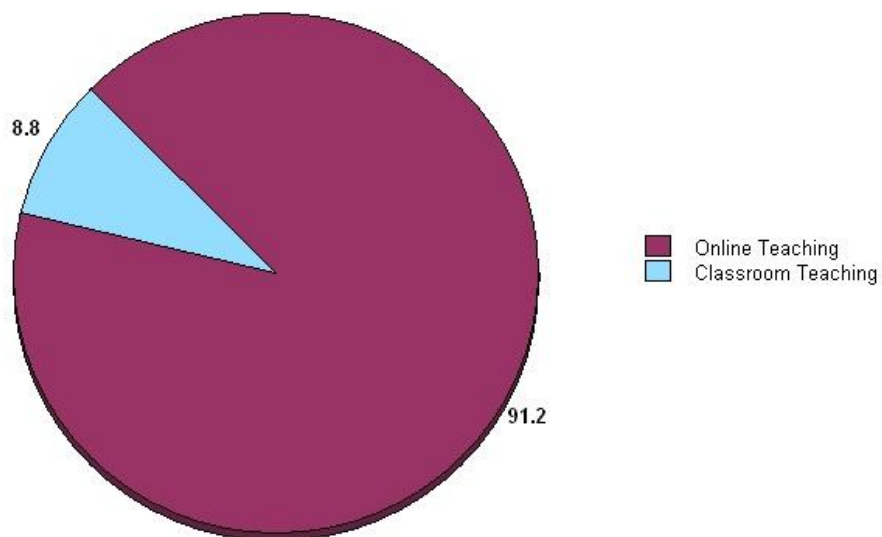
<u>S.No.</u>	<b>Features/Functionalities</b>	<u>Moneyville</u>	<b>Add It Up</b>	<b>FYFL Financial Literacy</b>
14.	Sliding Images along with Navigation			X
15.	Discussion Board/Forum			X
16.	Posts on Different Topics			X
17.	Live Chat			X
18.	Attractive Appearance		X	X
19.	Tag Cloud with Tags and Categories			X
20.	Good Information/Data	X	X	X
21.	Organization of Data			X
22.	Search Toolbar			X
23.	Connection with Social Networking Sites		X	
24.	System Effectiveness in Completing Tasks		X	X
25.	Overall Look and Feel			X
26.	Fully Functional System	X		X
27.	Professional Look			X

A survey has been conducted to test the experiences of the students with the learning environments. This survey was completely taken by the students from high school, undergraduate and graduate school. Before they see and explore the learning environment, a pre-questionnaire survey was conducted to check their usage with computers and online learning tools, and how interested they are to learn financial literacy through learning tool. The participants were asked to perform pre-determined tasks with the developed environment, FYFL Financial Literacy learning environment. These tasks are given in such a way to structure their exploration and help them understand and explore all the features. A post-questionnaire survey

was administered to users, after performing all the tasks to evaluate their acceptance and satisfaction with the system usability, interaction and information.

There were approximately 50 students who participated in these surveys of pre-questionnaire and post-questionnaire. About 92% of the participants believe that K-12 teaching should involve more online teaching tools to supplement the traditional classroom teachings. This has been shown in the Figure 5.7 below.

