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DEVELOPMENT OF A MOODLE CLASS BLOG TO IMPROVE STUDENTS INTEREST IN TEACHING AND LEARNING IN SCIENCE EDUCATION.

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Abstract

This paper presents the development of a moodle class blog to improve student's interest in teaching and learning in science education. The objectives of the study were to access, share and exchange materials and ideas with their teachers and peers just as they do in the social networking as well as interacting with other professionals in the field, have links and be up to date in terms of knowledge. Rapid Application Development software methodology was used in the design of the moodle class blog with phases of analysis, design, development, implementation, testing and evaluation.The moodle class blog was developed using HTML, PHP MyAdmin,Javascript and Mysql. The on-line moodle class blog provides features that will enable the student access and download learning materials in Portable Document Format (PDF) and as well as video format into their laptop for learning activities. It also provides exercise modules that test the understanding of students on each topic at the end of learning session. In order to evaluate the satisfaction of students in using moodle class blog, an instrument (questionnaire) was developed to obtain the responses of students on the performance of the moodle class blog. The mean and standard deviation of student's responses showed that students were satisfied with the performance of moodle class blog and it is effective in learning of Chemistry and Biology curriculum at NCE level

Keywords: Moodle, Moodle Class Blog, Students Interest, Science Education, Abia State College of Education (Tech) Arochukwu

1.0 Introduction

The development of education is a major aspect of national development. Without a concrete laid down foundation, it would be impossible to effect purposeful development orientation in Nigeria. It is on the recognition of this important aspect of national development that since the end of colonialism in Nigeria, the various regimes in the country have devised various educational programmes, established primary and secondary schools and indeed tertiary institutions with the aim of laying the foundations for other field of national development. One of the tertiary institutions which has been laid down for the development of the nation is Colleges of Education (Technical).

Colleges of Education (Technical) are part of institutions of higher learning whose objective is to produce middle level personnel with the necessary skills needed to work in the industry, teach in the junior secondary schools and as well be self-reliant (Okoro, 2019). Recently, the colleges offer courses not only in vocational and technical education but sciences, social sciences, arts, Nigeria languages and different courses in education. National Policy of Education (2004) sees Vocational and Technical Education (VTE) basic aims as to provide trained manpower in the applied science, technology and business particularly at craft, advances craft and technical level, which are capable of developing occupational manpower. In other words, Vocational Technical/Technology Education is conceived as an instrument for attainment of self- realization for individual and national efficiency, through economic, scientific and technological development. Going by this definition, it could be deduced that science is the foundation upon which the bulk of present technology breakthrough is built upon.

Science is seen as the art or process of thinking, reasoning out and invention of practicable, useful ideas which seeks to solve human problems. Adamu (2000) on his part sees science as a process involving various complex activities of man which result in producing universal statements leading to the explanation of observable behaviour of things that exist for which their characteristics can be predicted. In summary, therefore, science is a body of organized knowledge which has a humanistic and moral influence on society due to the possibilities it offers for the development and advancement of technology. This implies that the environment/society is greatly influenced by science. Hence, the methods of teaching and studying science in the schools should be of paramount interest to the educators considering the impact of technology in the environment and the nature of the students of this digital era. However, the study of sciences in some institutions is done under the umbrella of science education. Science education according to Buseri (1995) is the application of educational (learning) theories especially those based on the philosophical, sociological and psychological perspectives in the endless search for knowledge, resulting in the development of the cognitive, affective and psychomotor domains through some systematic processes involving careful observation, deduction and testing by empirical means. Science education is thus more than the presentation or acquisition of scientific facts and skills, it includes the development of new ways of thinking, reacting and behaving; a development that reveals itself in increased skills, knowledge and thinking capacities to tackle problems of life, in new habits of action, in more desirable attitudes, in benefited personality and in improved character. This form of education is exercised and acquired both informally and formally in schools (Buseri, 2003).

