

THE DESIGN AND IMPLEMENTATION OF AN E-LEARNING SYSTEM

(A Case Study of Kaduna State Polytechnic)

Thesis Submitted in Partial Fulfilment of the Requirement
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B.Sc.

In

Computer Science [Information Technology]

By

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To

The Department of Computer Science

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[May, 2022]

DECLARATION

This is to certify that this Thesis entitled **THE DESIGN AND IMPLEMENTATION OF AN E-LEARNING SYSTEM**, which is submitted by **Muhammad Hajara Hussaini** in partial fulfilment of the requirement for the award of degree for B.Sc. in Information Technology to the Department of Computer Science, Baze University Abuja, Nigeria, comprises of only my original work and due acknowledgement has been made in the text to all other materials used.

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DEDICATION

I dedicate this project to Almighty Allah and my parents in person of Mr. and Mrs. Muhammad Hussaini for encouraging me to do well and always strive towards improvement. I would also like to dedicate this project to my supervisors Dr (Mrs) Lawrence Morolake and Mr. Samuel Ubaru for they aided me in my time while I worked on the project.

ABSTRACT

In today's world, the masses, particularly students, find it difficult to understand or comprehend what they are being taught, which could be due to a lack of enthusiasm or bad teaching methods. This project offers a platform for students to enhance their abilities and basic understanding, allowing for greater advancement for both them and the website as time goes on. Lecture materials will be uploaded time to time by the lecturers, assignments and quizzes will be issued and graded as per the instructor's will and instructions and also, teachers and students can engage on the platform without the use of email or any other third-party website. I used the waterfall method and the agile methodology for this project. During the development of this project, some interviews were carried out and results gotten from the interview guided me along the process. All of the elements on the website were designed to ensure that the user is interacting with and adjusting to the learning materials supplied. Future enhancements will be used as time goes on.

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LIST OF ABBREVIATIONS

ARPANET	Advanced Research Projects Agency Network.
CAI	Computer Aided Instruction.
CAL	Computer Assisted Learning.
CBT	Computer Based Training.
CMS	Courseware Management Systems.
CSS	Cascading Style Sheet.
ERD	Entity Relationship Diagram.
HTML	Hyper Text Markup Language.
ICT	Information and Communication Technology.
IT	Information Technology.
LMS	Learning Management Systems.
MOOC	Massive Open Online Course.
MIT	Massachusetts Institute of Technology
PDF	Portal Document Format.
WWW	World Wide Web.

CHAPTER 1: INTRODUCTION

1.1 Overview

E-learning is the electronic delivery of a learning, training, or education program (Li, Lau, and Dharmendran, 2009). This includes the enhancement of face-to-face instruction on campus by in-class use of computers and the World Wide Web (WWW), enhanced distance education (on or off campus), individual and group learning with both print and computer-based materials, and instruction entirely online. Because of this mix, e-classroom and text-based e-learning knowledge is moving vastly towards every student, whether through learning materials, e-mail for contacting teachers or tutors, or any other e-learning applications. The use of information and communication technologies (ICT) for educational purposes has increased in recent decades, and the proliferation of network technologies has resulted in substantial changes in e-learning practices. (Kahiigi et al., 2008).

Online learning results in learning and other supportive resources are available through a computer, and it includes computer-based training, computer-based instruction, and technology. The e-learning system uses text messages, emails, and other forms of e-communication to deliver information and data (Katz, 1998, 2000; Trentin, 1997). Students, or e-learners, will be on their computers receiving lectures as if they were in a classroom, be it in the comfort of their bedroom, sitting room, or even in a moving car. The adoption of e-learning provides the institutions as well as their students or learners the much flexibility of time and place of delivery or reception according to learning information Smedley (2010). This has gone a long way towards helping e-learners acquire degrees or knowledge in institutions they have never seen in the real world.

1.2 Background and Motivation

Learning is one of the most essential human activities that requires concentration combined with interactivity, a clear and distinct understanding of the facts being stated or discussed, which includes high communication skills, techniques, attractive learning qualities (colorful pictorial presentations) and so on. However, not all learning processes are considered to be effective. Learning can occur as a result of newly acquired skills, principles, perceptions, knowledge, facts, and new information (Adeyanju, 1997).

When nearly a hundred percent (100%) of the population being lectured assimilates the knowledge or ideas, effectiveness can be assumed to have been reached. Many factors are required for effective learning to take place. These factors are usually caused by the teachers, students, the teaching and learning materials, and the learning environment with its many features. The effectiveness of the learning process differs when the population size is very large and there are unfavorable learning conditions such as noise, poor ventilation, and extreme temperatures in the environment. Wagner et al (2008) note that e-learning makes available extra prospects for interactivity between students and teachers during content delivery. The duration of teaching and learning, the rate of comprehension, and individual learning styles all have an impact on students' knowledge assimilation and, in turn, on their performance, which will interfere with the ability of the teacher and student to teach and learn respectively. The elements affecting effective learning are most obvious in learning aspects that demand an intensive or extensive practical approach in order to pass knowledge to pupils. In computer science, for example, a great deal of practical knowledge is necessary, particularly in computer networking, programming, and computer maintenance. These elements have an impact on students' practical training, such as insufficient computers, insufficient time for practical teaching and learning, lack of computer labs, and lack of power supply, to name a few. The use of e-Learning allows self-pacing. For instance, the asynchronous way permits each student to study at his or her own pace and speed whether slow or quick. It therefore increases satisfaction and decreases stress (Codone, 2001; Amer, 2007; Algahtani, 2011; Marc, 2002; Klein and Ware, 2003). As a result of this, most computer science students with little or no practical knowledge use the services of a roadside "computer training institute" because it is not financially costly and there is a high demand for the services. This approach by such students has a high likelihood of imparting incorrect knowledge to students,

particularly in terms of explanations of concepts found or used in the computer science world. Therefore, there is a need to address this disparity and guarantee that students meet the practical standards required of them. The advancements achieved in the computer industry, such as the development of advanced hardware, software, and other technologies, could be used to help solve these problems.

In recent years, mobile applications and websites have been used to govern several aspects of human interaction, including entertainment, education, health, and commerce. This is because mobile computing can give a tool to a user when and where it is needed, regardless of the user's mobility or location, hence facilitating location independence. Exploring the powerful capabilities of multimedia and applying them to teaching and learning processes through the creation of learning materials and products such as e-books, Computer Assisted Learning (C.A.L), Computer Aided Instruction (C.A.I), Computer Based Training (CBT), Internet Based Training, and others would go a long way towards improving the development of students' practical and theoretical knowledge (Friesen, 2009). Therefore, because of the high content value of e-learning products and the captivating multimedia features embedded in them, a student can easily acquire such knowledge even in the absence of a teacher and the required physical environment by using the e-learning materials repeatedly and following the animated instructions provided. The quality of mobile learning has improved as computer technology has advanced. The latest communication technology trend is to figure out how to make excellent use of wireless equipment to build a widespread communication environment that can improve traditional learning performance and establish new learning activities or models for active learning. Wireless technology allows a learner to access information at any time and from any location. A student can use wireless connectivity to access rich online information, search for knowledge using the necessary technological devices, interact with classmates or teachers, and participate in a mobile classroom at any time and from any location. E-Learning has become widely acknowledged as a vital tool for learning and training as the usage of network computers, the Internet, and developments in telecommunication technology has increased. In several emerging countries, traditional higher education has remained prominent in schools. Reliable hardware and a high-speed internet connection are required for effective virtual classroom participation. Some computer laboratories and classrooms may lack computers that satisfy the minimal or recommended specifications for

optimal virtual world use (Stacy & Liz, 2008). Teachers and students are naturally exploring new ways of creating knowledge as e-learning grows in popularity. The World Wide Web (WWW) is the most recent technology being studied as an educational platform. The WWW, which serves as a platform for storing and disseminating knowledge, can be accessible in a short amount of time, which is critical for the educational community.

The increase in admission requests to schools in every region of the world has put further strain on the resources of a number of schools. For example, there is a shortage of people and material resources to meet the educational needs of the enormous population. In most regions, the population of school-aged citizens has increased to the point that only a small fraction of them may be admitted. A new learning environment must be built that provides autonomy and flexibility, establishes contacts and facilitates smooth communication between cultural and knowledge centres, and allows all members of a knowledge-based society easy access. In traditional classroom-based instruction, the lecturer delivers course lectures in a specified location at a specific time. As a result, it places a time and location constraint on both the instructor and the student. Due to the human component, the lecturer may not always be able to put forth their best effort when preparing and delivering course models because of the enormous number of pupils that require care and direct engagement with them is difficult. Learning strategies based on modern technology such as the Internet and the World Wide Web, along with traditional classroom education, appear to be the solution to this problem. One approach to accomplishing this is through the use of virtual classrooms.

A virtual classroom is a virtual learning environment that takes place in cyberspace. It gives students the tools they need and connects educators and students together to share knowledge and ideas. The virtual classroom is a type of e-learning that has applications for supplementing traditional learning methods. E-learning can be implemented through a variety of media and technology. The study of computers in education, such as computer-mediated instruction and multimedia as an instructional tool, gave birth to the virtual classroom. To put it another way, virtual classrooms can be thought of as "classrooms" capable of partially or completely replacing traditional educational, evaluative, and administrative functions of a regular classroom by utilizing advanced computer and ICT technologies such as the internet, e-mail, on-line chatting, www, CD-ROMS, DVDs, teleconferencing, and video conferencing" (Mangal and Mangal:774). Many of the

difficulties that these virtual classrooms encounter, such as interface design evaluation, computer integration into course design, and computing social issues, are extremely relevant to the design and usage of internet-based virtual classrooms. Using current technologies, virtual classrooms can be created using the Internet and its resources. Previous research sheds light on the fact that digital nativeness is not always absolutely correlated with digital literacy, since students lack the command of educational technologies and how they can be used toward meaningful purposes, even though they can be quick at adapting to these new environments (Ng, 2012). Teachers are responsible for guiding students through the digital literacy process for educational technologies. This information can be linked with the active use of social media to create engagement and participation in the virtual classroom as a platform for more than just email and notifications. One advantage of using the Internet as a virtual classroom platform for educators and trainees is that the amount of knowledge that can be stored is nearly endless. Access to high-quality, flexible learning technology is one of the benefits of the virtual class room. Learners can access or download knowledge stored electronically at their own leisure, thus bypassing the time and location constraints that come with classroom-based learning. The use of telecommunication equipment to transmit and receive a variety of content such data, sound, and video is a component of distant learning. Live online presentations are also becoming more popular as an online learning platform and classroom for a variety of educational providers. Social networks, in addition to virtual classroom environments, have become a significant aspect of e-learning.

1.3 Statement of the Problem

It is self-evident that computer science students must be both technically and theoretically sound in order to meet the challenges of the labor market. Regrettably, the majority of computer science students lack the necessary skills before entering the labor market. Students are frequently identified as the most frequent customers of the roadside "computer training institutes," and as a result, they may not receive the value of services requested. This situation was attributed to numerous claims made by both students and teachers about the teaching and learning patterns in most cases. For example, students report that a large majority of teachers lack good teaching communication skills, whereas teachers blame ineffective learning on inadequate teaching and learning facilities and infrastructure. As a result, the issue revolves around effective teaching and

learning processes for influencing and advancing students' theoretical and practical knowledge. Most of the problems come up from the poor facilities and infrastructures.

1.4 Aim and Objectives

The aim of this project is to automate the existing learning manual system by the help of technological devices and a website, fulfilling all requirements so that their valuable data/information can be stored for a longer period of time with easy accessing and manipulation. It also aims at providing a user-friendly environment for sharing knowledge and giving everyone the opportunity to learn regardless of where they are, as long as they register with the system. The project's major objective is to keep track of student and teacher information, assignments, quizzes, and other educational related aspects. Because the project is being constructed at the administrative level, only the administrator has access to modify the contents of the website and grant access to users. The main feature of the system can be used once the people interested have registered. After the registration, they can view available course materials, take online tests and also interact with tutors via the platform.

1.5 Significance of the Project

For the creation of a website, this project combines multimedia features, some artificial intelligence characteristics, and human–computer interaction concepts. The e-learning program is intended for people that intend to enroll in provided courses within the platform. These proposed e-learning routes are deviations from typical teaching and learning procedures and hence have the following primary importance:

1. Students' effective learning of the subject topic—traditional classroom approaches have a high tendency to respond to the many factors that affect learning. As a result, these variables may exist with little or no impact on the learner as a result of the adoption of e-learning. Therefore, the focus of this project is on designing an e-learning application that will be compelling through the availability of various learning platforms and the smart use of multimedia, resulting in improved learning and reduced instructor teaching workload.