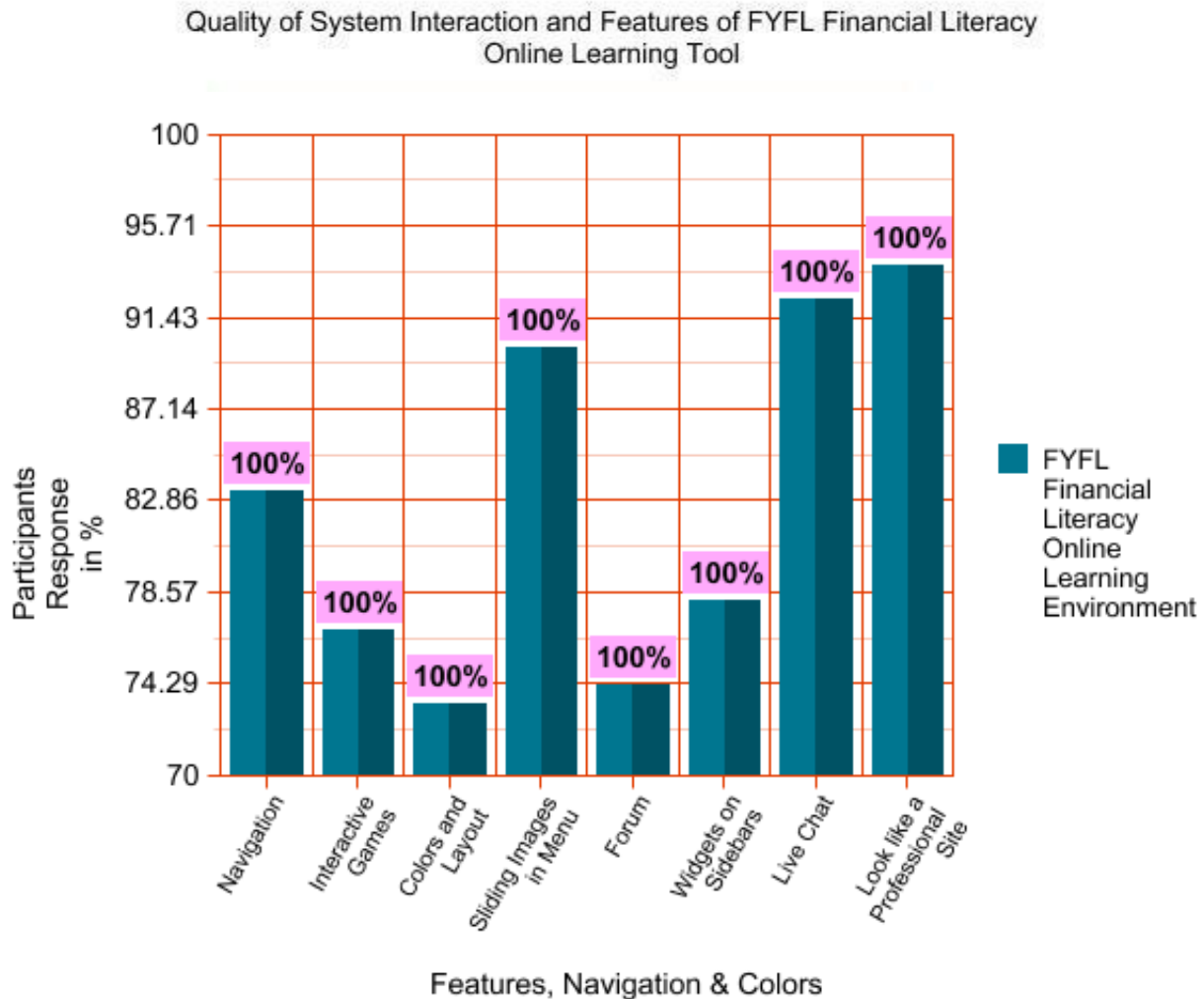
**Online Learning Environments in Classroom Teaching**



**Figure 5.7:** Pie chart showing the percentage of people who believe that online learning environments should be involved to supplement the traditional classroom teachings.

From the results and responses of these surveys, it has been clearly proved that 92% of the participants liked the system and were satisfied with the overall system information, features, usability and interface. This gives us a satisfaction for creating a successful online learning environment for K-12 students. A graph shown below in Figure 5.8 demonstrates the system

satisfaction results, which shows the number of participants who have taken the survey and their ratings.

