

A Web-based Information Management System for Educational Institutions in Riverine Areas

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Abstract

The educational achievement of pupils from equal socioeconomic backgrounds differs by region of the country they reside. Since their environs are susceptible to disasters like as floods, institutions in riverine locations such as Anambra West Local Government areas of Anambra State face low academic teaching and learning. Existing teaching and learning approaches, on the other hand, do not accommodate the negative consequences of the floods, such as the loss of teaching and learning resources, school absenteeism, and so on. Therefore, the study proposed a Web-based Information Management System to solve these issues and improve teaching and learning. For the analysis and implementation of the system, the Object Oriented Analysis and Design Methodology was employed. PHP 7 was used to create the application, with MySQL serving as the database management system. Once accepted, the technology would offer an online platform for continual learning, and enhancement of students' academic achievement.

Keywords: Riverine; Floods; Local Government Areas (LGAs)

Introduction

Governments of countries and impacted areas are growing more worried as a result of the health repercussions, dangers, fatalities, catastrophes, and losses associated with floods. This is attributable to the fact that the cost of the losses incurred by hydrological crises rises every year [1]. Floods account for one-third of all natural catastrophes, thus amounting to 37.1 percent [2]. This is largely due to urbanisation and the massive surge in human populations, which causes open spaces to be transformed into residential units and businesses on a continuous basis. Flood is a natural severe weather phenomenon induced by increasing global temperatures, which leads to heavy rain, ocean thermal expansion, and glacier melt, all of which produce an increase in sea level and salt water inundation of coastal territories. Flooding is the most common of all environmental hazards, and it regularly claims over 20,000 lives per year and adversely affects around 75 million people world-wide [3].

Given that it is responsible for the development of human resources in any economy, investment in education is tantamount to investment in human capital formation. Investing in education can take many forms, including the establishment and management of schools as a business venture and/or the acquisition of any particular type of education by individuals to enhance their employment prospects and income earning capacity. Schultz [4] suggested that by investing in education, governments, corporations, communities, NGOs, and individuals can help prepare young people for the challenges ahead. If children are really the leaders of tomorrow, then it is time we started investing in them. Education in Nigeria is based on a 6-3-3-4 system, which involves four levels of institutional learning processes: the primary, the secondary, and the tertiary level. Globally, riverine areas are naturally prone to flooding. In the year 2012, flooding became a national disaster in Nigeria for the first time, and Anambra State was identified as one of the most affected states. Seven million people were affected; 2.3 million were

victims of internal displacement, while 363 people reportedly died. Out of the 21 local government areas (LGAs) in Anambra State, 8 were affected. Five out of these eight included the Omambala areas and were the most adversely affected.

Rashid [5] posited that floods have posed tremendous danger to students' lives and properties. Anambra State became the next casualty when about 18 communities particularly, in Anambra West Local Government Area were sacked by the raging flood which displaced over 500,000 people. In some areas, only farmlands were affected while in others, both homes and farmlands were all swept away [6]. Flood may sometimes result in missed school and delayed academic progress, missed social opportunities and increased exposure to various life stresses such as illness [7]. The effects of disasters in educational institution must not be seen only in terms of the need to prevent catastrophic damage that may destroy the buildings but also in terms of preserving the lives of students during disasters. Udochu [8] observed that the cost of travelling daily to school has risen as students have to pay for boat rides in the morning and evening every day. Therefore, this study is aimed at developing an online platform that alleviate the issues faced by both teachers and pupils in the riverine areas in Anambra State. The paper is arranged as follows: Section 2 contains the related works while Section 3 contains the methodology. Section 4 presented the analyses of both the current and the prospective system whereas Section 5 contains the design and implementation. Finally, section 6 contains the conclusion.

Related works

Floods have a great impact on the educational system in the riverine areas. For the students, it prevents them from attending lectures. Udochu [8] confirmed that going to school is a nightmare. Students have to either wade through flooded fields or board canoes that are dangerously rowed through the raging river. It's risky for students to keep crossing the river in boats, but they have no option. Students have to endure hunger the whole day, as they cannot cross the river daily to go for lunch. Figure 1 shows students about to take a boat ride to school.

In considering the issue of insufficient teachers in riverine secondary schools today, Ehrenbe [9] stated that manpower development is important for societal development and that its possibility and success wholly rests on the teachers. Hoxby [10] observed

that teachers are the hubs of educational system and the success of any educational system depends on their numbers quantity and devotion. On the other hand, Kalu [11] traced the fallen standard of education in Nigeria to lack at incentive in educational system. He also pointed out that where there are insufficient or no teachers as a result of flooding, government should embark on a web-based information management system to help students in those areas to be able to help themselves. Habib [12] lamented on quantitative nature of teachers in our riverine schools. In fact, insufficient teacher have led to World Bank [13] to conclude that shortage of staff is another problem of academic performance in our riverine secondary schools. The scarcity of teachers is found virtually, in all subject areas. And it was indicated by Franco and Kanfer [14] that teachers are usually reluctant in accepting transfer from urban to those riverine areas because of several factors, which include force of the nature of the community, challenges they are likely to meet as a result of flooding. Habib [12] equally noted that this problem of shortage of teachers in our riverine secondary schools started after Nigeria's civil war in 1970. Teachers take an unexpected chunk of time off work during this flooding season [12]. In so doing, they will not be able to cover their scheme of work, leaving the students not well equip for external examination or competitions among their fellow students in another schools. Figure 2 shows teachers' means of transportation to school [12].