2. When compared to the cost of traditional learning materials or the cost of a typical instructional system, the cost of learning materials could be greatly reduced. This is achieved in this project, however, by providing free access to users with low content value.
3. Reduced teaching and learning time and increased teacher effort: some research suggests that using e-learning products can reduce training time by up to sixty percent (60%) when compared to traditional classroom methods (Khoo, 1994). As a result, the rate of knowledge assimilation increases, allowing teachers to focus more attention on areas where students are weak. This is primarily accomplished in this project through the application of technological aspects such as multimedia. Other reasons for the study include safeguarding pupils from assimilating incorrect information handed on by quacks; insufficient learning and teaching resources; difficulty in getting timely access to information; and general issues impacting successful learning.

1.6 Project Risks Assessment

Aside from the standard risks and constraints that every project faces due to time, scope, quality, and funding, a key constraint occurs from the gathering of information or data from the relevant personnel with a fair and objective assessment of the proposed e-learning products.

RISKS

RISK	PREVENTION
Inability to carry out research due to loss of hardware/software resources	1. Be aware of and observe school IT security procedures. 2. Keep all hardware tools away from danger.
Loss of work due to equipment failure /loss	Daily Backup of data to multiple sources of storage such as flash drives, hard drives, google drive, etc. for multiplicity
Software availability (Unavailability of API's)	Alternative API's will be checked for. Software requirements will be identified in good time for a possible contentious software.
Change of requirements	Redo requirements

1.7 Scope/Project Organization

Through the use of interactive sessions, the proposed e-learning solutions are aimed at achieving effective learning. The contents of the product are structured to suit people who are new to using computers, and their use is not restricted to computer science students alone, but also to students from other disciplines who want to learn the fundamentals. Certain security concerns, such as piracy, were moderately considered in the creation of the suggested items, while some security mechanisms, such as passwords, were applied. The security requirements for each of the proposed e-learning products are different. Password usage will be added on the e-learning application package's side to distinguish premium users from free users. The internet application is intended to be open and uncontrolled in order to increase product awareness and marketing. To assure content validity, the e-book is prepared in portal document format (PDF). Nonetheless, the three e-learning goods do not have any powerful anti-piracy features, owing to the fact that more advanced technology and software are developed every day, which is, ironically, used for computer product theft.

Finally, the physiological and cognitive effects of the suggested e-learning products on their users are limited by the usage of multimedia features and user interface design. This is one of the most critical duties that must be integrated into the products. This is accomplished in this learning program through the use of a help menu and help animations, in the internet application through the use of hyperlinks, flash animations, and still images, and in the e-book through hyperlinks and still images.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter seeks to take into account the different perspectives of some academics and practitioners on the design and implementation of e-learning in the educational sector. Thereafter, section 2.2 looks at the historical overview of e-learning across the world. Section 2.2.1 looks at the evolution of e-learning. Section 2.2.2 looks at the history of e-learning in Nigeria. Section 2.3 describes some of the relevant literature and nomenclature accessible in relation to the use of HTML/CSS, Database and JavaScript to solve the research question. Finally, Section 2.4 provides a summary of the entire chapter.

2.2 Historical Overview

The term "e-learning" has been in use since 1999, when it was used at a computer-based training (CBT) systems seminar for the first time. Due to the ever-changing nature of its parts, the word e-learning has been defined in a variety of ways by numerous scholars. Hedge and Hayward (2004) define e-learning as "an innovative approach for delivering electronically mediated, well-designed, learner-centered, and interactive learning environments to anyone, anywhere, at any time through the use of the internet and digital technologies in accordance with instructional design principles to anyone, anywhere, and at any time". They underlined the importance of using the internet, which today dominates the e-learning society as the primary medium for conducting e-learning activities, in their definition. According to another academic (Sale, 2002; Ajadi et al., 2008), it entails the use of electronic technology in the delivery of education and training applications, as well as the monitoring of e-learner performance and reporting of learner progress. This description is in line with the Wikipedia online encyclopedia's definition, which states that it is any learning activity that involves the use of digital technology. However, when it comes to explaining or defining e-learning, the use of electronic equipment (such as computers) and digital technology (such as ICT) are the most prominent elements. Furthermore, e-learning has gone through a variety of stages, which include the following: electronic books (e-books), computer-based training (CBT), computer-assisted learning (CAL), computer-assisted instruction (CAI), courseware management systems (CMS), learning management systems (LMS), internet-based learning, and mobile learning (M-learning). Each of these phases is intended to deliver information

and skills through the use of a specific electronic technology, learning framework, and/or electronic retrieval system/media. With the exception of online e-learning tutorials, internet-based learning, and mobile learning goods, most e-learning products are accessible on CD-ROM, DVD-ROM plates, flash drives, or even hard drives, making learning flexible and mobile. For teaching and learning activities to take place, the e-learning technique rarely requires the physical presence of the teacher and students. It isn't restricted to a single area or period of time. Today's e-learning solutions are domain-specific, as Shavinina (1997) points out. Knowledge and skill development are the most important goals in domain-specific products.

Other terms, such as online learning and virtual learning, began to emerge in search of a more appropriate description. Algahtani (2011) described the completely online mode as "synchronous" or "asynchronous" by the application of optional timing of interaction. The synchronous timing comprises alternate on-line access between teachers or instructors and learners, or between learners and teachers, and the asynchronous allows all participants to post communications to any other participant over the internet (Algahtani, 2011; Almosa and Almubarak, 2005). The principles of e-learning, on the other hand, have been well documented throughout history, and there is even evidence that early kinds of e-learning existed as early as the nineteenth century. E-learning technologies and delivery methods grew in popularity after the computer and the internet were introduced in the late twentieth century. Individuals were able to have computers in their homes for the first time in the 1980s, making it easier for them to learn about specific subjects and build specific skill sets. People had access to a multitude of online knowledge and e-learning opportunities in the following decade, and virtual learning environments began to thrive. The advancement of e-learning is linked to technological innovations as well as improved computer affordability. Not only were new programs built to instruct, but also to allow communication between the teacher and the student. This new system was similar to the one in use today, although it wasn't given a name until 1999. The original idea of e-learning was to address difficulties in contemporary essays that were mostly technical in character. The advancement of e-learning is linked to technological advancements as well as improved computer affordability. Computer-Based Training (CBT) was created in the late 1980s and early 1990s, and it was the first kind of electronic education. This is thought to be the foundation of today's e-learning (Eger, 2005). The CBT system necessitates the connection of a personal computer to another kind of multimedia, such as a CD-ROM. Although the system itself represented a significant advancement, its content

was not fully developed and it lacked several later elements of e-learning, such as no time or location constraints. Parallel to the development of CBT, technology progressed, eventually leading to the rise of the internet and the construction of the web system. This time, the origins and technical foundation were also in the United States. Technology has made advances. At first, information could only be transmitted in text format, but in the early 1990s, browsers were developed that allowed users to add graphics to the text. The internet grew swiftly and its cost dropped, making it more accessible to the middle class. The web system was upgraded to become the now-famous and widely used WWW (world wide web).

2.2.1 Evolution of e-learning

E-learning has certainly improved the overall quality of people's lives. Many people, however, are still unaware of how e-learning began, who the pioneers were, and how it evolved into what it is today. E-learning was created as a result of the invention of reading and writing, the profession of teaching, and the advancement of print and electronic technologies. E-learning aims for professional, entrepreneurial, and personal growth and achievement in addition to instructional goals. This section aims to shed light on the evolution of e-learning till date.

1. **The 1840s (stenography):** Wotton-under-Edge teacher Isaac Pitman taught his students shorthand (stenography) through correspondence (Leerbeleving, n.d.). He would mail assignments to his students, who would then submit their assignments back to him for review (Keegan, 2020). This writing style was designed to boost writing speed and was popular among secretaries, journalists, and other professionals who needed to take notes or write.
2. **1924 (Automatic Teacher):** Sidney Pressey, an educational psychology professor at Ohio University, created the "Automatic Teacher" testing computer ("The History of E-Learning," 2017). This typewriter-like testing equipment was used to answer multiple-choice questions. It contained a window with a question and four options for responses. Students had to pick the correct answer from a list of four options. Until the proper answer was selected, the system would not move on to the next question. As a result, students could identify whether or not their answers were correct. Due to a lack of interest and commitment from educators, the Pressey machine did not succeed.

3. **1954 (Glider):** Harvard Professor BF Skinner created the "GLIDER" teaching machine, which allowed schools to provide pupils with pre-programmed lessons ("The History of E-Learning," 2017). This machine resembled a box with a series of questions inside. Each question would be displayed in a small window, with the answer written down on paper using a certain technique. Students who answered correctly would move on to the next phase and be rewarded. Unlike Pressey's machine, which was designed to assess children, Skinner's was designed to educate them. It was also in the 1950s that educational institutions discovered the value of radios in teaching and learning (Keegan, 2020). Numerous radio shows covered topics such as religion, politics, current affairs, economics, and science during the time period. Up to the 1960s and even World War II, radio and television were effective tools for boosting education.
4. **The 1960's Computer-Based Education:** The first computer-based training (CBT) application was inspired by Skinner's GLIDER. Programmed Logic for Automated Teaching Operations (PLATO) was created by Daniel Alpert and Don Bitzer (Keegan, 2020). PLATO was originally created to provide computer-based education to increase student literacy, but it has since evolved into a critical component of modern multi-user computing. This curriculum was created for University of Illinois students, but it has now been adopted by institutions all throughout the region. The program was able to experiment with the early types of emails, message boards, and context-based assessment during its four-decade run. PLATO also influenced the development of the Blackboard e-learning system. Professors Patrick Suppes and Richard Atkinson of Stanford University employed computers to teach arithmetic and reading in Palo Alto elementary schools in 1966. At the same time, Bernard Luskin, a prominent media psychologist, collaborated with Stanford engineers and academicians to bring teaching robots to schools (Keegan, 2020). In the United States, the Department of Medicine at the University of Alberta was the first to offer online courses in 1968. Using the IBM 1500 network, the institution taught 17 classes to over 20,000 students. Teachers were able to deliver course materials, arrange documents, and assess tasks from a distance using this method. In the history of e-learning platforms, this was arguably the earliest concept of contemporary online learning (Keegan, 2020). The Advanced Research Projects Agency Network (ARPANET) was established in 1969. (Keegan, 2020).

ARPANET, a wide-area network built on secure protocols, was the technical forerunner of the internet. Businesses and people could use this network as well. It was the forerunner of the internet as we know it today, and it is often regarded as the most pivotal piece of technology in the e-learning timeline since it solved the problem of large geographic distances.

5. **1976 (Internet-Based Courses):** The Open University in the United Kingdom launched its initial online courses. The institution was one of the first to provide one-credit internet-based courses. It also invented the Cyclops whiteboard system, which allowed teleconferencing long before Skype or Zoom existed (Keegan, 2020). In 1976, Coastline Community College became the world's first totally remote community college. There are multiple "mini campuses" at the college, although it concentrates on self-directed study. At the moment, the college also provides on-campus instruction (Keegan, 2020). The Apple Education Foundation was founded in 1979 by Apple in collaboration with Bell & Howell. The foundation provided computers to kids and gave grants to anyone who could create educational software (Tamm, 2019).
6. **The 1980s (PC):** The Apple Macintosh 128K was the very first personal computer (Keegan, 2020). People had already acquired computers that could do a variety of tasks by this time. They began exchanging information with other Mac users through the internet, perusing websites, honing their abilities, and learning about a variety of subjects—all from the comfort of their own homes.
7. **The 1990s (Learning Management System):** Certain colleges were founded in the early 1990s to give purely online education. This instance made use of the internet to provide education to people who are unable to physically attend school owing to scheduling conflicts or geographic constraints. Technology also assisted schools in lowering the cost of distance learning, which helped students save money as well. To say the least, e-learning opened up education to a wider audience at this time. In 1995, Learning Management Systems (LMS) began to gain popularity. The LMS was used by schools and universities to keep track of student records, attendance, tests, and grades, as well as to send out notices and fee vouchers. Blackboard was the first company to successfully employ LMS to provide education, mobile, communication, and commerce software, and other related services to academic professionals,

enterprises, and government organizations. In 2014, Blackboard's software and services were used by over 17,000 institutions and organizations in over 100 countries (Keegan, 2020). During a CBT Systems seminar in 1999, researcher and educator Elliot Masie was the first to introduce "e-learning" in a professional environment. The word was coined to describe how people learn, enroll in online degrees, and further their education using computers (Keegan, 2020).