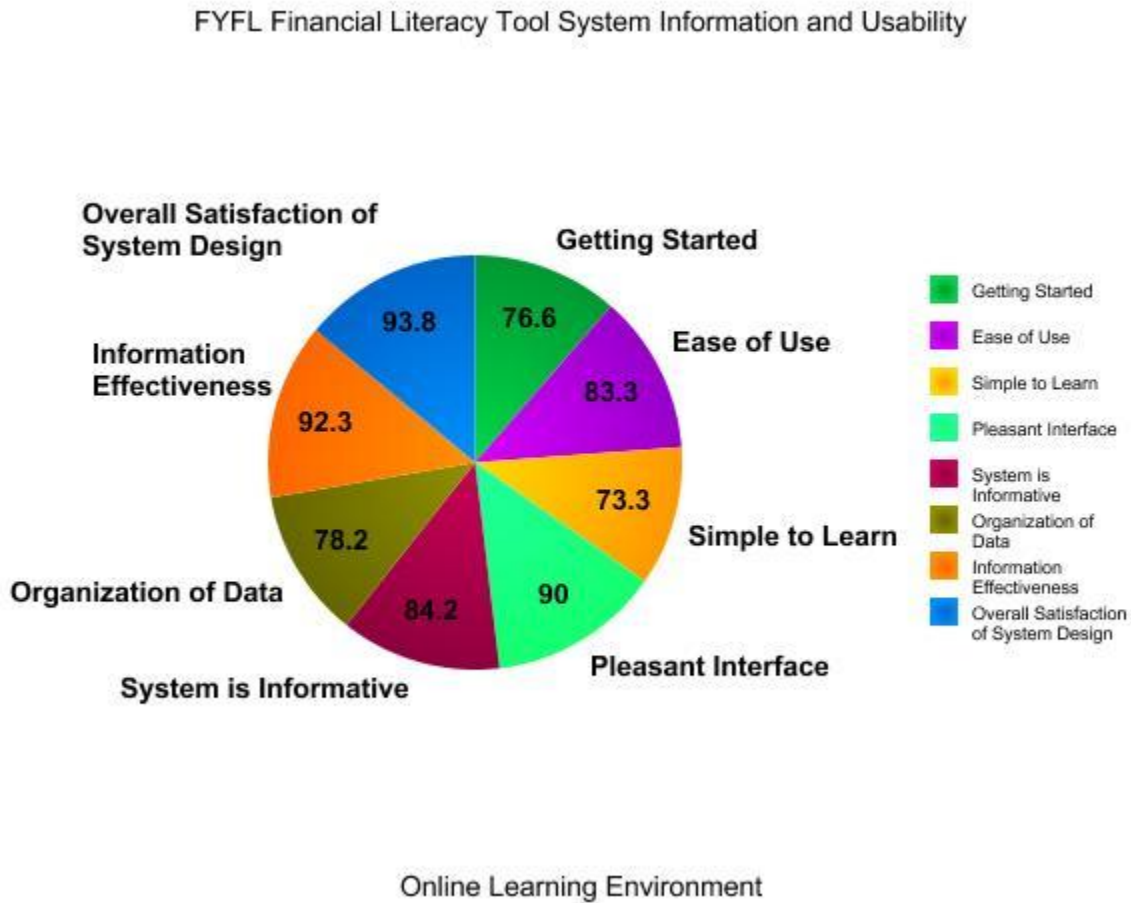


**Figure 5.8:** Shows the responses of participants for System Interaction and Features

The students were really excited with the live chat and the forum facility that has increased their collaboration with other students. 87.5% of the participants told that these online educational forums and such live chat to discuss and communicate, if it were available to them. Creation of these functionalities has addressed the issues from the existing learning environments. Usage of the information, media files, technology and interactive materials has also helped the students in improving the quality of their education through online environments.



This has been verified with their responses in the post-questionnaire survey. The results for these questions are illustrated in Figure 5.9.



**Figure 5.9:** Illustrates pie diagram of approximate participant percentages on Information Quality and Usability of FYFL Financial Literacy system

With all these results and responses, the FYFL Financial Literacy Online Learning Environment has been proved an effective system that helps students in accomplishing their tasks and get good knowledge on financial terms. It has also been proved to be a good interactive system that keeps the students engaging with various features and forum style learning. Hence satisfies the end users and fulfills the requirements of the clients.