Figure 1: Students about take a boat ride to school.

Figure 2: Teachers' means of transportation to school [12].

The nature of parents' occupation in the riverine area that affects students is a major factor in the overall promotion of quality education. Home background of students has a very significance role to play in their educational career in the schools. It is clear that many parents are farmers, while some are traders. For the fact that many of them are farmers they leave homes early in the morning and come back late at night weary to inquire of their children's academics or social well-being. To this end, Lavell [15] observed that the role of the family in child's socialization is a determining factor in the child's environment. Similarly, Nathwani [6] noted that to a large extent parents and occupation act as sociological factors that always influence the students' academic achievement. As a result of this, Nathwani [6] explained that some students come from homes where it is even difficult for parents to feed and clothe their children properly. Some rural parents who are farmers may not know the value or importance of education in one's life. Parental attitude towards farm work affect majority of the students in riverine areas. Third negative attitude may lead to discouraging the students from showing interest in education.

A web-based information system has also been applied for conducting examinations in schools. Zhenming, *et al.* [16] developed a novel online examination system based on a Browser/Server framework which carries out the examination and auto-grading for objective and operating questions. Ayo, *et al.* [17] proposed a model for an e-educational system in Nigeria, and it was tested at Covenant University. The system has the potential to eliminate some of the problems that are associated with the traditional methods of examination. Cordon [18] added that a web-based information management system has the capability to report and analyse

different data and information for individual and collective users. Al-Bayati and Hussein [19] present an application of generic software, which provides an empty template to the teacher who would like to develop his/her required e-exam for hearing impaired (HI) people. Onuka and Durowoju [20] proposed a theoretical approach that incorporates available fingerprint biometrics authentication technologies in conjunction with e-learning environments to curb unethical conduct during e-learning exams. Rashad and Yang [21] developed a web-based system that carries out examinations and auto-grading for students' exams. The system helps lecturers, instructors, teachers, and others who are willing to create new exams or edit existing ones, as well as students participating in the exams. Akinsanmi, *et al.* [22] developed a web application where tests in multiple-choice formats can be taken online and graded immediately. In order to reduce paper work and save time, and to incorporate student information and the functionalities of a college, Lorgat [23] developed a web-based student management information system. Note that Nwokoye, *et al.* [1] have developed an information system for flood management in Anambra state, but that cannot cater for the specifics and nuances of an institution. This proposed system i.e. web-based information management system for educational institutions (WBIMS) will help students to make enquiries regarding any subject they want to study [24]. Flooding hinders teaching and learning in educational institutions. It seems natural to use an information management system (IMS) to leverage competitive advantage [25] and enhance learning.

Specifically, WBIMS differs from regular information systems because the primary objectives of this system deal with the operational activities in the school. In this way, WBIMS is a subset of the overall planning and control activities covering the applications of humans, technologies, and procedures of the school. WBIMS makes it possible for schools to get the right information to the students at the right time by enhancing the interaction between the students and the teacher, the data collected in its various subject areas, and the methods and procedures each subject uses. It brings together the raw data collected by the various areas of specialization of the educational system. WBIMS allows information to move between teachers and students instantly, reducing the need for face-to-face communication among them in the event of disasters and thus increasing the responsiveness of the educational system. Since students have less time to study at schools and complete their syllabi as a result of the flood, a web-based information management system can help them succeed.

Methodology

For the successful implementation of the web-based information and management system, we adopted the object-oriented analysis and design methodology (OOADM). This method includes the following problem identification, feasibility study, system analysis, system design, coding, testing, system implementation, program maintenance and documentation. This methodology employs the tools such as data flow diagram, data dictionary and unified modeling diagrams [26].

Analysis

Analysis of the existing system

The current system was extensively examined in order to identify the issues that it was encountering. The diagnosis of these flaws would aid in the creation of a new one that would allow for teaching and learning even in flood times. The present educational system in Anambra West LGA employs the traditional teaching and learning approach, whereby the teachers must be physically present in the classroom before the lesson will commence. It was observed that between July and October of every year, which falls within the first term and second term of the secondary school academic calendar, the schools in the above LGA often encounter floods and the growth of water hyacinth as a result of excessive rainfall. The school environment, its equipment, learning materials, and the students of these communities are trapped by the flood within this period. Also, the deposit of water hyacinth that had grown in those areas posed difficulties in the attempt to evacuate students in those communities. The students find it extremely difficult to go to school. Even if they intend to attend other schools within that period to meet their learning processes, the engine boats and canoes that serve as the means of transportation that will convey them to the schools can no longer sail freely on the water because of water hyacinth, making it difficult for them to attend other available schools.

