

**A DEVELOPMENT AND EVALUATION OF WEB BASED LEARNING RESOURCES (WBLRS)  
FOR PHYSICAL AND HEALTH EDUCATION CURRICULUM IN COVID-19 PANDEMIC.**

**UKPAI R, N (PhD)**

**Department of Physical and Health Education, Abia State College of education (Technical),  
Arochukwu, Nigeria.**

**&**

**OYUNRANTI T.L**

**Department of Computer Science Education, Abia State College of education (Technical),  
Arochukwu, Nigeria.  
tubormail@yahoo.com**

**Abstract**

*This research seeks to design and evaluate the satisfaction of Web Based Learning Resources (WBLRs) in teaching and learning of Physical and Health Education in Abia State College of Education (Technical), Arochukwu, South East Nigeria. The objective of this research is to develop learning resources using combination of technical and pedagogical features for teaching and learning of Physical and Health Education, provide on-line platforms for collaboration among students for learning of Physical and Health Education, produce flexible, collaborative, adaptable and multi-media web resources for undergraduate of Physical and Health Education and evaluate the satisfaction of students in using the WBLRs for learning of Physical and Health Education at Nigerian Certificate in Education (NCE) level. Rapid Application Development software methodology was adopted in the design of the Web learning system namely analysis, design, development, implementation, testing and evaluation. The on-line learning platforms 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 WBLRs, an instrument was developed to obtain the responses of students on the performance of the WBLRs. The mean and standard deviation of student's response show that students were satisfied with the performance of WBLRs and it is effective in learning of PHE curriculum at NCE level.*

**Keywords:** *Web Based Learning Resources, On-line learning, Technical and Pedagogy features, learning contents, online collaboration, Covid-19.*

**1. Introduction**

Learning is one of the most important features of academic environment. It is a process through which change in behavior can be achieved. According to Mustakin, Trisnaningsih and Muna (2020), learning is a form of change experienced by the students in their ability to behave in new way as a result of interaction between stimulus and response. In order for students to acquire needed knowledge and understanding, the learning environment and methodology employed must be effective and able to help students absorb the learning materials efficiently. One of the ways by which effective learning can be achieved is by use of technology (Olasile&Emrah, 2020). Technology is a major factor influencing education today. Schools are expected to use technology to enhance the education of their students (Eileen, Aisling, Moya & Grainne, 2021).

Web Based Learning Resources (WBLRs) also called e-learning, computer-based learning or technology-mediated learning represent a meaningful method to acquire knowledge and skills by applying web technologies and tools in teaching practice (Tatiana, 2019). It is an interactive web-based tools that support

learning by enhancing, amplifying and guiding the cognitive processes of learning (Said, 2010). Web-Bases Learning Resources (WBLRs) provides a powerful platform for enhancing teaching and learning process in school education. They can provide teachers and learners with a wide range of new and exciting experiences that are not possible in traditional classroom. It also provides a learning environment for students to continuously engaged in learning activities when off the campus or even in event of pandemic such as covid-19 (Olasile&Emrah, 2020).

The teaching and learning of Physical and Health Education in Abia State College of Education (Technical), Arochukwu was halted during the Covid-19 pandemic. The pandemic forced the government to shut down all academic activities and send both the instructors and students off the campus in order to prevent spread of the disease. This action has negative consequence on learning activities because the main method of teaching has been traditional face to face and by implication, shutting down of schools means teaching and learning has to stop. With no alternative methods or learning environment put in place, the students had to go home and continue remaining idle while the pandemic last. This prevents them from deep learning activities and deprive them valuable time needed to study and acquire the required skills to functions efficiently in digital world.

This research is therefore designed to develop an online platform using web technologies that will help instructors and students of the departments continue to engage in teaching and learning activities irrespective of natural or social factors that may emerged to hinder or disturb the academic activities in the campus.

## **2. Problem Statement**

Physical and Health education is one of the courses offered by students in Abia State College of Education (Technical), Arochukwu. The objective of Physical/Health programme according to National Commission for Colleges of Education (2012) include producing teachers who can inculcate and promote sound health attitude and practical at the Basic Education level, producing teachers who can organize and administer sports programmes (both intramurals and extra murals), preparing teachers so as to qualify them for a 2 or 3 years NCE degree programme in Physical and Health Education in Nigerian university and abroad. In order to achieve these objectives, there is need to deploy best methods available for the teaching and learning of the course. This will ensure that required skills and knowledge are acquired by the students for them to be digitally compliance and fit into the modern world. But there are factors that can hinder effective learning of the course such as outbreak of covid-19 pandemic or social disorder or unrest. These factors could lead to closure of schools and prevent instructors and students from engaging in learning activities that are very vital for skill acquisitions before passing out of the programme. This research is therefore geared towards developing an on-line learning platforms that will provide medium for continuous learning for both instructors and students in advent of pandemic or other factors that could hinder face to face learning environment.