Science Education deals with sharing of science content and process with individuals who are not considered traditionally to be members of the scientific community (Kola, 2013). The individuals could be students, farmers, market women or a whole community. No wonder the Federal Ministry of Education (2004) has the objective of Science Education in Nigeria among others to include: To help a spirit of enquiry, creativity in the teachers and to help science teachers fit into the social life of the community and society at large. But it is unfortunate that, for the past decades a growing gap has been observed between the scientific and technical expertise offered by schools, on one hand, and the social demand in this regard, on the other: societies are showing a growing need for individuals trained in this field, while the number of students attracted to it is stagnating and in some cases declining (Organisation for Economic Cooperation and Development [OECD], 2006; 2008). This gap according to OECD has been described by many as students' loss of interest in Science and Technology. In relation to this, Ajaja (2008) found out that poor performance in science subjects in schools has been a serious concern to educationists, business organizations and government at large. The poor interest and achievement could be attributed to the methods/approaches used by the teachers. Tobias (1990) also shows that many college students attributed their uninterested attitude toward science to the uninteresting lecture such as focused on problem-solving technique and lacked an intellectual overview of the subject (Osborne, 2003). Also, However, Siemen (2005a) observed, that over the 20years, technology has reorganized how people live, communicate, and learn. For the objectives of science education as stipulated in the minimum standard for Colleges of Education to be achieved, there is need for innovative teaching and learning approaches that are in line with the global trend, environmentally friendly and as well increase student's interest and engagement.

There are multiple ways in which students can learn, communicate, and interact with the instructor and other students outside a classroom setting especially in this digital era and pandemic situation. According to Jarvenpaa (1996) technology holds considerable potential to increase effectiveness in the acquisition of knowledge both in corporate training and in the higher education environment. With the use of current technology, students can be constantly engaged in learning by the stimulation of others who give varying perspectives and insights to problems and opportunities. Orstein and Levin (2006) observed that the average 21st century student is used to electronic media (like Television, Radio, Slide, CD Rom, Projectors, CDs, DVDs) and interactive media (like cell phones and the internet) which are technological devices employed by the teacher/learner to enhance the interest, acquisition and retention of knowledge. Orstein and Levin (2006) stated that, the media both stimulate and reflect fundamental changes in attitudes and behaviours that prevail in the society. These observations and other warranted the need for the development of a moodle

class blog (an online learning platform) for effective learning teaching and learning of science education courses in the college.

2.0 Problem Statement

The increasing effect of technology, issues of industrial actions and continuous decline in the interest / performance of students in sciences courses have significant effect on how Science Education should be taught in the classroom to attract students. The use of the traditional method of teaching is no longer interesting and effective for the students of this digital era. Teachers find it difficult to attract and sustain their interest. Most students abscond from lectures because of the boring nature of the conventional method.The students' lack interest in the subject and failure in science education may results into shortage of science experts.Thus, the need for an interactive learning platform that involves the use of technological gadgets that will attract the students and encourage learning.

The current issue of pandemic in the nations is a major concern and creates a justification of the need to try out other learning approaches that will engage the students in the learning activities though not in the classroom. This will give room for a crash programme if the school eventually reopens. Consequently, it is believed that the issues of crash programmes, inadequate teaching methods and students absconding from lectures due to lack of interest will be minimised if not completely taken care of by the development of a moodle class blog which will be used by the school of science education in the colleges if approved.

3.0 Objectives of the Study

The objective of the study is to develop a moodle class blog to improve students' interest in the teaching and learning of Science Education in Abia State Colleges of Education (Technical). Specifically, study will develop an online learning platform also referred to as cloud-based classroom/platform where the students will be able to:

1. Access, share and exchange materials and ideas with their teachers and peers just as they do in the social networking.
2. Interact with other professionals in the field, have links and be up to date in terms of knowledge.

4.0 Literature Review

The development of the Internet and its applications has greatly increased the role of computer-based instruments in the learning process. This is the reason why educational institutions have an increasing need to use virtual learning environments (VLE), namely an electronic learning platform that accompanies the traditional teaching-learning-assessment process. Considering the learning environment, the conventional or traditional teaching methods have been used for a very long time even in this digital age. The theories behind the methods according to Davis, Edmunds and Kelly-Bateman (2010) certainly do not become obsolete by any means, but they do need to be used in a very different way to be able to incorporate the attributes of a 21st century learning environment.As a result, a series of software applications appeared, having the role to enable the integral management of the on-line learning process, as well as the blended learning-type applications (Popat, MacLean, and Heppell, 2007). This type of platforms have two roles: on the one hand, they enable the content management (courses, homework), ensure synchronized collaboration (by chat, videoconferences), as well as non-synchronized collaboration (forum, messages, blog.) and, on the other hand, they can be used in managing the courses and the students that applied for the courses (Weller, 2007). Since virtual learning platforms have started being used especially in universities, in managing distance learning courses in particular as observed by Oproiu, Amp and Chicioreanu, (2012) one would suggest the platforms also be used in all colleges especially in periods like this pandemic period when it is so impossible and difficult to gather the students in the classroom. Also Okoro (2019) has it that teachers cannot afford to ignore the complex social, intellectual and emotional functions of digital technologies in the lives of young people. Thus, to reach today's learners; teachers need to be responsive to learners' experience with their