It was also observed that floods often encroach on schools during the termly examinations, which in effect prevents the school management from organising examinations and the students from taking the proposed termly examination. Consequently, the students stay at their various homes. This is a very serious problem as the school management would not be able to do a proper evaluation of the students' performance and, in so doing, find it difficult to promote students to the next level. As a result, the students are promoted to the next class without proper assessment. The teach-

ers, on the other hand, do not come to school during this flooding season. In so doing, they would not be able to cover their syllabuses and schemes of work, leaving the students unwell equipped for external examinations or competitions among their peers in other schools. From observation, some teachers posted to those riverine areas do not attend classes during these flood times. In order to create the impression that they come to school, they falsify the staff attendance records. These indolent staff later receive their salaries, irrespective of the fact that they did not attend classes. On the other hand, some even refuse postings to those areas due to the flood or the scary transport systems using canoes. This situation is not so good for the students.

During this season, students from those areas will stay at home and engage in fishing. By the time the flooding season is over, they will be facing their external examinations such as WAEC, NECO, or NABTEB. It was observed that majority of the students often fail their external examination, and some usually lose their valuable school certificate/properties that would have given them the opportunity to further their education. This often demoralises the students and might result in them dropping out of school. Specifically, the female students get married to suitors while the boys travel out to search for daily bread. This current system are filled with plenty demerits which are summarised as follows. Excessive rainfall and flood cause secondary school-aged students to drop out of school. The educational system is always disrupted because schools are destroyed, access roads blocked and teachers absent. Indigenes battle with their lives as many are somewhat displaced due to the flood.

Analysis of the new system

After studying the old system, a new system is designed to eliminate the problems identified above. The proposed system will be used by the students, teachers, and school management to bridge the gap in educational activities due to flooding. This is a web-based information system that allows the login of registered teachers and the preparation of lessons that would be administered to the students during the rainy season. The function of the new system is such that the school management will first of all register all the students and teachers on the school database and upload the scheme of work, examination questions, and results. The registered teachers, on the other hand, are expected to login to the site during the time they have classes according to the displayed time

table, upload their lesson videos, note the lesson, quiz, or class exercise if any, and chat with the students present online. During the flood season, when the affected schools are closed, the students are expected to log in to the website from their respective homes, and from the displayed time table, select the subject they have at that moment. This action will take the students to the page where they can download lesson videos, take notes on the lesson or scheme of work and chart with the subject teacher, take and submit class exercises, write and submit assignments. Figure 3 shows the data flow diagram of the proposed system.

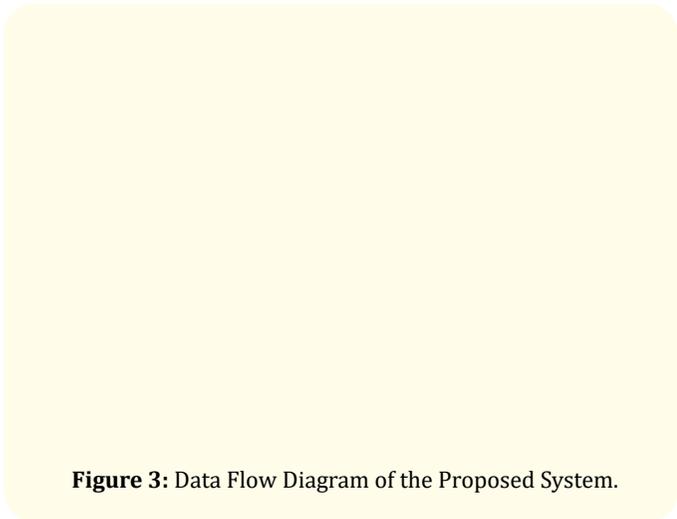


Figure 3: Data Flow Diagram of the Proposed System.

Design and implementation

Here, the objectives of the proposed solutions include the following: creating the graphical user interfaces, designing the necessary input/output, and database specifications; as well as generating a module for data validation so as to ensure users key in the right data. Data flowcharts and flow diagrams that underlie the system are displayed too. The architectural diagram of the new system is shown in figure 4, and it identifies the main components that would be developed for the product and their interfaces. The high-level model is decomposed as follows: the main menu, which is the home page, has the following submenus/forms: Registration, Login, Student’s Registration, Teacher’s Registration, Examination/Quiz Creation and Lesson Note Creation forms. MySQL was used for database development (back end). Several tables were designed for storage, and they include sign up, Login, Teacher’s, Examination/Quiz and Lesson Video. The data dictionary was generated to describe the components of database tables. The menu designs were depicted using the system flowchart in figure 5.