## **3. Objectives of the Study**

The main objective of this study is to develop and evaluate Web-Based learning platforms for teaching and learning of Physical and Health education at Nigeria Certificate in Education (NCE) level. Specifically, the study tends to:

1. Develop learning resources using combination of technical and pedagogical features for teaching and learning of Physical and Health Education.
2. Provide on-line platforms for collaboration among students for learning of Physical and Health Education.
3. Produce flexible, collaborative, adaptable and multi-media web resources for undergraduate of Physical and Health Education.
4. Determine the suitability of WBLRs for teaching Physical and Health Education at NCE level.
5. Evaluate the satisfaction of students in using WBLRs for learning Physical and Health Education at NCE level.

## **4. Literature Review**

The term Web-Based Learning Resources (WBLRs) has been described using other terminologies such as Web learning tools and learning object. Said (2010) define WBLRs as an interactive web-based tools that support learning by enhancing, amplifying and guiding the cognitive process of learners. It can also be described as encompassing broad range of instructional approaches which include tutorial, asynchronous discussion, live conferencing, practice exercises, cognitive interactivity and presentation blending with other instructional activities (Cook, Garside, Levinson, Dupas, and Monitor, 2010). Observation made from implementation of WBLR in education sector shows great benefits to students, teachers and academic institutions, (Tatiana 2009). WBLRs allows students access learning materials and multimedia packages or to join course by using ICT. It provides a learning environment which can be controlled by learners rather than the instructor. This made it possible for learners to learn at his or her pace and time which is a significant features of constructivist approach to learning.

Recent researches in WBLRs development is geared towards developing a learning system that is both technical and pedagogical significant. It has been observed that most WBLRs in use today are still within the domain of technical and software experts rather than teachers and learners (Nam & Smith, 2007). For WBLRs to be efficient in teaching and learning, it must incorporate both technical and pedagogical features. The technical usability of WBLRs ensures that it minimizes the cognitive load of the learner and free more resources for learning process (Brink, Gergle & Wood, 2002). It allows learner to focus on learning materials rather than how to access them but does not provide deep learning experience requires by the learner. Pedagogical usability of WBLRs is associated with aspects that are fundamental to learning (Kranss & Ally, 2005). Nokelainen (2006) described the pedagogical usability of WBLRs to include learners control learning activity, collaborative learning, goal orientation, applicability, added values, motivation, previous knowledge, flexibility and feedback. Some of the criteria for measuring pedagogical usability of WBLRs according to Hadjerrouit (2010) includes but not limited to understandability, Learner-control, Goal-orientation, Time, Interactivity, Multiple representation of information, Motivation, Differentiation, Flexibility, Autonomy, Collaboration and Variation.

The challenge facing the development of WBLRs that is both technical and pedagogical useful is suggested by Martinidale, Cates and Qian (2005). They opined that it is more difficult to create WBLRs that accommodates the demand of constructivist learning theories which encourage learner's centre approach to learning because of the complexity of features, structure and design of such system. ITU monitor (2009) stated that the design and development of WBLRs which provides added value in learning and teaching is very demanding and time consuming. WBLRs require a learner centre approach to learning using digital resources (Wilson, 1998). The implication of this is that the WBLRs has to be design to support a learner-centered environment that enhances learning activities through interactive, flexible, differentiated, authentic and motivating activities (John & Sutherland, 2009). Unfortunately according to Akpınar & Simsek (2007) most of these features are nonexistence in most WBLRs used in academic institutions today.