8. **The 2000s (Rise of the Massive Open Online Course (MOOC)):** E-learning was first used to teach employees and develop business operations. To capture the progress of e-learning, new terminology such as "mobile learning," "gamification," and "social e-learning" have been established. When the Massachusetts Institute of Technology (MIT) established the Open Course Ware project in 2001, it took a big first step. Since then, the project has provided outstanding educational tools to the general population. It includes 50 courses with video lectures and tasks from MIT experts (Keegan, 2020). Udemy was created in 2010 by a group of Turkish professionals. The platform began modest and has since grown to become one of the world's largest and most well-known online course systems. On the website, you may browse and purchase a wide range of courses that include full lifetime access, video lectures, assessment questions, and completion certificates. As of January 2020, about 50,000 teachers are teaching online courses in over 65 languages to over 50 million students around the world (Keegan, 2020). 2010 was also the year of social media learning. Facebook, YouTube, Twitter, and LinkedIn made learning more accessible through blogs, Twitter threads, short films, and documentaries (Keegan, 2020). Andrew NG and Daphne Koller of Stanford University launched Coursera, one of the world's largest online learning platforms, in 2012. Udacity and edX were two more successful platforms that emerged around this time. As a result, the year 2012 has been labeled the "Year of the Massive Open Online Course (MOOC)" (Tamm, 2019). When the COVID-19 crisis occurred in 2020, it dealt a huge blow to the traditional classroom-based system, which lasted until now. As a result, parents and schools have been forced to consider using e-learning to keep their children's education going while they are in quarantine. Students have been attending online classrooms where their teachers teach from their homes using teaching software.

The pandemic has clearly demonstrated the versatility and benefits of e-learning (Keegan, 2020).

2.2.2 History of e-learning in Nigeria

Nigeria is the most populous country in Sub-Saharan Africa, with a population of around 140 million people (NPC, 2007), a landmass of roughly 923,768 square kilometers, and over 274 ethnic groups. The social and economic costs of providing education for the population are high, especially in light of limited resources and rising demand. Because of Nigeria's ever-increasing population, the escalating demand for education at all levels, the difficulty of resourcing education through traditional means of face-to-face classroom bound mode, and the compelling need to provide education for all regardless of environmental, social, or cultural circumstances, the country must find appropriate and cost-effective ways to respond adequately to the massive unmet demand. All of these emerging circumstances point to the necessity for a comprehensive search for more credible, secure, trustworthy, efficient, successful, and cost-beneficial educational solutions, with remote education being the most natural option to attain these goals, according to Jegede and Sadeq (2003). In various regions of the world, e-learning is not a new trend in terms of advancing education. Currently, it is being used by various Nigerian universities to promote Distant Education (D.E) and lifelong learning. It all boils down to computer-assisted learning. In Nigeria, just a few government-owned universities use some type of ICT infrastructure to carry out their academic operations, while the desire to engage in e-learning is still a distant dream for some due to a lack of ICT infrastructure. Increased access to learning opportunities, convenience of time and place, making available a broader variety of learning resources, improving opportunities for personalised learning, and the advent of more powerful cognitive tools are all benefits of Nigeria's adaptation to e-learning. According to Ajadi et al (2008), the use of e-learning in education (particularly in Nigeria's national open university) benefits students who are largely employed.

2.3 Related Work

Although there have been numerous works similar to mine that have been used at some institutions, I will add personal touches to make mine distinctive and stand out. Despite the fact

that the concepts and other features might be similar, I chose to add a more flexible user interface by borrowing ideas from other sources to customize mine. Some of the related work includes:

1. Udemy: One of the most well-known e-learning platforms is Udemy. Over 40 million students use this educational platform, and over 50,000 professors and subject matter experts create online courses. With Udemy, anyone can create a course and learn new skills. It does so by providing a variety of online learning materials, such as PDF papers, PowerPoint presentations, text, and video content. Revenue and pricing are applied to both instructors and students, respectively. Some of the pros include: no set-up cost; highly technical knowledge is not needed; and an application is available for iOS and Android. Some of the cons include: interaction with students is minimal (both for students and instructors) and high levels of competitiveness among course instructors.
2. Coursera: Coursera is a 23-million-user e-learning network dedicated to providing high-quality online training courses to people all over the world. It offers students the ability to acquire certificates from renowned schools upon enrolling in paid courses by working with world-class universities and corporations. It provides on-demand video lectures, homework exercises, peer-reviewed assignments, and community discussion forums for individual courses, specialized courses, and degree programs. Depending on the course or program, Coursera provides free courses, subscriptions, and one-time purchases. Some of the pros include: certificates and degrees of various types are awarded to students; they provide a wide range of learning opportunities and activities; and they provide high-quality educational materials and interactions with instructors. Some of the cons include: instructors from partner institutions are only allowed to use it, and course development possibilities are limited compared to other platforms for instructors.
3. Skillshare: Another popular e-learning platform is Skillshare, which has over 4 million students and up to 24,000 lessons in various fields. Lessons range in length from 20 to 60 minutes and include a series of short films, class projects, and a student community that fosters participation through discussion forums. Tutors are free to join but it comes with specific guidelines, and as for students, a 14-day free

trial is given, after which a price is paid to have access to all courses. There are four different types of classes:

1. Technology, which includes data science, web design, and e-commerce.
2. Business, which includes finance, accounting, and project management.
3. Lifestyle, which includes teaching, languages, gaming, and wellness.

The pros associated with this platform are that students can exchange feedback in a supportive discussion area and they can take multiple courses for the same price. Along with the benefits, there are some drawbacks, one of which includes the lack of a certificate of completion.

2.4 Summary

With the advancement of the computer and the internet in the late twentieth century, e-learning media and approaches grew. E-learning has progressed from simply supplying information to students to offering learners of all ages access to a large amount of material whenever and wherever they desire. The literature review in this chapter shows how e-learning came into existence and how it evolved with time. It shows that there is still room for enhancements and alterations in this project, as well as a more engaging and appealing user experience.

Chapter 3, which comes immediately after this chapter, explains the requirements, analysis, and design methodology used in simplifying and effectively redefining the educational process for the users, as well as important diagrams like Use Case, Activity, and Sequence diagrams that help to describe different aspects of the project.

CHAPTER 3: REQUIREMENTS, ANALYSIS, AND DESIGN

3.1 Overview

The requirement, analysis, and design of the e-learning system are covered in Chapter 3. In Chapter 3, the requirements, analysis, and design will be explored, as well as the technique or methodologies utilized and the significance of the approach chosen. This chapter will cover system specifications, functional and non-functional requirements, application architecture, schematics, and user interface.

3.2 Proposed Model

The proposed model for the application was Agile method, and it was used in the system development process. Along the line, the waterfall model was also used.

3.3 Methodology

The methodology will detail the development and testing process for the e-learning website, as well as how the features will be launched and delivered. The approaches that have been chosen are Waterfall and Agile processes. Each of the suggested alternatives will have its own definition and explanation for being chosen (Waterfall Methodology - A Complete Guide | Adobe Workfront, 2022).

THE WATERFALL MODEL

The waterfall model separates project operations into consecutive, linear stages, each of which is dependent on the deliverables of the previous phase and corresponds to a task specialization. The following are the stages of the waterfall model:

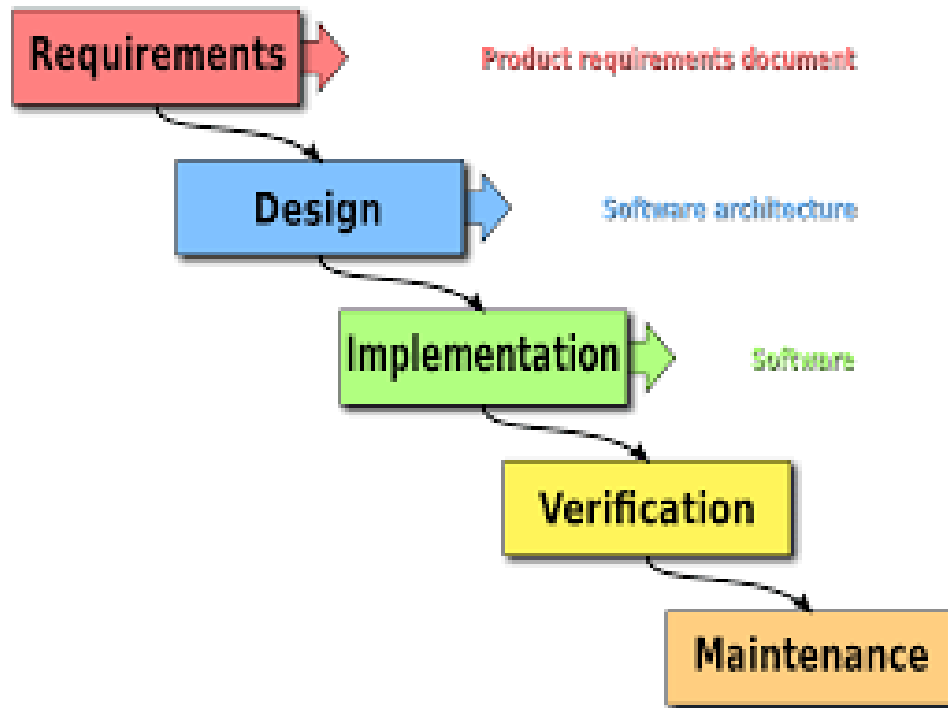
REQUIREMENTS: The Waterfall method assumes that all project requirements can be gathered and understood ahead of time. The project manager goes to great lengths to thoroughly know the requirements of the project sponsor. Written requirements, which are normally presented in a single document, are used to explain each stage of the project, including expenses, assumptions, risks, dependencies, success indicators, and completion dates (A Complete Guide to Waterfall Methodology | Adobe Workfront, 2022).

DESIGN: Software developers create a technological solution to the problems specified in the product requirements using scenarios, layouts, and data models. The project's aim and scope, as well as the general traffic flow of each component and the interconnection points, are all specified in the higher-level or logical design. Following that, it is converted into a physical design using various hardware and software technologies (A Complete Guide to Waterfall Methodology | Adobe Workfront, 2022).

IMPLEMENTATION: After the design is completed, technical implementation begins. This may be the quickest phase in the Waterfall process because extensive study and design have already been performed. Programmers write applications based on project needs and specifications, as well as testing and implementation. It may be necessary to return to the design phase if considerable adjustments are required during this stage (A Complete Guide to Waterfall Methodology | Adobe Workfront, 2022).

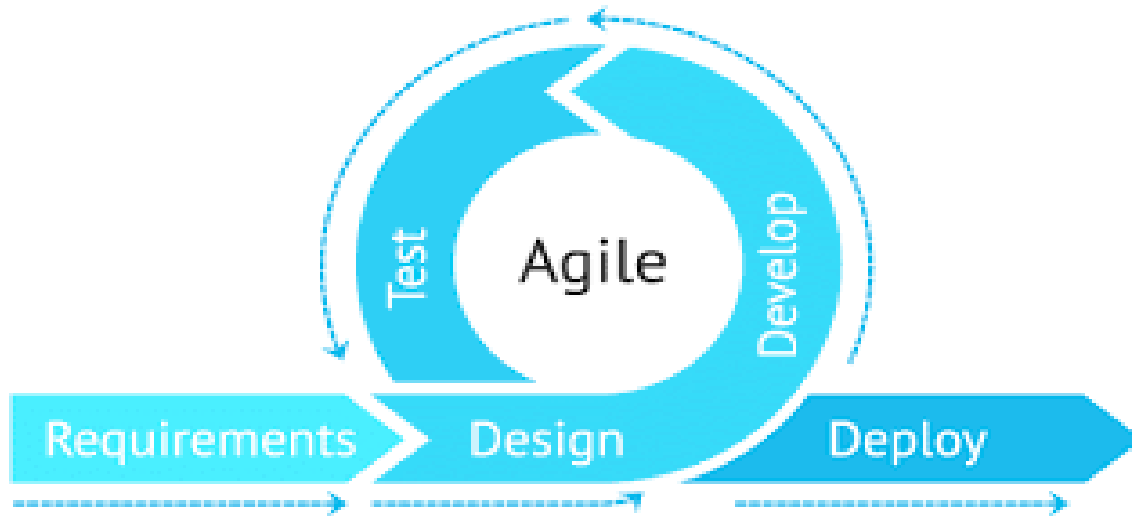
VERIFICATION & TESTING: Before a product can be released to clients, it must be tested to ensure that it is error-free and that all requirements have been met, ensuring a great user experience with the application. The testing team will use the product manager's design documents, personas, and user case scenarios to create their test cases (A Complete Guide to Waterfall Methodology | Adobe Workfront, 2022).