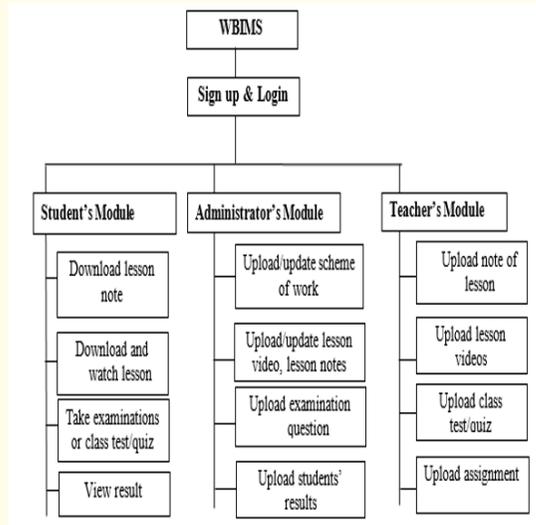


Figure 4: High Level Model of the New System.

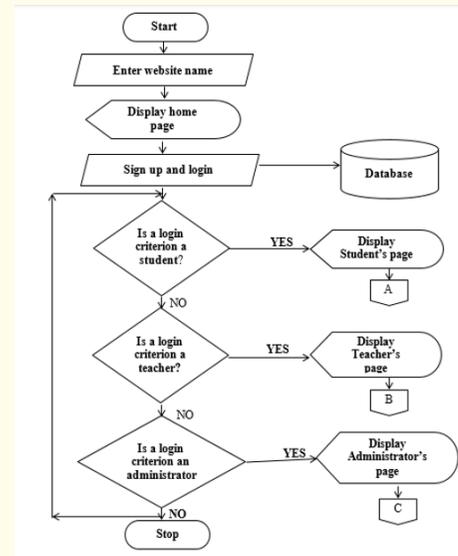


Figure 5: The System Flowchart.

The popular unified modeling language (UML) was used to describe the logical system, i.e., the necessary functions of the system. The use case and sequence diagrams of the system are shown in figure 6 and figure 7. While the former provides the graphical depiction of the interactions among the elements of a system, the latter depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.

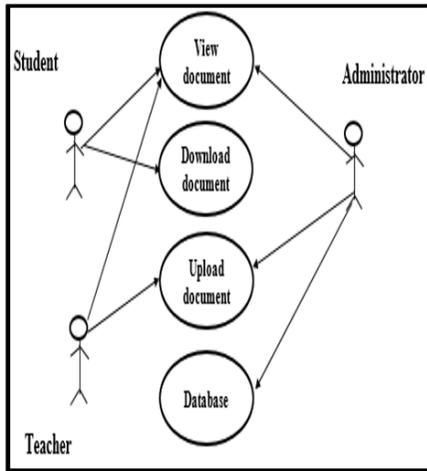


Figure 6: Use Case Diagram.

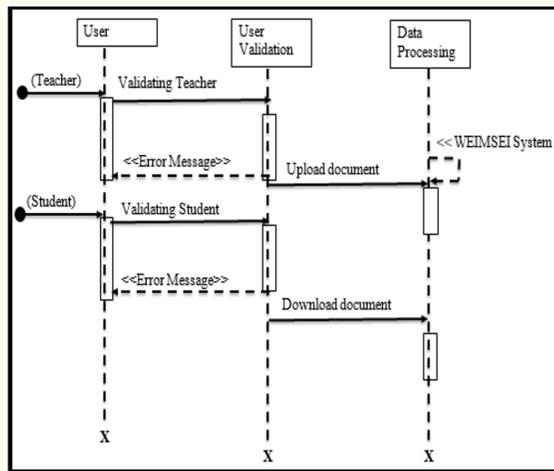


Figure 7: Sequence Diagram.

For the new system requirements, the minimum hardware and software specifications are as follows. The minimum server requirements are Pentium (R) Dual-Core running at 3.20 Hz, at least 4 gigabytes of random access memory (RAM), and at least 80 gigabytes of hard disc. The minimum workstation or client requirements are a Pentium (R) central processing unit, at least 1 gigabyte of RAM, and at least 10 gigabytes of hard disc. Other hardware requirements include printers, web, digital, or phone cameras, and scanners.