## **CHAPTER 6**

### **CONCLUSION AND FUTURE WORK**

#### **6.1 Conclusion**

The aim of this thesis is to explore the existing online learning environments developed for K-12 students and develop a new educational prototype that overcomes the existing drawbacks. Online learning for K-12 students has great potential to transform the traditional classroom teaching and instructional approaches into self-paced learning that enhances the student's knowledge and performance across wide range of topics. In this contemporary world, online learning is cited as the essential element for students to gain sufficient knowledge on various topics.

The online learning environment mainly focuses on exchanging ideas, concepts, work and information in between the instructors and students, and also among groups of students from any place in the world. The students can have a possibility of contacting any other person he/she would like to share ideas and conduct group discussions. Such discussions enhance interactivity and collaboration among students. An online learning environment can be developed effectively by understanding the goals and objectives of the course being developed. Prior to developing, the designer must conduct meetings with various sections of people related to the course, to identify and clearly articulate on what the goals and objectives of the course are and what the students are going to procure from interacting with the system.

Online learning is emerging as an important component in K-12 learning. To provide more opportunities for a secure and bright future, it is necessary to have good exposure and

financial training to be financially responsible and the productive citizens, K-12 students must have access to the online learning opportunities in many different forms as students have multiple learning styles and learning preferences. Financial education is usually given less importance in schools, but it is very important for students to have good knowledge in finance and related terminologies. This thesis provides a secure and interactive tool for K-12 students to interact and gain knowledge on financial literacy. The Financial Literacy tool is engaging and accessible to everyone. It provides interaction with the system through many educational games that provide financial knowledge and collaboration through discussion boards, forums, posts and live chats with other students.

Through the surveys conducted, it is noticed that many students found this tool very interesting and helpful in providing them an education in financial matters. From the observations and the feedback of the students who took surveys, it is found that they were very involved and engaged with the interactive features that were incorporated in the learning environment. They have also liked the appearance and theme of the system, which proves that the developed Financial Literacy tool which rarely exists is very effective and beneficial to the students.

## **6.2 Future Work**

The Financial Literacy tool is developed to enhance the finance literacy education to K-12 students across the United States. This project is evolving with many new changes and versions for each new phase of development, as per the requirements. Every version of this project is being developed using state of the art technologies for each version, such as developing the prototype using Cloud Computing and WordPress – a Content Management System. The

requirements for this Cloud Computing version of the Financial Literacy System FYFL 2.0, were derived from the future work of the previous version of this learning environment ‘Add It Up,’ FYFL 1.0. A new prototype has been developed successfully in this version of the system. It includes features like discussion boards, forums, RSS feeds, live chat etc. that make the system dynamic and interactive. These updates help them to collaborate with other students conveniently from any place and at any time.

The clients of ‘For Youth, For Life’ and ‘Stoneware, are from many different populations all across the U.S., with plans to support international populations, therefore they will need to support universal usability requirements. Many user requirements have been fulfilled in the current tool that we have developed. The developed learning environment has been delivered to the clients and has been evaluated. We will utilize the results based on client evaluation to revise the requirements for further changes to the system and final product.

Future development work for this educational environment include refinement of the client’s requirements and redesign/development based upon changing needs and goals of the project. During their evaluation of the developed learning environment, the clients may provide future modifications or additional requirements to be delivered with the next version of the financial tool. Many new web features and applications are also provided that can still be incorporated in the future development of Financial Literacy tool. Future evaluation work will fully utilize K-12 students as participatory design partners. The students will be more involved in the process to provide additional details on their social computing needs and system interaction requirements. This allows the students to have more input into system development and provide the designers with more detailed feedback for future implementations. To conduct this process, a complete research on the students, parents, schools and the faculty members will be conducted.

In addition, new flash games and the content can still be added with more terminologies and existing ones can be modified to have good instructions on how to play them and provide better understanding when a student accesses the applications. Financial Literacy is a broad topic. The system can be developed with clear and extensive data and information for each of the menu items. Future research plans include more investigation into the system's security and the impact of additional features, content and information.