DEPLOYMENT & MAINTENANCE: After the program has been deployed to the market or to consumers, the maintenance phase begins. A team will be formed to manage updates and the delivery of new versions of the program as bugs are detected and user requests for modifications are received (A Complete Guide to Waterfall Methodology | Adobe Workfront, 2022).



THE AGILE MODEL

Adaptive planning, evolutionary development, early delivery, continuous improvement, and flexible responses to changes in requirements, capacity, and understanding of problems to be solved through the collaborative effort of self-organizing and cross-functional teams with their customers or end users are all part of the AGILE model in software development. (Wikipedia, Agile software development, 2021). Since agile development is iterative, features are given in stages, allowing some benefits to be enjoyed sooner rather than later. Testing is integrated throughout the lifetime of agile development, allowing for regular inspection of the functional product as it evolves (Munkhtsetseg & Uyanga, n.d.).



3.3.1 Method 1 (e.g Interview)

During the search for the target audience (students), interviews were conducted with some of the students in the school, their opinions were requested and a quick survey based on what they would like to see and/or experience when using the website was taken. The interviews were conducted virtually. Some of the lecturers were interviewed too and their answers and suggestions were noted.

3.3.2 Method 2 (e.g Observation)

After interacting with several students, it was discovered that most of the students liked the idea of an online platform to aid their school processes. Majority of the students opted for a clear and bright interface. This gave a good concept for the user interface, which made it more friendly and welcoming to the users. As for the lecturers, they suggested for a website that can easily be navigated and also opted for intellectual tasks to aid in the learning process. Following feedback from both parties, the balance of the two ideas was achieved by implementing the designs while preserving the instructional goal of the project.

3.4 Tools and Techniques

As the project progressed, it made use of a variety of tools and techniques, some of which includes:

- **HTML (Hyper Text Markup Language) editor:** An HTML editor is an application that allows you to alter the markup of a web page in HTML. Although any text editor can control the HTML markup of a web page, specialist HTML editors can provide more ease and capability. It works alongside with CSS which is used for styling.
- **MySQL:** MySQL is an open-source relational database management system. It is used for e-commerce, database warehousing, web database and for logging applications.
- **PHP:** PHP is a popular general-purpose scripting language with a focus on web development.

3.5 Ethical Consideration

The ethical consideration was based on authentication processes that were established in signing in and signing up in order to allow users to restore their previous progress with a different website or another device entirely.

3.6 Requirement Analysis

The components necessary in the Requirement Analysis were covered in an interview supplied by both the target audience and their guardians, and the information gathered helped in meeting the criteria.

3.7 Requirements Specifications

This section distinguishes between functional and non-functional criteria. These criterias are important measures that must be met in order for the website to be classified as efficient and hence, improve the project's quality.

3.7.1 Functional Requirement Specifications

The functions of a system and their respective components are defined by functional requirements. It concerns the services that the system should provide to the user.

Table 3.1 Functional Requirement Specifications

Req. No.	Description	Type
R-101	The web application shall use web server and a browser.	Configuration
R-102	The web application shall include a user interface.	Functional
R-103	The system shall allow a user to sign in	Functional
R-104	The system shall allow update and retrieval from database.	Functional
R-105	The system shall allow administrator to manage user logins.	Functional
R-106	The system shall allow administrator to add, update or delete user details.	Functional
R-107	The system shall allow instructors to upload materials, quizzes and assignments.	Functional
R-108	The system shall allow students to view materials, quizzes and assignments.	Functional
R-109	The system shall allow both tutors and students to communicate with each other via message feature	Functional
R-110	The system shall allow the administrator to manage calendar events	Functional
R-111	The system shall allow tutors to add students to his/her class	Functional
R-112	The system shall allow the administrator to register students, tutors, classes and departments.	Functional

3.7.2 Non-Functional Requirement Specifications

Non-Functional Requirement is a type of requirement that specifies criteria for judging a system's operation.

Table 3.2 Non-Functional Requirement Specifications

Req. No.	Description	Type
R-101	When opened, the system shall stay running unless there is an intentional shutdown of the web application or the platform.	Performance
R-102	The system shall handle all tasks given as users increase with time.	Performance
R-103	The system shall be available to all users at all time	Availability
R-104	The system should be reliable in a way that all tasks are performed properly without errors	Reliability
R-105	The system shall be easy to use	Accessibility
R-106	The system shall be user friendly.	Usability

3.8 System Design

System design is the process of defining the architecture, modules, interfaces and data for a system to satisfy specified requirements. This system is designed to help students attain knowledge on their digital devices at their comfort, without constraints from the traditional e-learning processes.