The requisite software include the Microsoft Windows operating system: Microsoft Windows 7, PHP version 7, a web server, MySQL, Code editor and Web Browser. Note that the PHP (Hyper-

text Pre-processor), a scripting language and it was chosen due to the following reasons; its open source nature, easily embedded into HTML, platform independent, easily interfaced with Apache, and easy access to other web-based tools such as Google maps. For the design of the front end, our choice of programming language are Hypertext Mark-up Language (HTML), Cascading Style Sheets (CSS) and Java Script. Whereas HTML is standard for creating web pages and applications, with CSS and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web. The results of the development of the GUIs are shown as figures 8 - 11. Figure 8 shows the home page and figure 9 shows the login and sign up page. Figure 10 depicts the new teacher’s registration form, while Figure 11 shows the page for creation of lesson videos. Figure 12 shows the page for creation of assignment, figure 13 shows the page for the creation of a lesson notes and figure 14 shows the page for the creation of examination questions.

Figure 8: The Home page.

Figure 9: The Login and Sign up page.

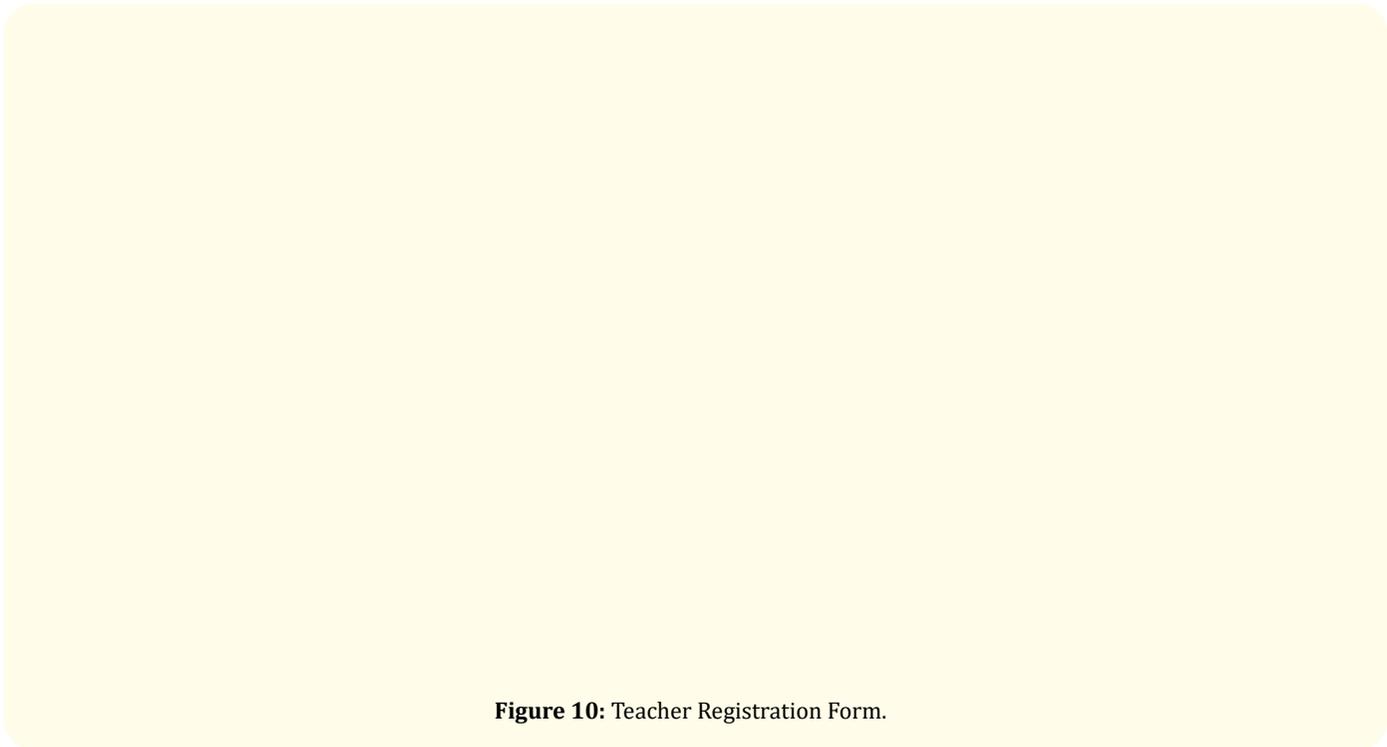


Figure 10: Teacher Registration Form.