culture which is what they experience through television, YouTube, Facebook, and gaming. This can be achieved through the creation of a moodle class blog.

MOODLE system constitutes itself as a virtual learning environment (VLE), where the learning process is completed online, representing a software open source and is destined to support a collaborative learning environment. It constitutes a new learning framework, based on the constructivist pedagogy where both teaching staff and students meet, complete collaborative activities and create information (www.moodle.org). The creation of this online platform will not only attract the students in the teaching and learning of Science Education, but it will enable the students and lecturers to improve their learning skills in this digital era.

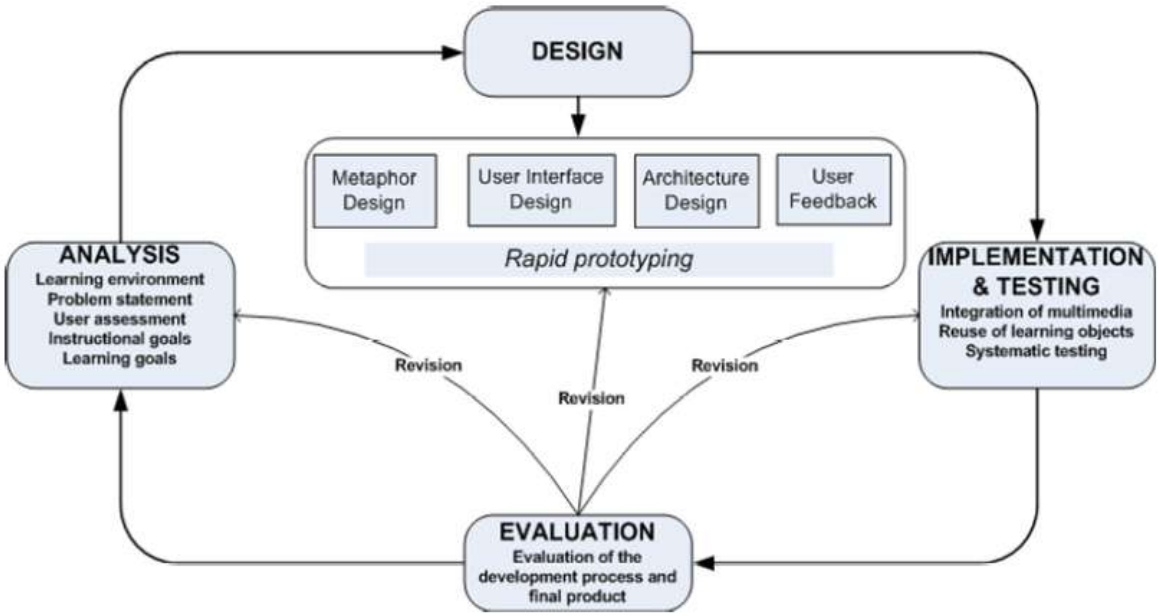
5.0 Methodology

In order to develop and evaluate the Moodle Class Blog for teaching and learning of Chemistry and Biology education in Abia State College of education (Technical), Arochukwu, the researchers adopted two basic steps. First, the online learning resources was developed using a well know software development process consisting of the following stages:- analysis, design, implementation and testing, and evaluation. This model for development of WBLRs was suggested by Hadjerrouit (2010). Secondly, students were taught with the developed system and were allowed to interact with it using online tools. The responses of the students were latter captured using an instruments and the mean and standard deviations were calculated to determine the overall satisfactions of students on the performance of the learning system most especially on the aspect that relates to technical and pedagogical usability of the learning resources.