Figure 3.1 Application Architecture

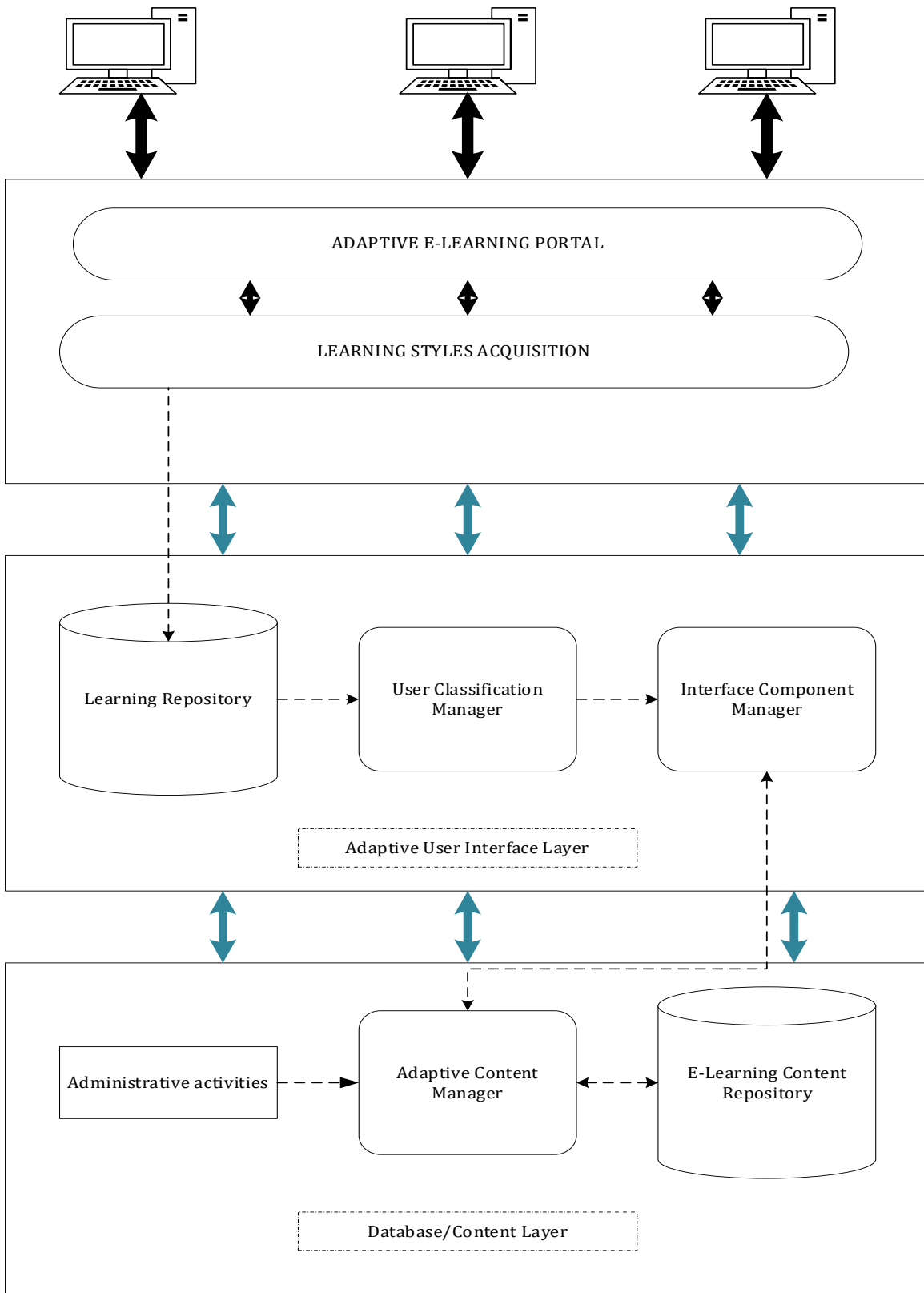


Figure 3.2 Use Case

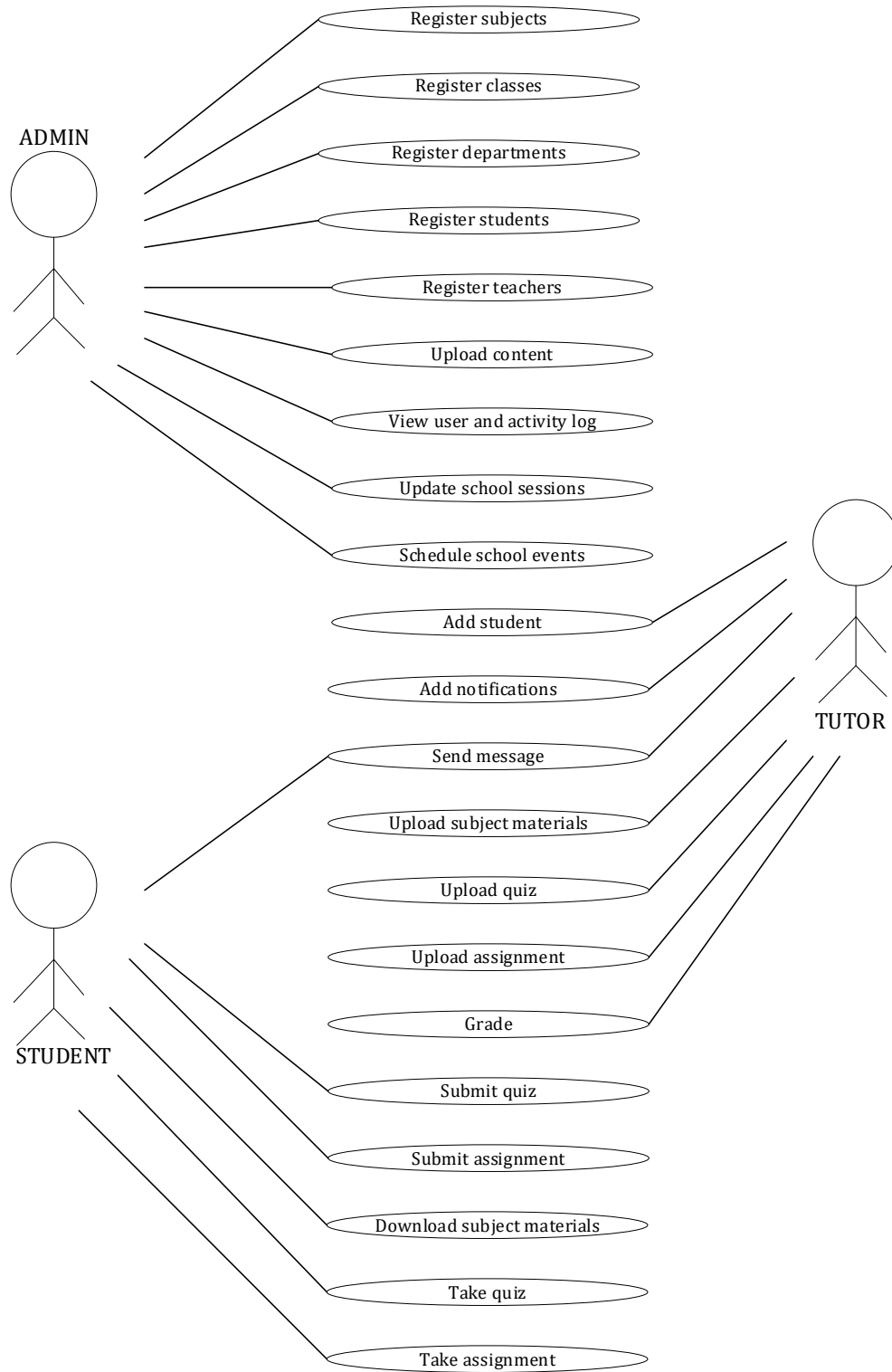


Figure 3.3 Data Design

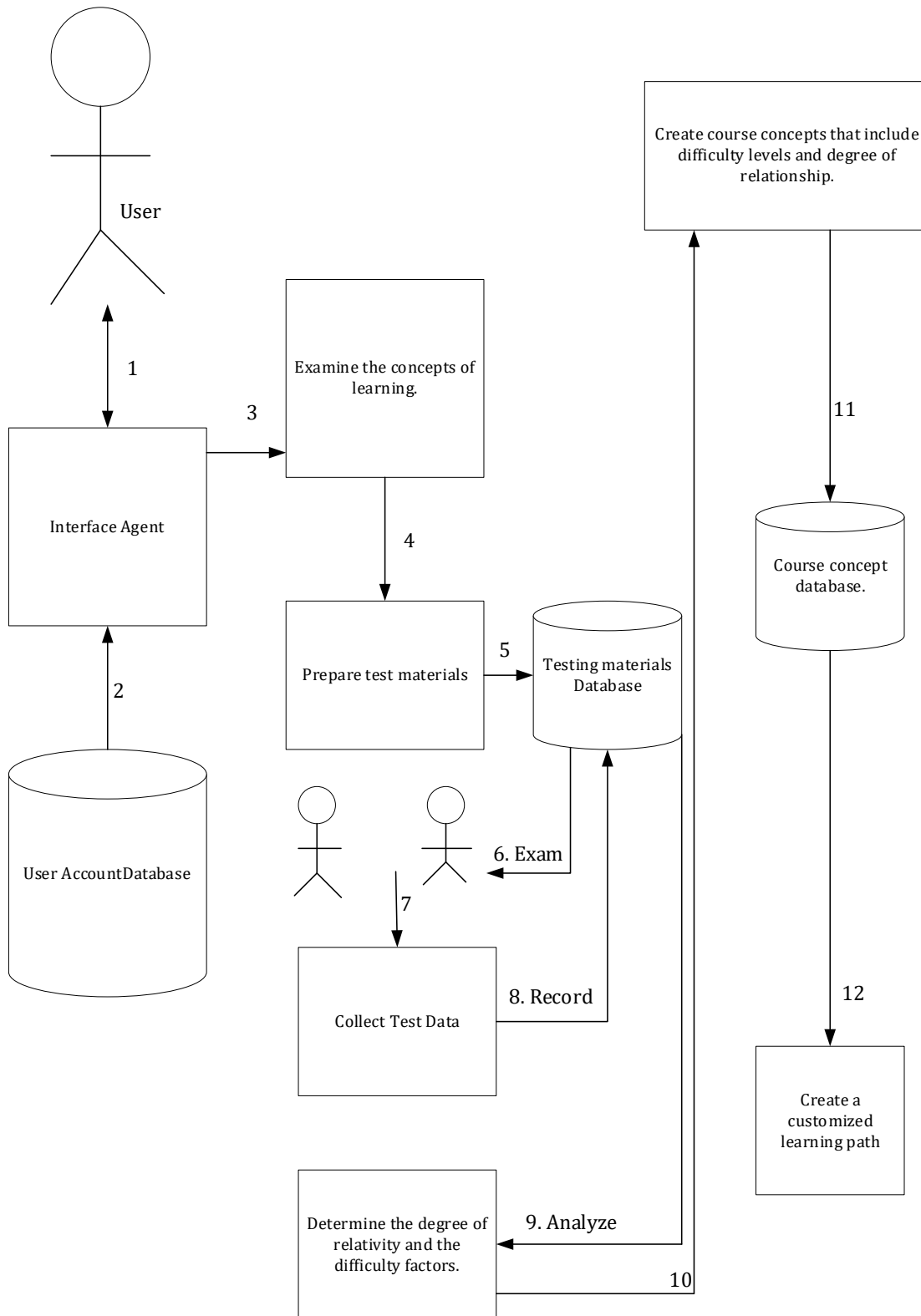


Figure 3.4 Activity Diagrams

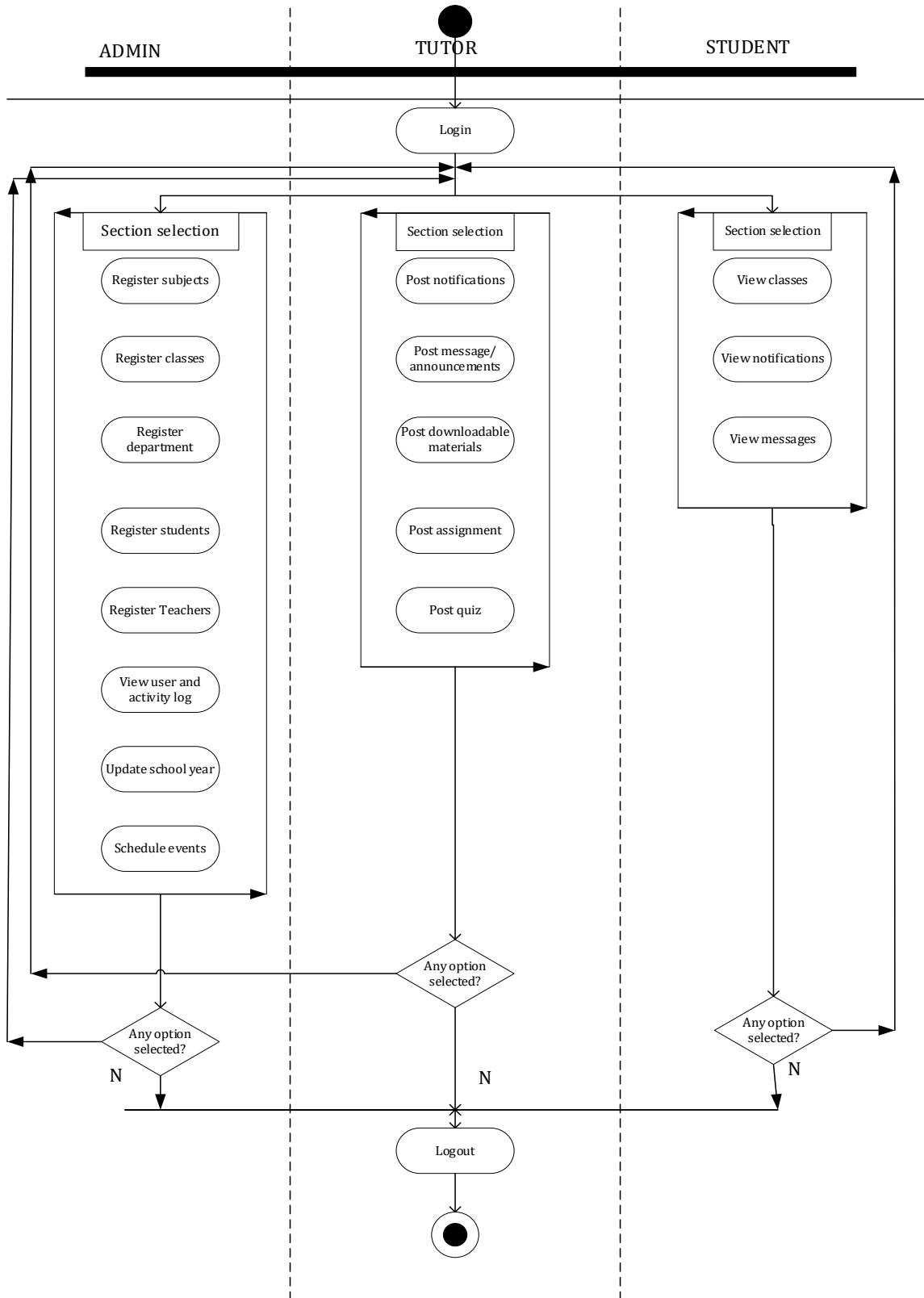


Figure 3.5 Dataflow Diagram