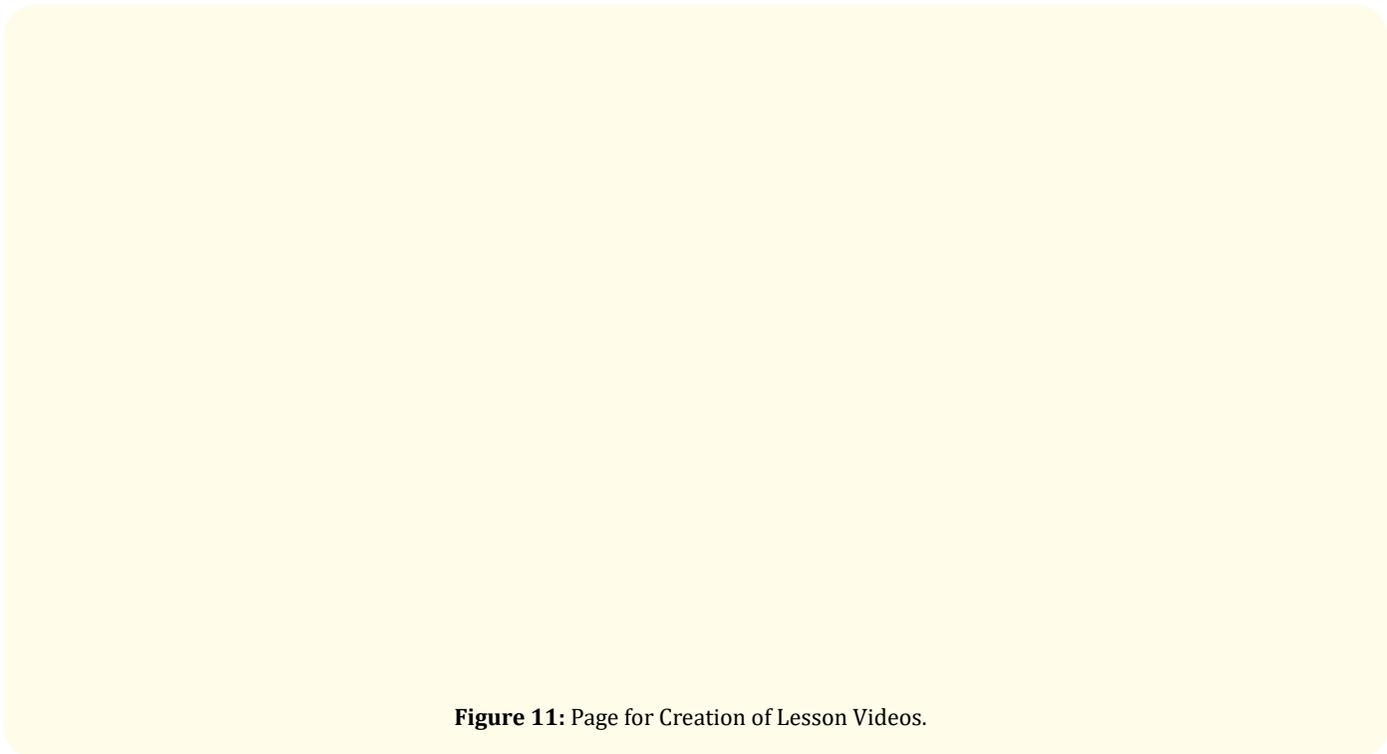


Figure 11: Page for Creation of Lesson Videos.