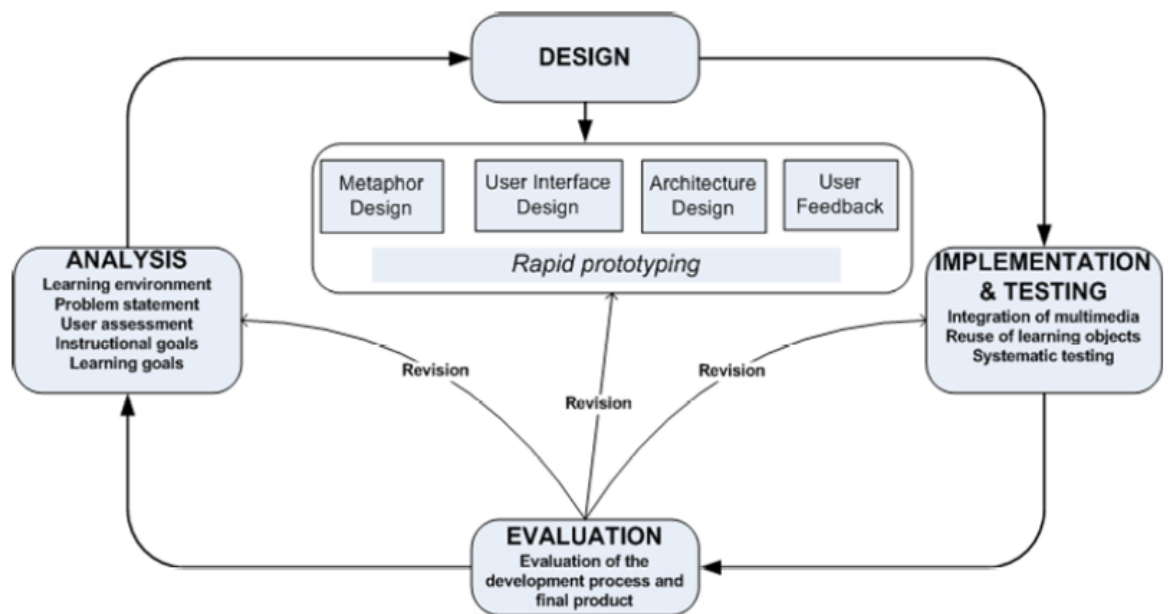
In summary, the exposition narrative on the development of WBLRs shows that there is a great disconnect between what should be a quality WBLRs and what is available in classroom today. There is urgent need to bring to the consciousness of developer that when designing WBLRs applications or platform, both technical and pedagogical usability must be considered.

## **5. Methodology**

In order to develop and evaluate the satisfaction of WBLRs for teaching and learning of Physical and health education in Abia State College of education (Technical), Arochukwu, the researcher adopts 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 ApproachHadjerrouit (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.

#### 5.3.1Activity 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
<ul style="list-style-type: none"> <li>• Start or login to the WBLR</li> <li>• Select a Lesson</li> <li>• Download learning content</li> <li>• Take a video tutorial</li> <li>• Solve a quiz</li> <li>• Evaluate the WBLR</li> </ul>	<ul style="list-style-type: none"> <li>• Produce the result at the end of quizzes.</li> <li>• Display error when an illegal action(s) is performed.</li> <li>• Keep track of users profile in the database</li> </ul>	<ul style="list-style-type: none"> <li>• Register the users (students)</li> <li>• Upload learning materials in PDF and video format</li> <li>• Set up assignments</li> <li>• Evaluate the system</li> </ul>

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.

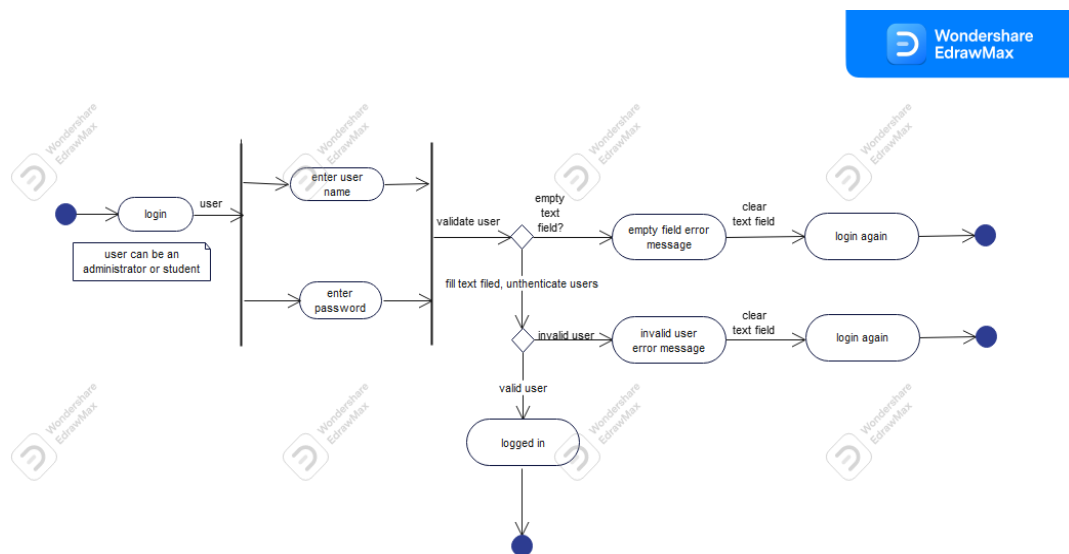


Figure 5.3.2 Activity Diagram for login process for WBLR  
Designed using EdrawMax Software.