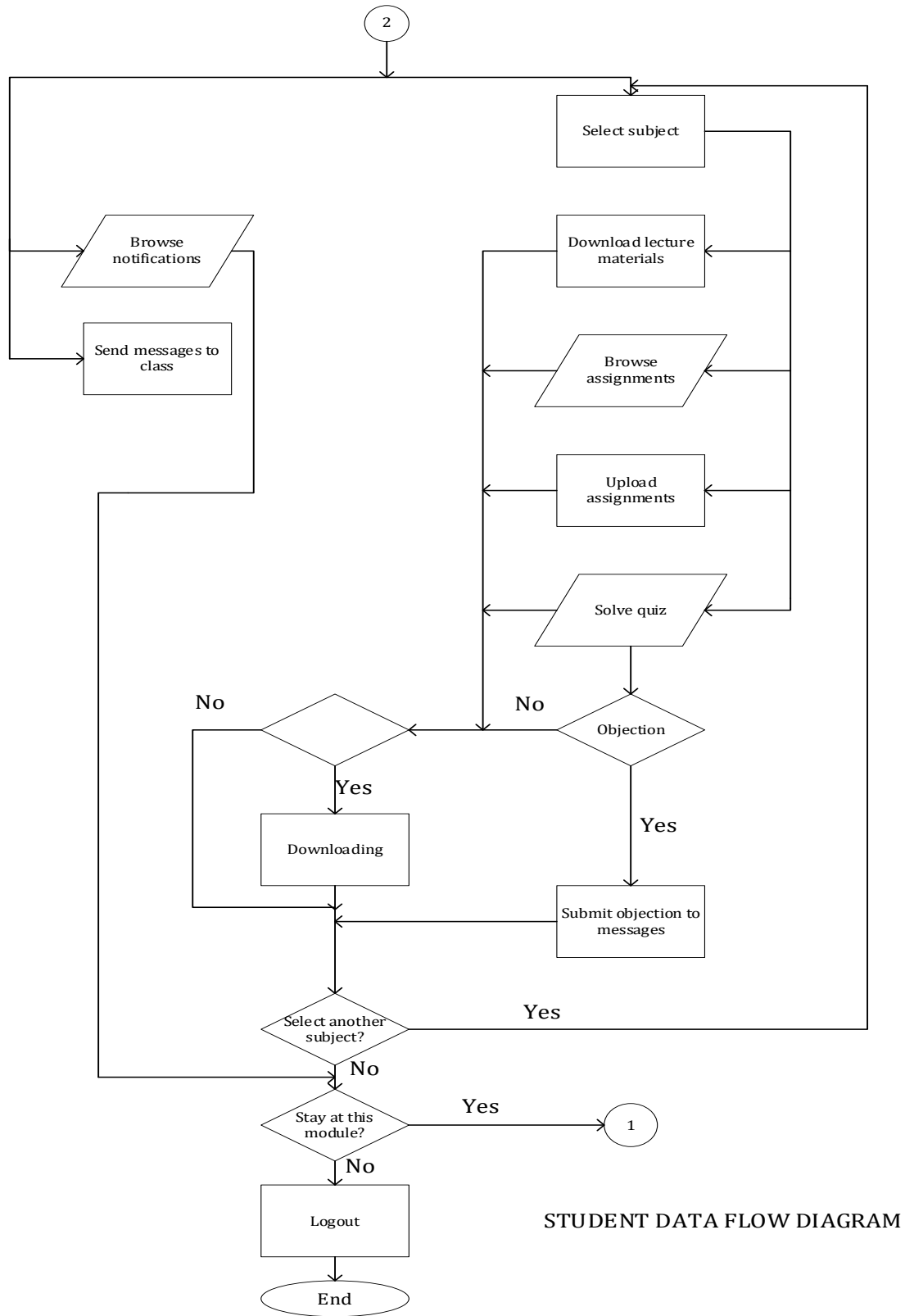


Figure 3.6 Dataflow Diagram continuation

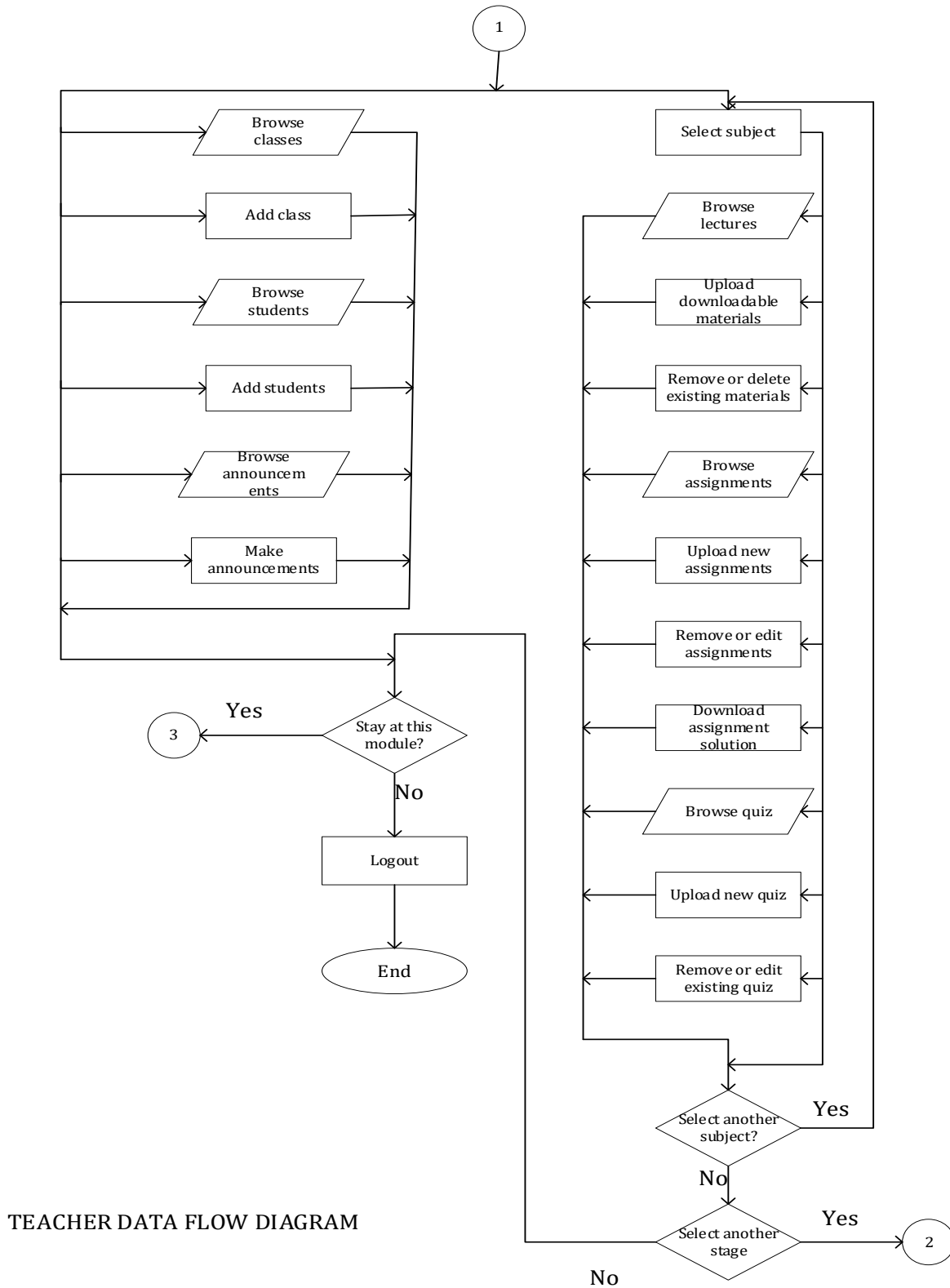


Figure 3.7 Entity-Relationship Diagram (ERD)

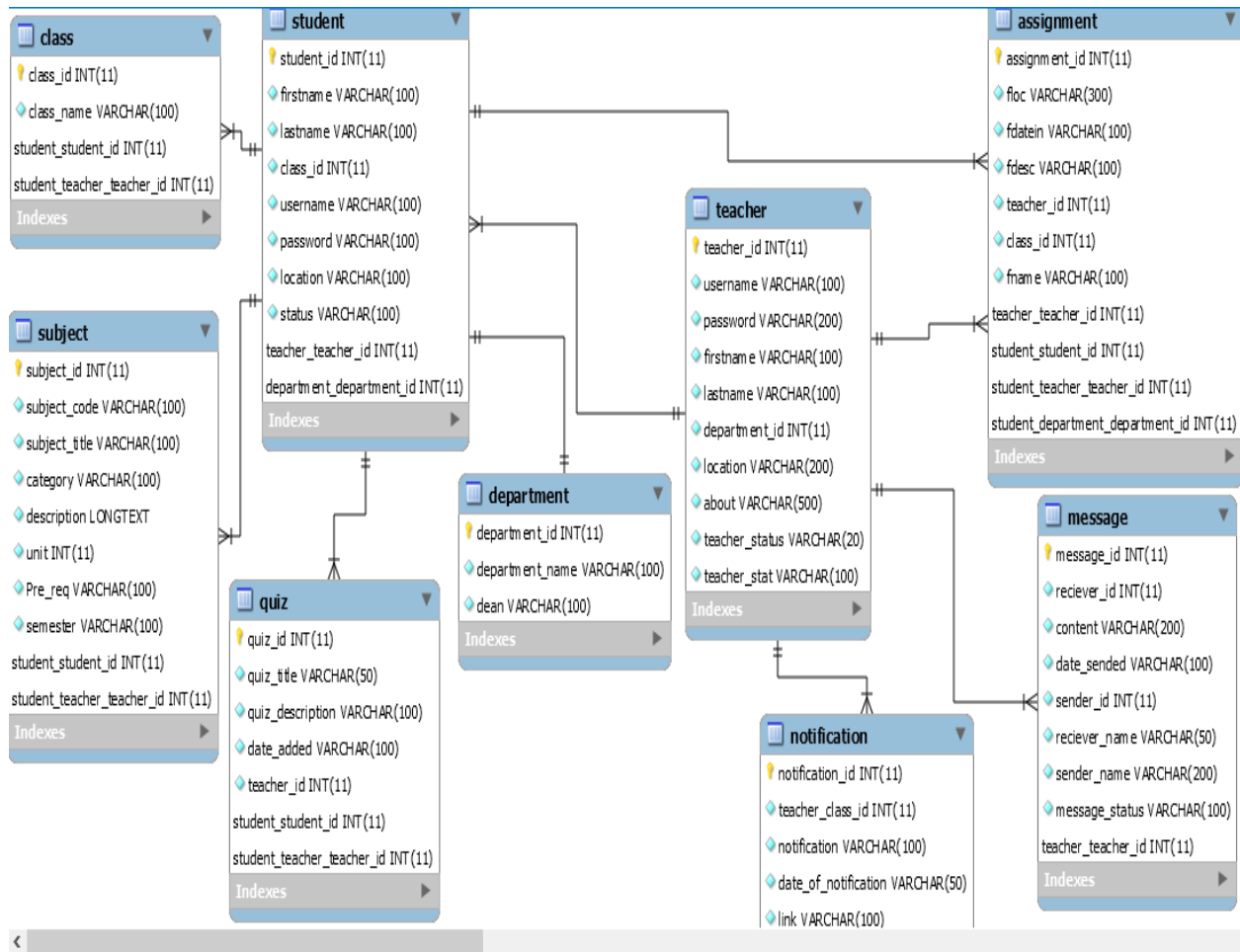
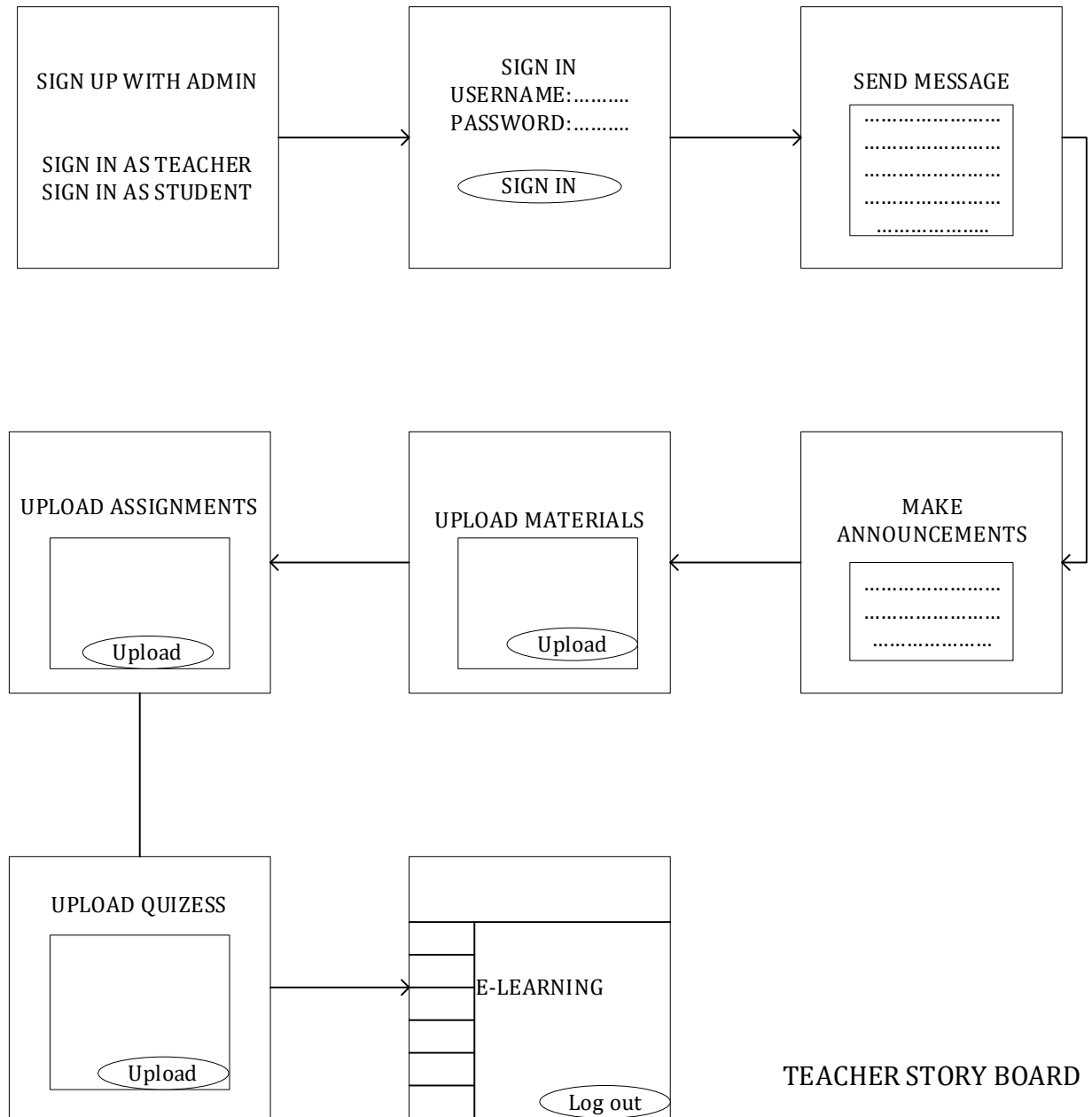
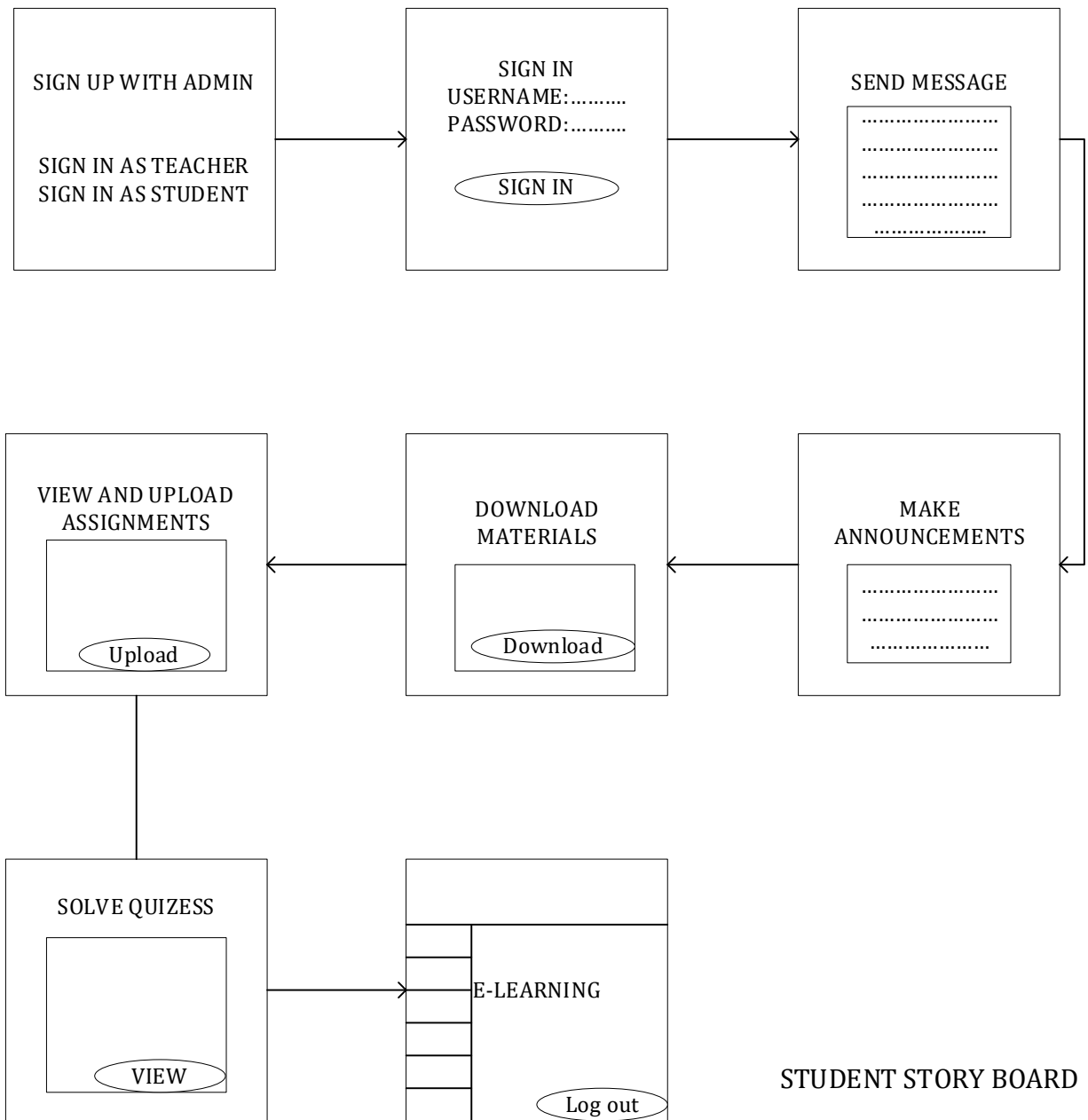