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# APPENDIX A

## AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS RESEARCH PROTOCOL REVIEW FORM

For Information or help contact THE OFFICE OF RESEARCH COMPLIANCE, 115 Ramsay Hall, Auburn University  
Phone: 334-844-5966 e-mail: hsubjec@auburn.edu Web Address: <http://www.auburn.edu/research/vpr/ohs/>

Revised 03.26.11 – **DO NOT STAPLE, CLIP TOGETHER ONLY.**

Save a Copy

1. PROPOSED START DATE of STUDY: Jun 11, 2012

PROPOSED REVIEW CATEGORY (Check one):      FULL BOARD       EXPEDITED      EXEMPT

2. PROJECT TITLE: FYFL: Utilization of a Content Management System to Develop Online Learning Communities for K-12 Students

3. Rajitha Gondi      Graduate Student      CSSE      (609) 216-3935      rzg0018@auburn.edu  
**PRINCIPAL INVESTIGATOR      TITLE      DEPT      PHONE      AU E-MAIL**

Shelby Center for Engineering Technology, Room #3137      FAX      rajitha.gondi@gmail.com  
**MAILING ADDRESS      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								
<p><b>Names of key personnel who have completed CITI:</b>  Rajitha Gondi      Cheryl D. Seals</p> <hr/> <p><b>CITI group completed for this study:</b>  <input checked="" type="checkbox"/> Social/Behavioral    <input type="checkbox"/> Biomedical</p> <p style="text-align: center; color: red; font-weight: bold; font-size: 1.2em;">PLEASE ATTACH TO HARD COPY ALL CITI CERTIFICATES FOR EACH KEY PERSONNEL</p>	<p><b>Please check all descriptors that best apply to the research methodology.</b></p> <p>Data Source(s):    <input checked="" type="checkbox"/> New Data    <input type="checkbox"/> Existing Data</p> <p>Will recorded data directly or indirectly identify participants?  Yes    <input checked="" type="checkbox"/> No</p> <p>Data collection will involve the use of:  <input type="checkbox"/> Educational Tests (cognitive diagnostic, aptitude, etc.)  <input type="checkbox"/> Interview / Observation  <input type="checkbox"/> Physical / Physiological Measures or Specimens (see Section 6D)  <input checked="" type="checkbox"/> Surveys / Questionnaires  <input checked="" type="checkbox"/> Internet / Electronic  <input type="checkbox"/> Audio / Video / Photos  <input type="checkbox"/> Private records or files</p>								
6C. Participant Information	6D. Risks to Participants								
<p><b>Please check all descriptors that apply to the participant population.</b></p> <p><input checked="" type="checkbox"/> Males    <input checked="" type="checkbox"/> Females    <input checked="" type="checkbox"/> AU students</p> <p><b>Vulnerable Populations</b>  <input type="checkbox"/> Pregnant Women/Fetuses    <input type="checkbox"/> Prisoners  <input checked="" type="checkbox"/> Children and/or Adolescents (under age 19 in AL)</p> <p><b>Persons with:</b>  <input type="checkbox"/> Economic Disadvantages    <input type="checkbox"/> Physical Disabilities  <input type="checkbox"/> Educational Disadvantages    <input type="checkbox"/> Intellectual Disabilities</p> <p>Do you plan to compensate your participants?    <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No</p>	<p><b>Please identify all risks that participants might encounter in this research.</b></p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Breach of Confidentiality*</td> <td><input type="checkbox"/> Coercion</td> </tr> <tr> <td><input type="checkbox"/> Deception</td> <td><input type="checkbox"/> Physical</td> </tr> <tr> <td><input type="checkbox"/> Psychological</td> <td><input type="checkbox"/> Social</td> </tr> <tr> <td><input checked="" type="checkbox"/> None</td> <td><input type="checkbox"/> Other:</td> </tr> </table> <p>_____</p> <p>_____</p> <p>_____</p> <p><small>*Note that if the investigator is using or accessing confidential or identifiable data, breach of confidentiality is always a risk.</small></p>	<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:
<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:								
<p>Do you need IBC Approval for this study?    <input checked="" type="checkbox"/> No    <input type="checkbox"/> Yes - BUA # _____    Expiration date _____</p>									