5.1 Software Development Model.

Hadjerrouit (2010) proposes the use of three basic approaches towards development of software system for online learning. First, the development process must be user-centered because users (students) are very important components of the system hence, they must be adequately involved. Secondly, Rapid prototyping approach can be used in the design phase of the system to fast track the development process by producing prototypes that can be latter modified to meet the users need (Farrell & Carr, 2007). Finally, incremental technique must be employed throughout the whole process to produce a quality system through continuous refinement cycle. The above approaches are best described using the figure below:

Figure 5.1: Development stages of Web Based Learning System.



Source: Developing Web-Based Learning Resources in School Education: A User-Centered Approach Hadjerrouit (2010).

5.2 Analysis

At this stage, problems to be solve are well defined and the objectives of the system are well stated. Information regarding the development process such as learning environment, instructional and learning goals are well stated in the user's requirement analysis which forms the basis to proceed to the next stage of development which is system design. The feasibility of the study was also considered after a thorough cost-benefit analysis was done to ensure the project meets it objectives as much as possible within available resources.

5.3 Design

Design characteristic consists of metaphor, user interface design, architectural design and user feedback (see figure above). This stage requires the infusion of both technical and pedagogical features of the learning system into software by the programmer. The functionality and the features of the software and how users will interact with it are described and implemented using a number of software development tools such as activity table, system mockup, web map, and so on.

5.3.1 Activity table

This tool helps to clearly state the role associated with the learning system so as to understand the role and actions of the users of the users. Three roles are identified in the development process and were clearly outline in the table below.

Table 1: Activity table stating the roles of the system users

STUDENT	WBLR	TEACHER
• Start or login to the WBLR • Select a Lesson • Download learning content • Take a video tutorial • Solve a quiz • Evaluate the WBLR	• Produce the result at the end of quizzes. • Display error when an illegal action(s) is performed. • Keep track of users profile in the database	• Register the users (students) • Upload learning materials in PDF and video format • Set up assignments • Evaluate the system

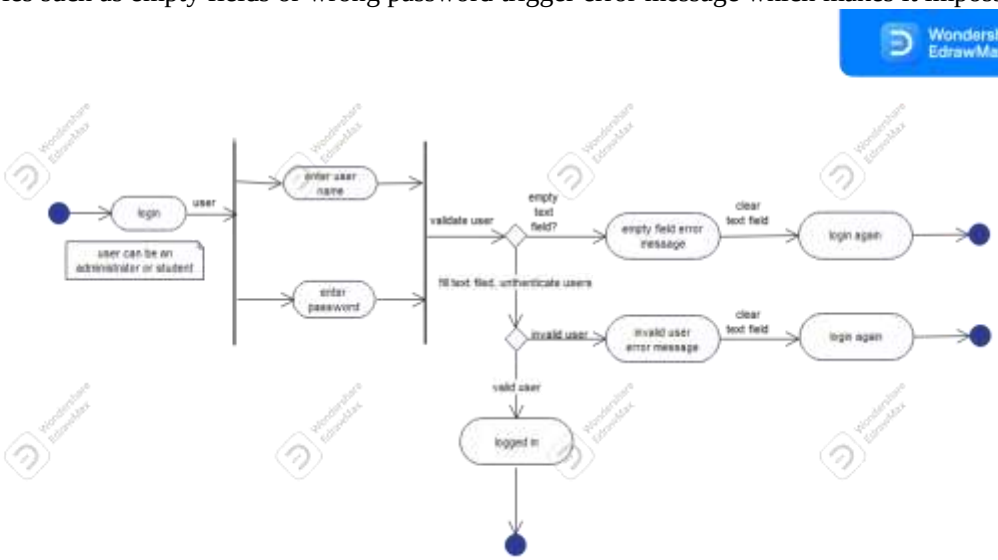
Source:Interdisciplinary Journal of E-Learning and Learning Objects, Volume 6, 2010.

5.3.2 Activity Diagram for WBLR

The work flow (sequence of events) during the execution of the software can be depicted using the activity diagram. This helps us to understand the action(s) various objects in the system will perform during the program execution. The first action required by the users of the system is authentication. Users are authenticated by means of user name and password. Figure 5.3.2 below gives details steps involved in login process to WBLR.

Figure 5.3.2 Activity Diagram for login process for WBLR
Designed using EdrawMax Software.