FIGURE 3.8 STORY BOARD





3.9 Summary

The usage of HTML/CSS and PHP, as well as the decision to develop using Agile, ensured that the requirements were completed while keeping the project on track. This chapter explains why Agile was chosen for this project, as well as some UML diagrams of the system that show how a user can interact with it and the requirements that must be completed in order for the project to be considered successful.

CHAPTER 4: IMPLEMENTATION AND TESTING

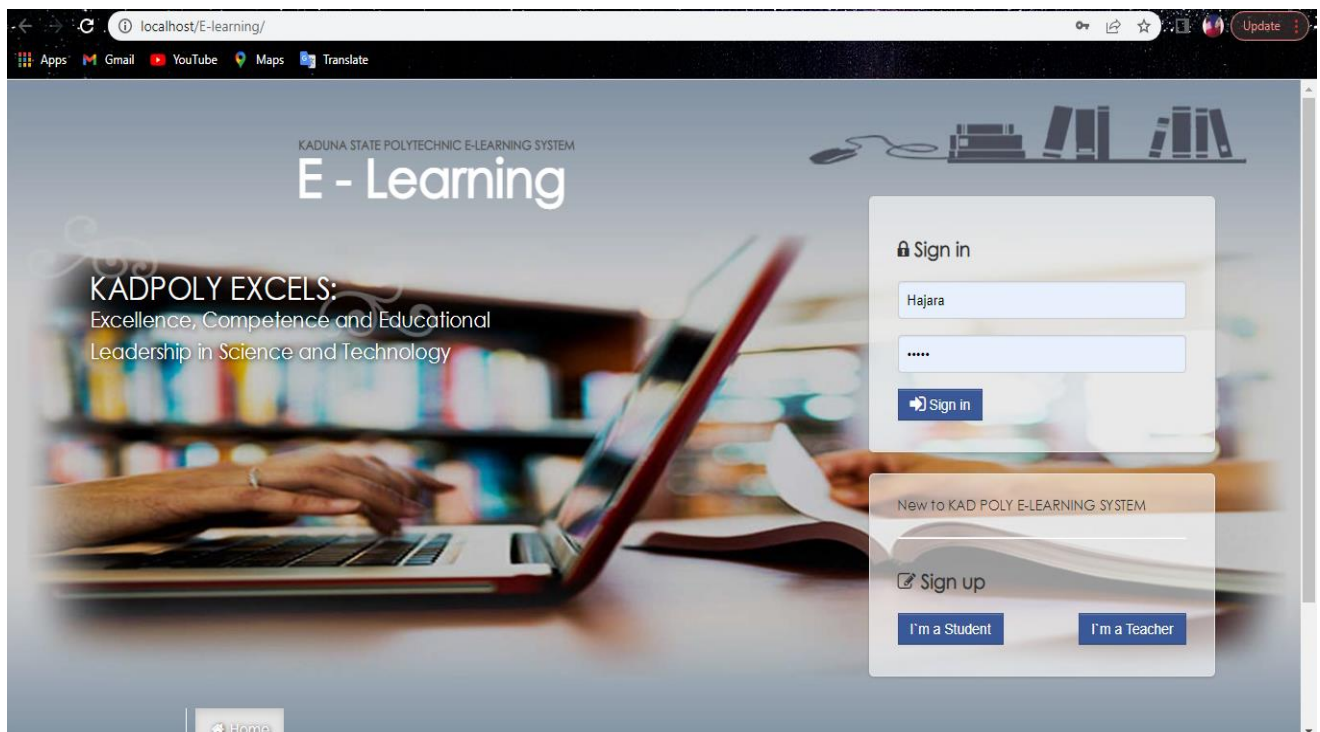
4.1 Overview

In this chapter, we'll look at the app's practical development as well as the various components that went into its creation, from the front end to the back end, as well as all of the obstacles that arose along the road, as well as the answers to the problems.

4.2 Main Features

The main features that make up the system are as follows:

1. **AUTHENTICATION:** in the Authentication features, this takes place in the back end of and makes use of the database which stores user accounts with the aid of “Sign Up” and “Sign in”. With that said it consists of a simple form within the “home” page to fill out. In the case one has registered then they will be allowed to log back in but if that does not take place, the user will be notified they have inputted the wrong log in details.



localhost/E-learning/signup_student.php

KADUNA STATE POLYTECHNIC E-LEARNING SYSTEM

E - Learning

KADPOLY EXCELS:
Excellence, Competence and Educational
Leadership in Science and Technology

Sign up as Student

ID Number

Firstname

Lastname

Class

Password

Re-type Password

☒ Sign in

[Click here to Login](#)

localhost/E-learning/signup_teacher.php

KADUNA STATE POLYTECHNIC E-LEARNING SYSTEM

E - Learning

KADPOLY EXCELS:
Excellence, Competence and Educational
Leadership in Science and Technology

Sign up as Teacher

Firstname

Lastname

Department

Username

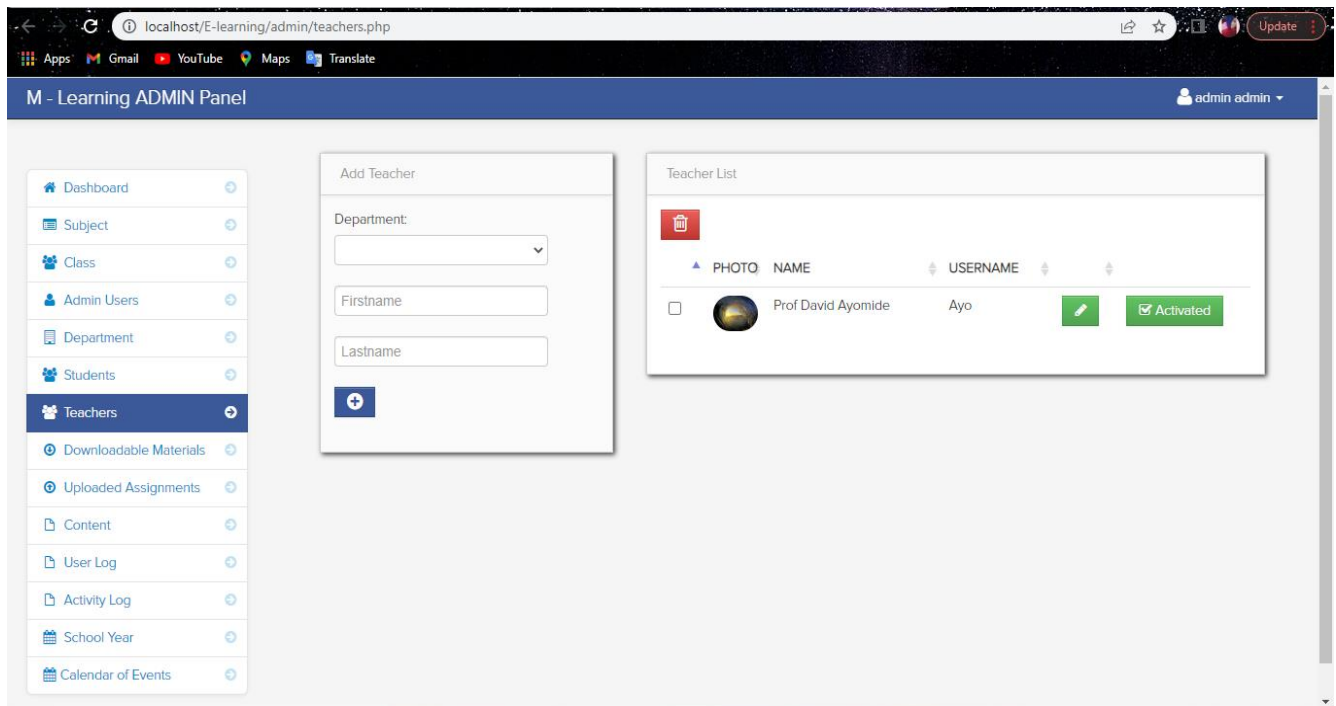
Password

Re-type Password

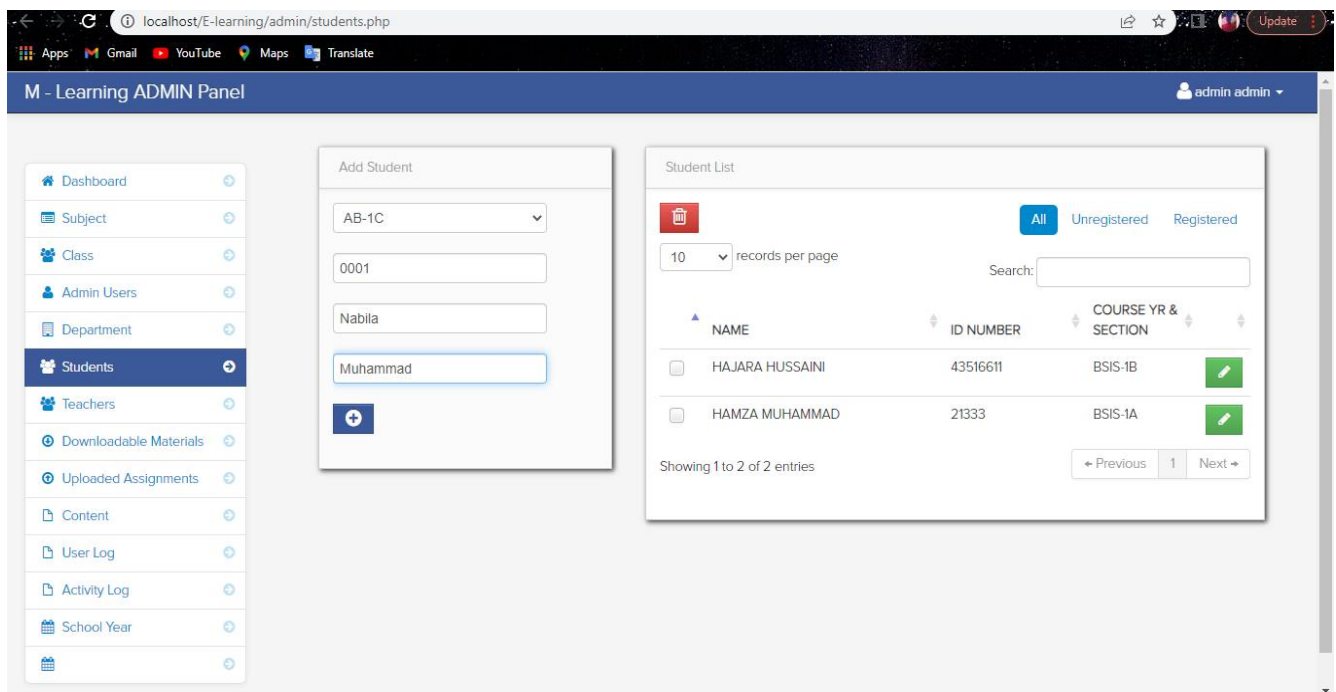
☒ Sign in

[Click here to Login](#)

2. REGISTERING OF TEACHERS BY ADMIN: This is the part where the Admin registers teacher on the platform.



3. REGISTERING OF STUDENTS BY ADMIN: This is the part where the Admin registers students on the platform.



4. REGISTER CLASSES AND SUBJECTS: This is the part where the Admin registers the classes and subject for the users to be able to join.