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.

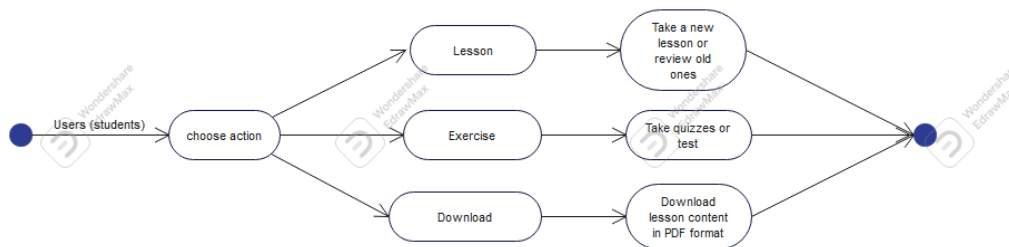


Figure 5.5(b), Activity diagram for student's Main page.

#### 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. The figure 5.4 below gives a screen presentation of the main page through which students can access different features of the software such as lesson, exercise and download.

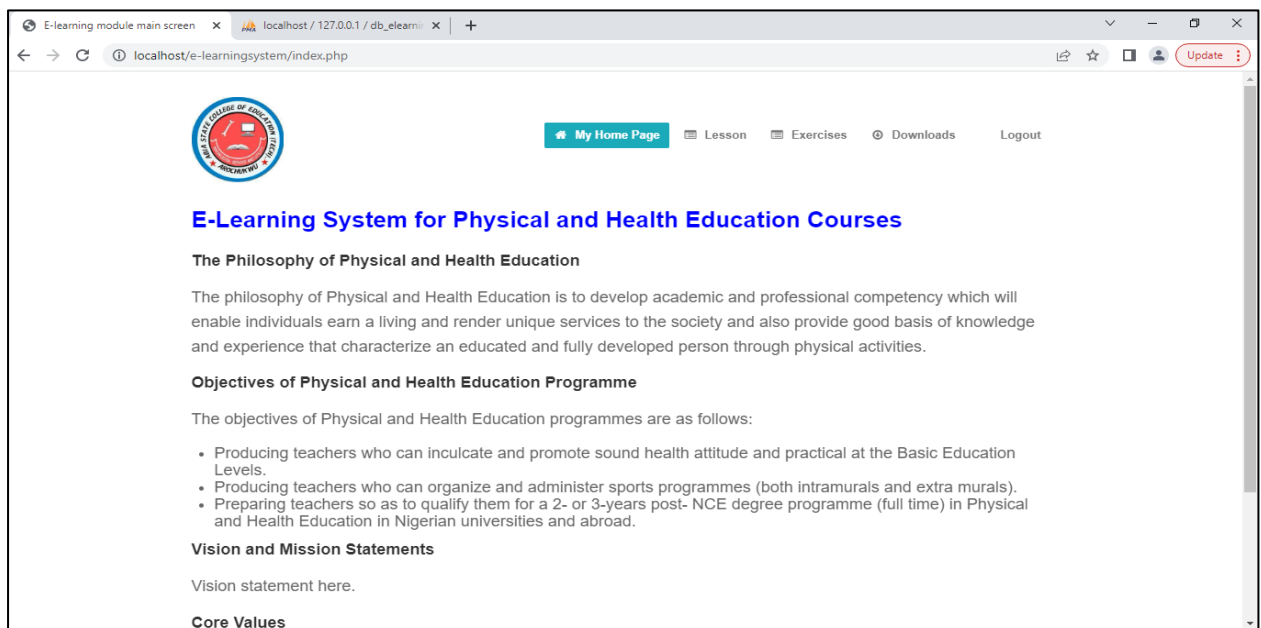
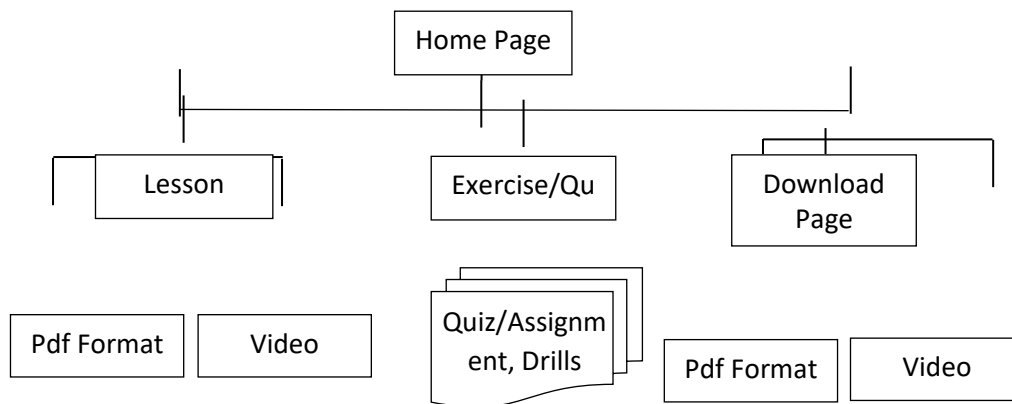


Figure 5.4WBRL Home Page.