Invalid entries such as empty fields or wrong password trigger error message which makes it impossible to

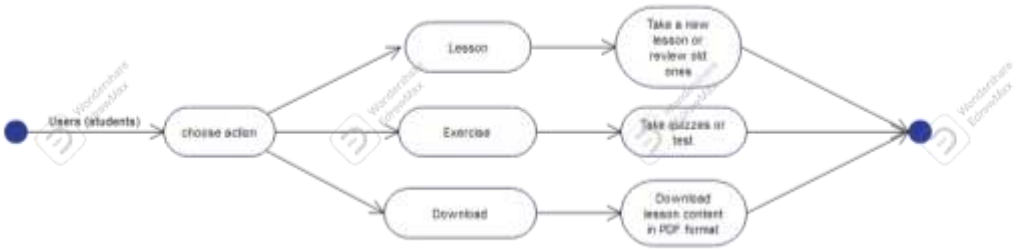


gain access to the system. If user is validated, the system grants him access to the program dashboard.

5.3.3 Activity Diagram for WBLR Users

The below activity diagram shows processes follow by students in utilizing the WBLR. Student, after successful login, can access any of the following functions of the learning resources: take a lesson by selecting lesson button, take exercise or download learning contents.

Figure 5.5(b), Activity diagram for student's Main page.



5.4 Mockup for Learning System.

This describes the features and functions of the learning system. Various screens that will be presented to the users of the system are described in the system mockup. Figures 5.4, 5.5, 5.6, 5.7 and 5.8 showed the screen captures of students' login, main menu,Biology module,Chemistry module and exercise respectively.