The Auburn University Institutional Review Board has approved this document for use from 6/21/12 to 6/20/13  
Protocol # 12-200 EP 1206

Received

JUN 20 2012

Research Compliance

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DATE RECEIVED IN OHSR: 6/20/12 by LED      PROTOCOL # 12-200 EP 1206

DATE OF IRB REVIEW: 6/21/12 by KJE      APPROVAL CATEGORY: 45 CFR 46.110#7

DATE OF IRB APPROVAL: \_\_\_\_\_ by \_\_\_\_\_      INTERVAL FOR CONTINUING REVIEW: 1 year

COMMENTS: original in 5/11/12 - not approved 6/1/12 - KJE



APPENDIX B

update  
on  
next  
page

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6/21/12 to 6/20/13  
Protocol # 12-200 EP 1206

AUBURN UNIVERSITY  
**SAMUEL GINN COLLEGE OF ENGINEERING**

DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

**(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL  
INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS  
DOCUMENT.)**

**INFORMATION LETTER  
for a Research Study Entitled  
“For Youth For Life (FYFL): An application supporting Financial Literacy”**

**You are invited to participate in a research study** to test the developed educational online learning environment on Financial Literacy and to determine if it is effective, met expectations and user friendly for both educators as well as learners. The study is being conducted by Rajitha Gondi, Graduate student, under the direction of Dr. Cheryl Seals, an associate professor in the Auburn University Department of Computer Science & Software Engineering. You were selected because you have been trained in design and usability and are age 19 or older.

**What will be involved if you participate?** If you decide to participate in this research survey, you will be asked to give your responses in an online survey. Your responses will be confidential and we do not collect identifying information such as your name, e-mail address or IP address. The survey questions will be about your background and familiarity with current educational tools and online learning community sites. The procedure involves filling an online survey that will take approximately 10-15 minutes.

**Are there any risks or discomforts?** The risks associated with participating in this study are minimal or non-existent. As all the participants will do the survey online, there are no risks or discomforts for the participants. The data is also anonymous and confidential. The surveys will be conducted online using survey monkey. Only those listed in the IRB will have access and no participant's identities are collected while completing the survey.

**Are there any benefits to yourself or others?** This study will be conducted at Auburn University to provide for a comfortable and familiar environment. You will not receive any monetary benefits from participating in this study. You will be utilizing an application that will introduce you to issues of financial literacy and it may increase your knowledge of this area and promote higher levels of financial literacy and self-efficacy. As Financial Literacy is related to finances, the participant's views/ideas will be helpful in further designing the prototype which will be helpful to the students for gaining financial knowledge too. We cannot promise that you will receive any or all of the benefits described.

**Will you receive compensation for participating?** You will not be given any compensation and/or incentives.

**Are there any costs?** There is no cost involved in the creating the surveys and in getting the participants involved.

**If you change your mind about participating,** you can withdraw from the study at any time without penalty. Your participation in this research study is voluntary. You may choose not to participate. If you decide not to participate in this study or if you withdrawal from participating at any time, you will not be penalized.

**Any data obtained in connection with this study will remain anonymous.** Your responses will be confidential and we do not collect identifying information such as your name, e-mail address or IP address. The collected data will be stored in hard copies and soft copies in locked cabinet in Shelby Center 3137. The data collected will be used to improve the performance of the application. Information collected through your participation may be used for the publications, presentations, thesis writing and for the future of the website.

**If you have any questions about this study,** we invite you to ask them now. If you have questions later Cheryl Seals, (334)844-6319, [sealscd@auburn.edu](mailto:sealscd@auburn.edu) or Rajitha Gondi, (609)216-3935 [rzg0018@auburn.edu](mailto:rzg0018@auburn.edu) , will be happy to answer them. You will be provided a copy of this form to keep.

**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](mailto:hsubjec@auburn.edu) or [IRBChair@auburn.edu](mailto:IRBChair@auburn.edu).

HAVING READ THE INFORMATION ABOVE, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, PLEASE CLICK ON THE LINK BELOW. *add link*  
YOU MAY PRINT A COPY OF THIS LETTER TO KEEP.