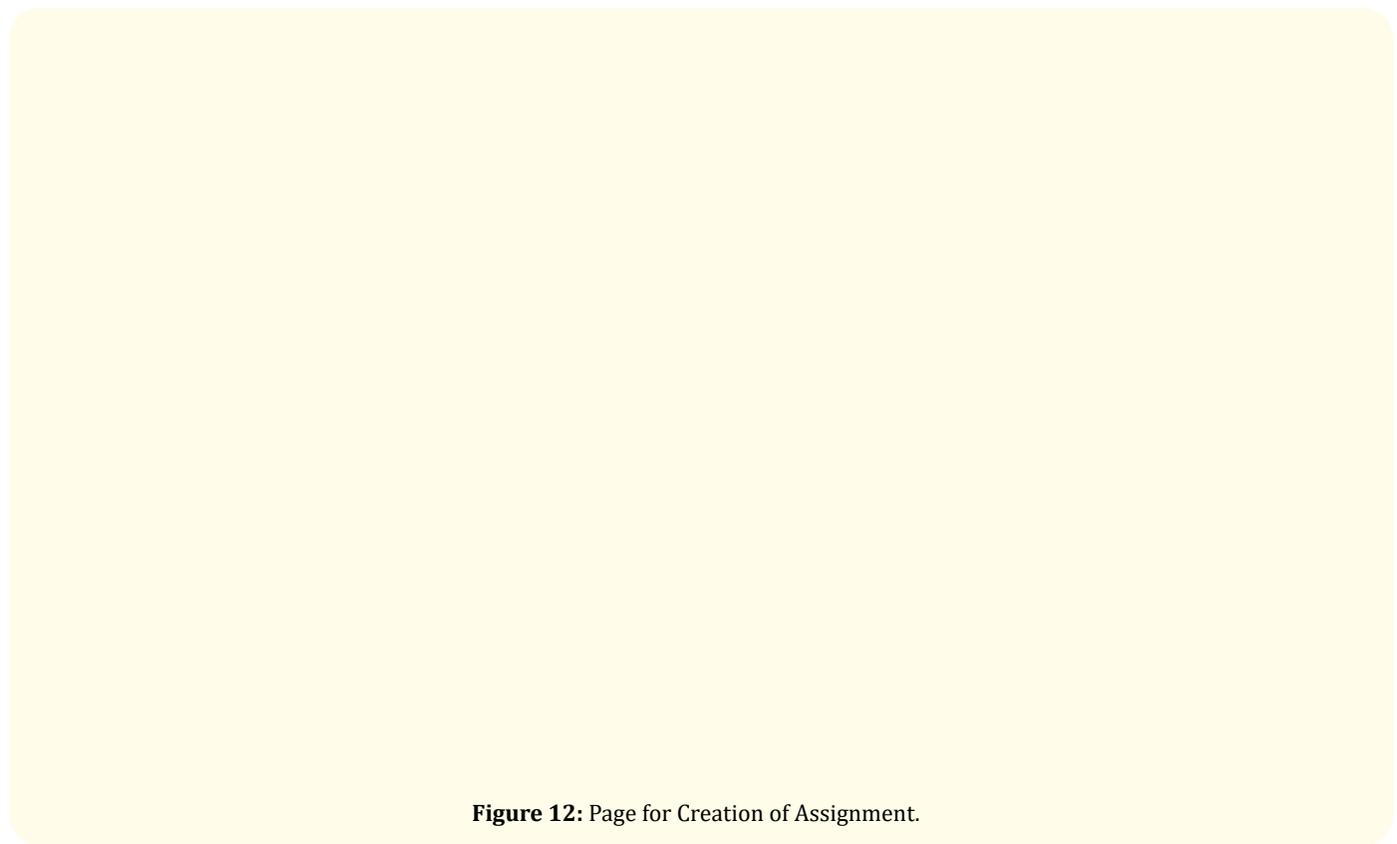


Figure 12: Page for Creation of Assignment.

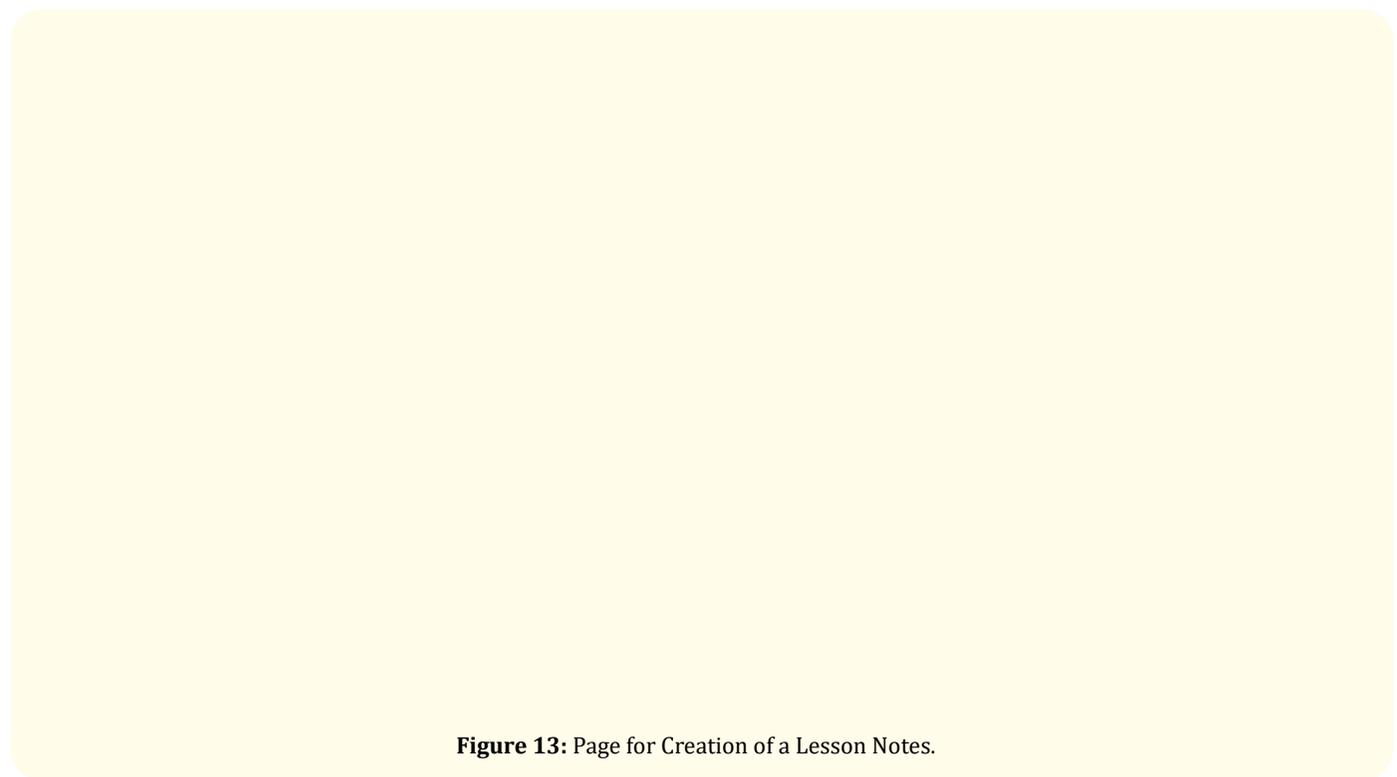


Figure 13: Page for Creation of a Lesson Notes.