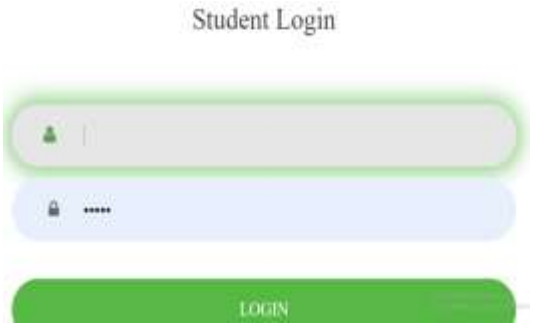


Figure 5.4: Student Login

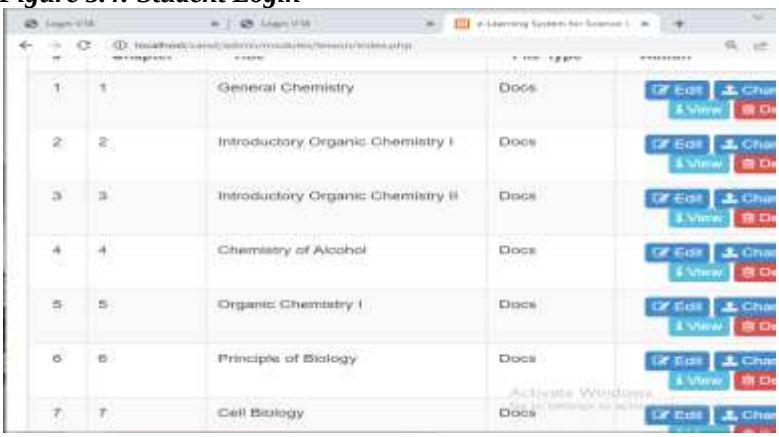


Figure 5.5: Main menu

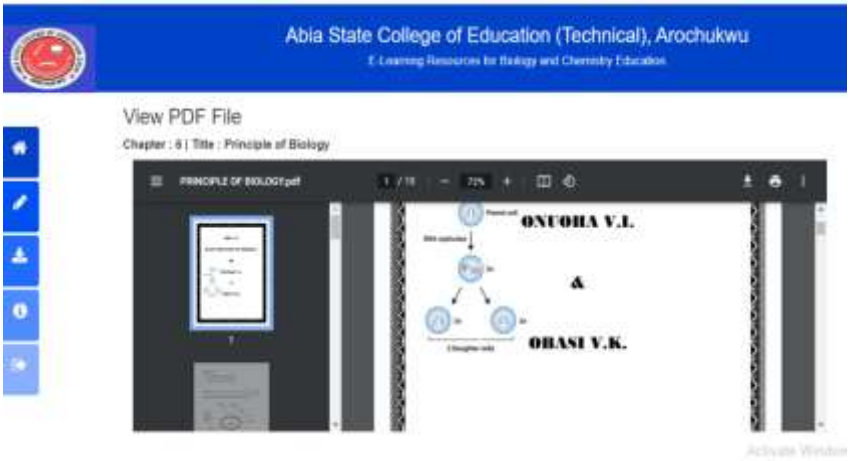


Figure 5.6: Biology Module

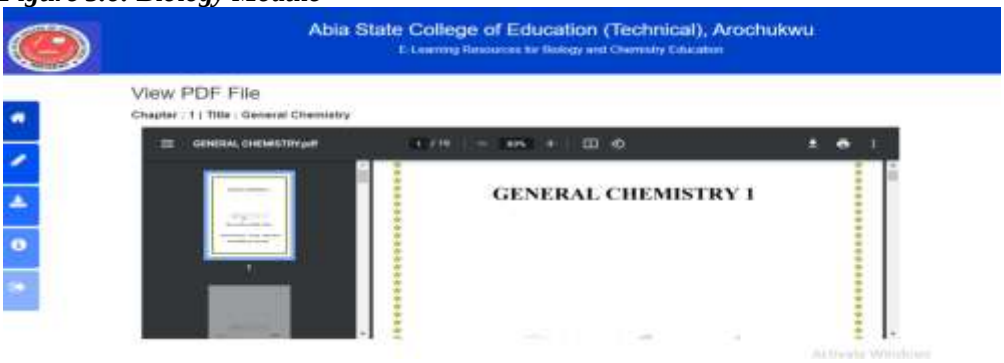


Figure 5.7: Biology Module

Figure 5.8: Biology Module

5.5 Web Page Architecture for Learning System

The architecture of WBLR is hierarchical in nature, the top of the hierarchy is the home page (see figure 5.9 below) from which other pages can be accessed or linked. From the home page, a user can navigate to other pages (Lesson, Exercises, Download and Gallery). Each page of the system can be linked through hyperlink text or graphics. Pages are designed using multimedia elements consisting of text, sound, graphics and videos which makes learning appealing and simple for the student. Navigability and flexibility are highly considered in the architectural design of the system. Flexibility ensures students determine the order of learning and pattern, they may skip or revisit a page to suit their needs.

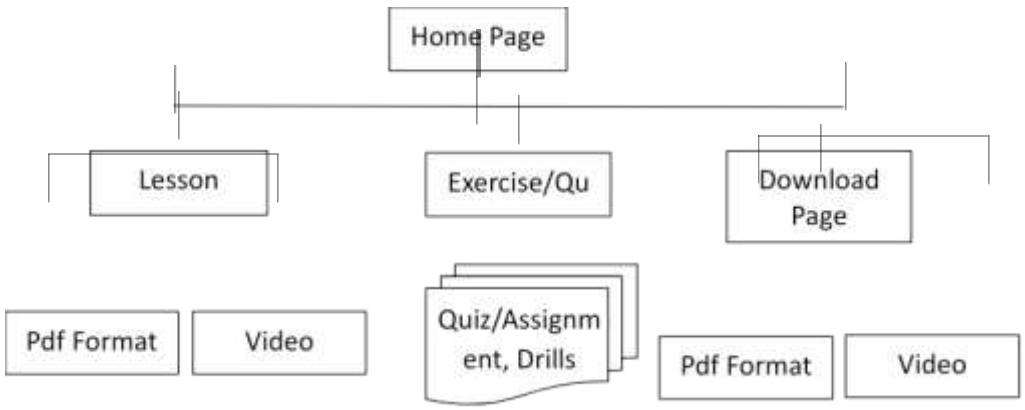


Figure: 5.9 Web Page Architecture for WBLR

5.6 Rapid Prototyping

A number of prototypes were created during the design phase of the development. Users (Instructors and Students) were allowed to interact with the software and provide feedback which is used for further refinement of the system until an acceptable product is derived. This process
ensures that the objectives of the system are achieved within minimum time for implementation.