\_\_\_\_\_  
Investigator Date

\_\_\_\_\_  
Co-Investigator Date

*The Auburn University Institutional Review Board has approved this document for use from*  
\_\_\_\_\_ to \_\_\_\_\_. Protocol # \_\_\_\_\_

*update*

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## APPENDIX C

### Pre-Questionnaire

#### For Youth, For Life (FYFL) – Financial Literacy

<https://www.surveymonkey.com/s/FYFLLearningEnvironmentPreSurvey>

**1) Identify your gender.**

- Male  Female

**2) What is your age group?**

- 10-15  16-19  20-25

**3) What is your highest level of education?**

- Mid School  High School  Bachelor's Degree

**4) How often do you use Internet?**

- Hourly  Once in a day  More than twice or thrice a week  Once /twice in month  Not at all

**5) Your Computer Knowledge and Experience?**

- Excellent  Very Good  Good  Satisfactory  Poor

**6) Have you ever used Online Financial Literacy Learning Tools?**

- Yes  No

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

Yes

No

8) Do you think Learning Financial Literacy through online learning is better or classroom teaching?

Online Teaching

Classroom Teaching

9) Rate your experience with Online Educational Tools on scale of 1 to 5.

1 – Worst    5 - Best

1

2

3

4

5

10) If you know any online learning tools/websites please mention below?

## APPENDIX D

### TASK LIST

1. Open Firefox/Internet Explorer
2. Open fyflnetwork.org
3. Go through the entire website; browse all the pages you wish to
4. Go to Checking ->
  - Interactive Checking ->
  - Activities ->
  - Virtual ATM Machine => See how an ATM machine works.
5. Go to Consumer ->
  - Interactive Consumer ->
  - Activities ->
  - Matching => Open two boxes at a time. Memorize the places where those words are located. Open repeatedly and finally match all the words as a couple.
6. Go to Insurance ->
  - Interactive Insurance ->
  - Activities ->
  - Insurance Word Search => Play the game to search for the words below, which are located on the screen horizontally, vertically or diagonally.
7. Chat with your friends (who has the site opened), by typing your name in the chat window on the side bar
8. Click on Forum
  - Click on any of the forum topics you want
  - Add a topic



## APPENDIX E

### Post-Questionnaire 1

#### FYFL - SYSTEM INTERACTION and USABILITY

<https://www.surveymonkey.com/s/FYFLLearningEnvironmentPostSurvey1>

**1) I am satisfied with how easy it is to use this system.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
Easy to Use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**2) It was simple to use this system.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
Simplicity of the System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**3) The interface of the system is pleasant.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
System Interface	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**4) The system has good navigation in the home page and in all other pages.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
System Navigation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**5) This system has all the required features and functionalities I expect it to have.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
System Features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**6) The colors, images and layouts of the websites are attractive.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
System Theme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**7) I like the navigation of the menu items through Sliding Images on the top?**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
Menu Navigation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**8) Overall, satisfaction with this system.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
System Satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) Please give us your reflections on learning while using the system.**

	Very Easy	Easy	Average	Difficult	Very Difficult	N/A
Getting Started	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning Advanced Features like Forum, Chat, Games, Tag Cloud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**List the most positive feature(s):**

1.
2.
3.

**List the most negative feature(s):**

1.
2.
3.

## APPENDIX F

### Post-Questionnaire 2

#### FYFL – INFORMATION QUALITY

<https://www.surveymonkey.com/s/FYFLLearningEnvironmentPostSurvey2>

**1) Was the system informative?**

	Yes	Partially Yes	No	N/A
System Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**2) The information provided by the system is easy to understand.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
Easy to Understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**3) The information is effective in helping me to complete the tasks, activities and scenarios.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
System Effectiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**4) The organization of data on the system screens is clear.**

	Strongly Agree	Moderately Agree	Slightly Agree	Moderately Disagree	Strongly Disagree	N/A
Organization of the data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**5) Does the Learning Environment look as a professional website?**

	Yes	Partially Yes	No	
Professional Look	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	