#### 5.5 Web Page Architecture for Learning System

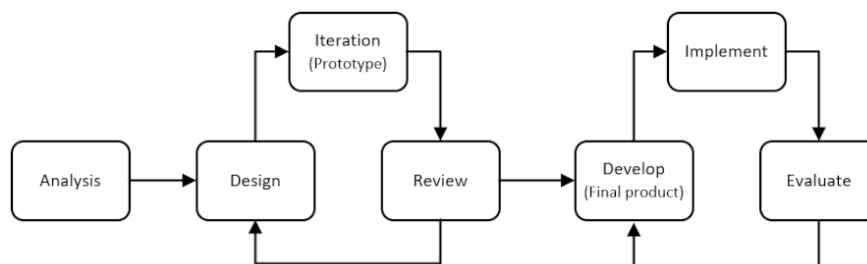
The architecture of WBRL is hierarchical in nature, the top of the hierarchy is the home page (see figure 5.5 below) from which other pages can be accessed or linked. From the home page, a user can navigate to other pages (Lesson, Exercises, Download and Gallery). Each page of the system can be linked 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:5.5 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 5.6: Rapid Prototyping model for WBLR*

## 6. 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 observe 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. 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 Physical and Health Education (SEILPHE)* consisting of fourteen (14) items was designed and administered to randomly selected students in the department of Physical and Health 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 Satisfaction with the Performance of the Learning System. N=21**

S/N	Item	X	SD	Remark
1	The content fits into curriculum of physical and health education	4.33	1.18	Agree
2	The aims and objectives of the content are clearly stated	4.14	0.65	Agree
3	The content is logically sequenced	4.57		Agree
4	The software helps students to construct their Physical and Health knowledge	4.33	0.97	Agree
5	The software involves students in active learning	4.33	0.58	Agree
6	Users can control the sequence of presentation	3.90	1.14	Agree
7	Users can stop in the middle of an activity and begin at that stop point in the next session	4.38	0.67	Agree
8	The feedback is related to student responses	4.81	0.92	Agree
9	The software has immediate feedback	4.62	1.16	Agree
10	The screen formatting is clearly presented and easy to read	4.62	0.50	Agree
11	The software has various responses to students’ activities	4.14	1.08	Agree
12	Graphics and audio are used for appropriate instructional reasons	4.38	0.92	Agree
13	Graphics, audio, and colour motivate students	4.67	1.55	Agree
14	The software has understandable visualization to help student in enhancing their Physical education knowledge	4.76	0.91	Agree
	<b>Total Mean</b>	<b>4.42</b>		Agree

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

The mean analysis in Table 7.1 above shows the items with mean greater than the threshold of 3.5 cut of point on a 5-point Likert scale. Each item has a mean value above 3.5 and a total mean of 4.42. This imply that students were satisfied with the use of learning system for Physical and Health Education. Item number 1 with mean value of 4.33 suggest that the contents of the learning system fits into the curriculum of Physical and Health Education programme. Also, the standard deviation value between 0.50 and 1.18 indicate closeness of students’ responses to their satisfaction with the performance of WBLR.



## **8. Conclusion and Recommendation**

In this research work, Web-Based Learning Resources System was developed using pedagogical and technical features to enhance individual learning of Physical and Health Education by the students. The development circle consists of analysis, design, implementation, testing and evaluation. Series of software development tools such as Activity table, Activity diagrams, Mockups and Rapid prototyping techniques were employed during the design phase of the system. Programming and script languages such as Hyper Text Markup Language, PhpMyAdmin, MySQL, Java script were used in developing the learning system. In order to evaluate the satisfaction of students in using the learning system, a data collection mechanism was developed to extract data from the students on their experience when using the learning system. Data collected were analyzed using mean and standard deviation. The results of analyzed data show that students were satisfied in using the learning system for Physical and Education programme of Abia State College of Education (Technical), Arochukwu. The outcome of this research gives basis for recommendation of the learning system in teaching of other science courses such as mathematics, chemistry, physics and computer studies in higher learning education in Nigeria.

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