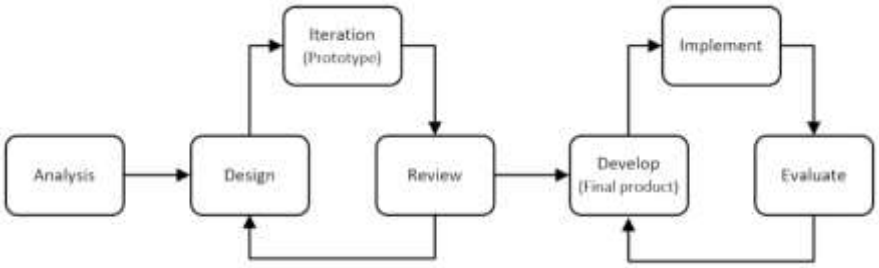


Figure 5.9: Rapid Prototyping model for WBLR

6.0 Implementation and Testing

There are two issues to implementation of WBLR. First is the development of front-end component of the system using programming languages such as Hypertext Markup Language (HTML) version 5.0 upwards, Java scripts, Cascading Style Sheet and Bootstrap. The front-end processor is the one the users interact with. It consists of the web pages and screen elements for accessing the system multimedia contents provided on world wide web. Reusable components such as videos, documents and software modules are downloaded from the net, modified and integrated to suit the learning system. The backend is the web server where the database and file system exist. This is implemented using MySQL Database Management System, PHP Myadmin scripting language and Java programming language. The database and file servers provides the logic layer of the application.

The testing of the system was carried out in collaborations with students in the department of Physical and Health education. A total number of twenty-one (21) students were randomly selected from N.C.E undergraduate students to participate in test running the learning system. They were allowed to interact with the system and observer any error(s) in content and graphics representations, cross referencing and navigation. This provides useful information for refinement process until a better and adaptable product is achieved.

7.0 Evaluation

Evaluation of the software is carried out to determine the pedagogical and technical satisfaction of the learning system. In order to achieve this, an instrument ***Software Evaluation Instrument for Learning of Biology and Chemistry Education (SEILBCE)*** consisting of fourteen (14) items was designed and administered to randomly selected students in the departments ofBiologyand Chemistry education to extract and analyze information using standard deviation and mean statistics on Satisfaction of users on performance of WBLR. The following areas of software features are examined for analysis. Content, teaching and learning skill, interaction, feedback and error correction, design, clarity and assessment and documentation. Table 7.1 below gives the detail information on mean analysis of the satisfaction of the users on various aspect of the learning system.

Table 7.1 Mean and Standard Deviation of Students' responses on their Satisfactions with the Performance of the Learning System. **N=21**

S/N	Item	X	SD	Remark
1	The content fits into curriculum of Chemistry and Biology education	3.73	0.47	Agree
2	The aims and objectives of the content are clearly stated	3.09	0.54	Agree
3	The content is logically sequenced	3.45	0.93	Agree
4	The software helps students to construct their Chemistry and Biology knowledge	4.00	0.00	Agree
5	The software involves students in active learning	3.82	0.40	Agree
6	Users can control the sequence of presentation	3.64	0.50	Agree
7	Users can stop in the middle of an activity and begin at that stop point in the next session	2.82	0.98	Agree
8	The feedback is related to student responses	3.45	0.52	Agree
9	The software has immediate feedback	3.55	0.76	Agree
10	The screen formatting is clearly presented and easy to read	3.91	0.30	Agree
11	The software has various responses to students' activities	3.36	0.50	Agree
12	Graphics and audio are used for appropriate instructional reasons	3.27	0.79	Agree
13	Graphics, audio, and colour motivate students	3.64	0.50	Agree
14	The software has understandable visualization to help student in enhancing their Physical education knowledge	3.91	0.30	Agree
	Overall Mean	4.42		Agree

N= No of responses, X = Mean, SD= Standard Deviation

The data from table 7.1 showed the means and standard deviations of the responses ofeleven students that interacted withMoodle Class Blog. The table showed that all the items had mean greater than 2.5 cut-off point. This implies that the students were satisfied with the performance of the learning system. The small values of the standard deviations indicated that students have very close opinions on the 14 items.

Conclusion and Recommendation

Some science students have low interest in learning science subjects as well as low academic performance. To increase student's interest as well as academic performance, the researchers developed Moodle Class Blog. Thereafter, eleven science students were asked to interact with the developed system and fill questionnaire as well. The researchers then collected the filled questionnaires and analyzed the data. The results of the data analysis shows that students were satisfied with the performance of the developed system. Based on this finding, the researchers recommended the use of the Moodle Class Blog to teach science subjects such as Biology, Chemistry and Physics among others in Abia State College of Education (Technical) Arochukwu.

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