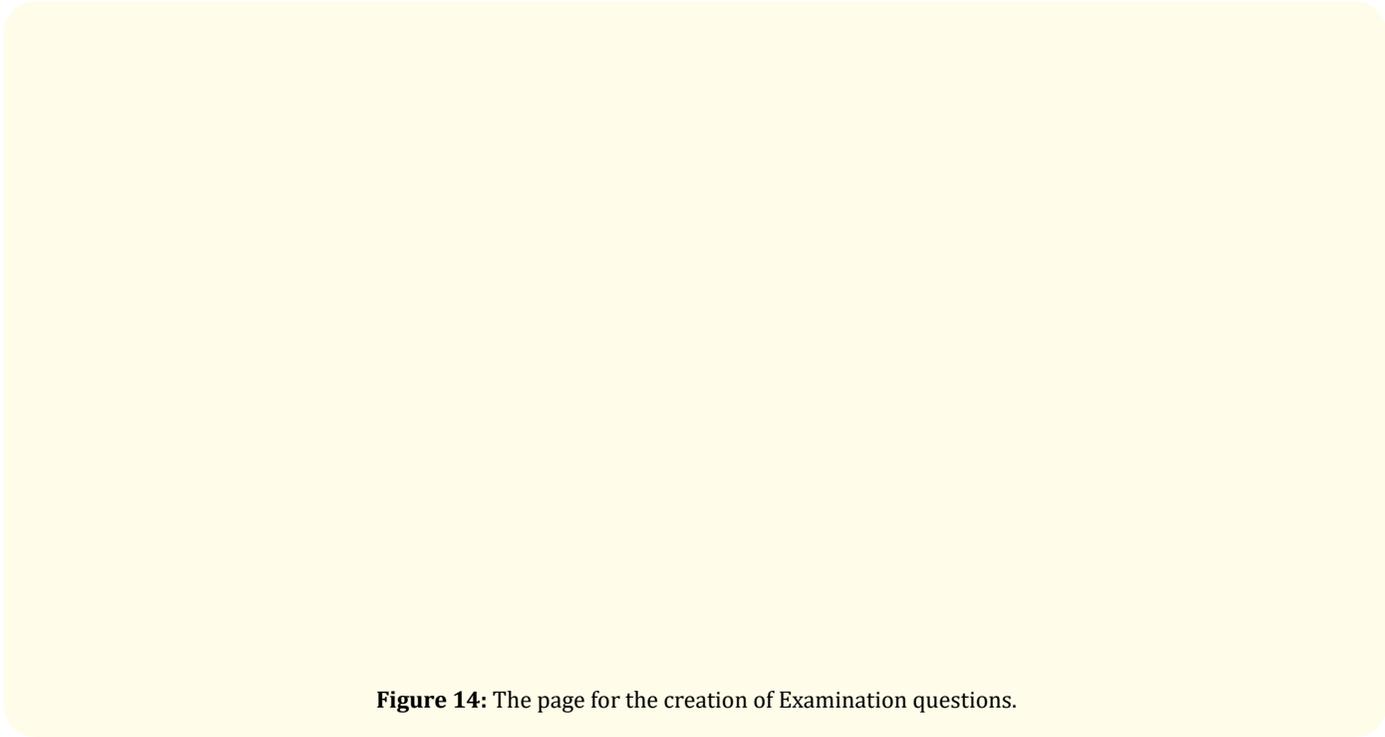


Figure 14: The page for the creation of Examination questions.

Conclusion

The proposed system will be of great benefit to the students because it will provide a platform that will enable them to learn their various subjects online at their different locations/houses. The system will help to fill up the gaps left by teachers' absence during the flood season and, most especially, to overcome the problems encountered by the students of riverine areas, which seriously affect their educational system. It will also help the students to continue learning without missing lessons, prepare them to cover their syllabus and scheme of work, and download lessons in order to be well equipped for external examinations and inter-school competition. On the part of the teachers, they can completely teach the whole scheme of work and syllabus. The implication is that the teacher can deliver lessons, projects, quizzes, and assignments to the students and also set examination questions for them during flood seasons. The system will be of great benefit to the school management as it will enable them to build a database of all the students and teachers in the school, administer examinations, and evaluate and determine the students' performances at the end of every term. Discontinuing the manual system where data and information are saved in books. With the platform, floods will no longer be an obstacle to not talking at the end of the term examinations.

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