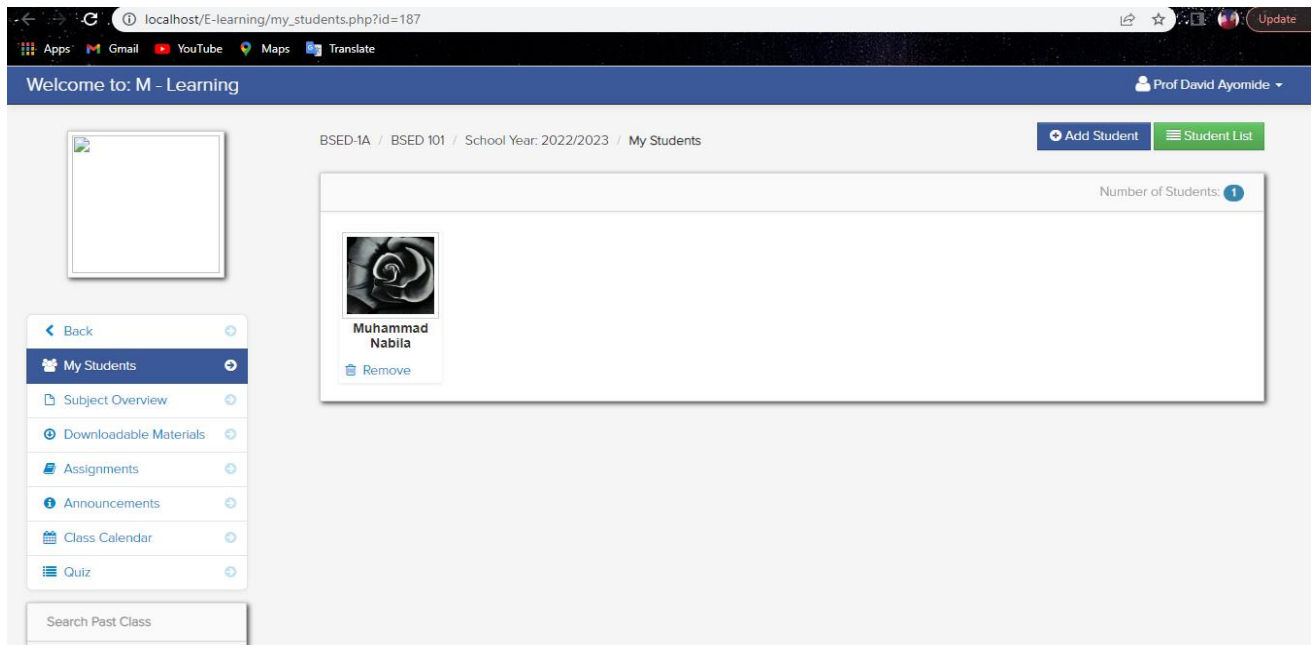
The screenshot shows the 'Add Subject' form in the M-Learning ADMIN Panel. The left sidebar contains a menu with options: Dashboard, Subject, Class, Admin Users, Department, Students, Teachers, Downloadable Materials, Uploaded Assignments, Content, User Log, Activity Log, School Year, and Calendar of Events. The 'Subject' option is selected. The main form area is titled 'Add Subject' and includes a 'Back' link. The form fields are: Subject Code (COM 209), Subject Title (Scripting language), Number of Units (3), Semester (2nd), and Description (a rich text editor). The browser address bar shows 'localhost/E-learning/admin/add_subject.php'.

The screenshot shows the 'Class List' page in the M-Learning ADMIN Panel. The left sidebar is the same as the previous screenshot, with 'Class' selected. The main form area is titled 'Class List' and includes a 'Class Name' input field and a '+ Add Class' button. Below this is a table of classes. The table has a 'records per page' dropdown set to 10 and a search bar. The table content is as follows:

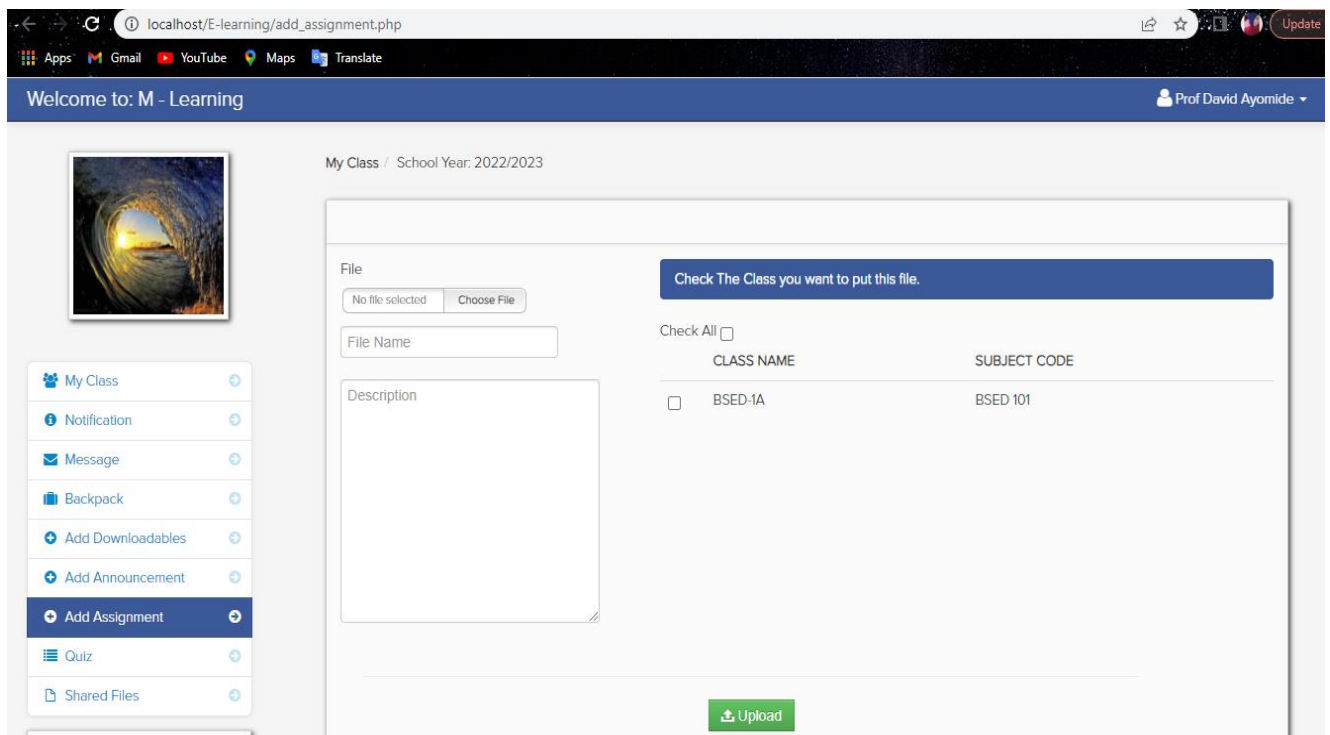
COURSE YEAR AND SECTION	
<input type="checkbox"/> BSIS-3A	
<input type="checkbox"/> BSIS-3B	
<input type="checkbox"/> BSIS-3C	
<input type="checkbox"/> BSIS-2A	
<input type="checkbox"/> BSIS-2B	
<input type="checkbox"/> BSIS-2C	
<input type="checkbox"/> BSIS-1A	
<input type="checkbox"/> BSIS-1B	

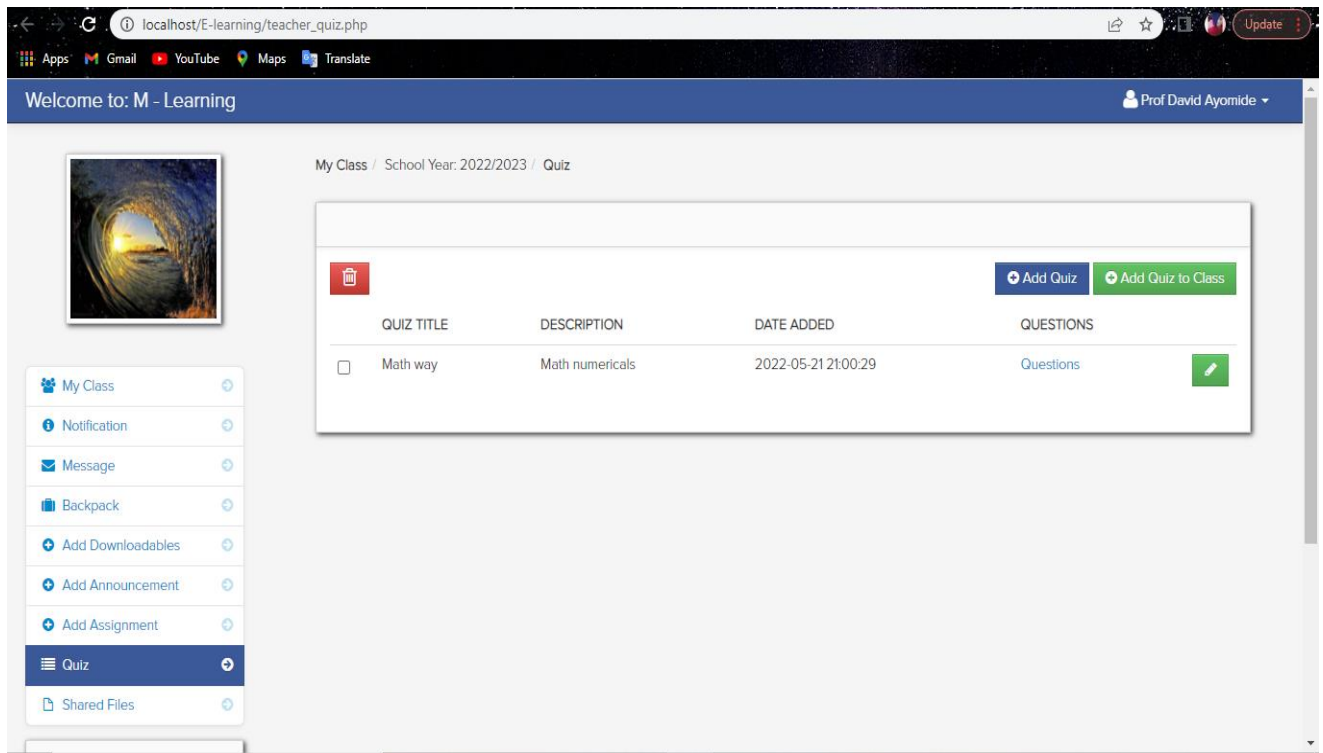
The browser address bar shows 'localhost/E-learning/admin/class.php'.

5. ADDING OF STUDENTS TO THE CLASS: Here, the teacher adds the student to his/her class.

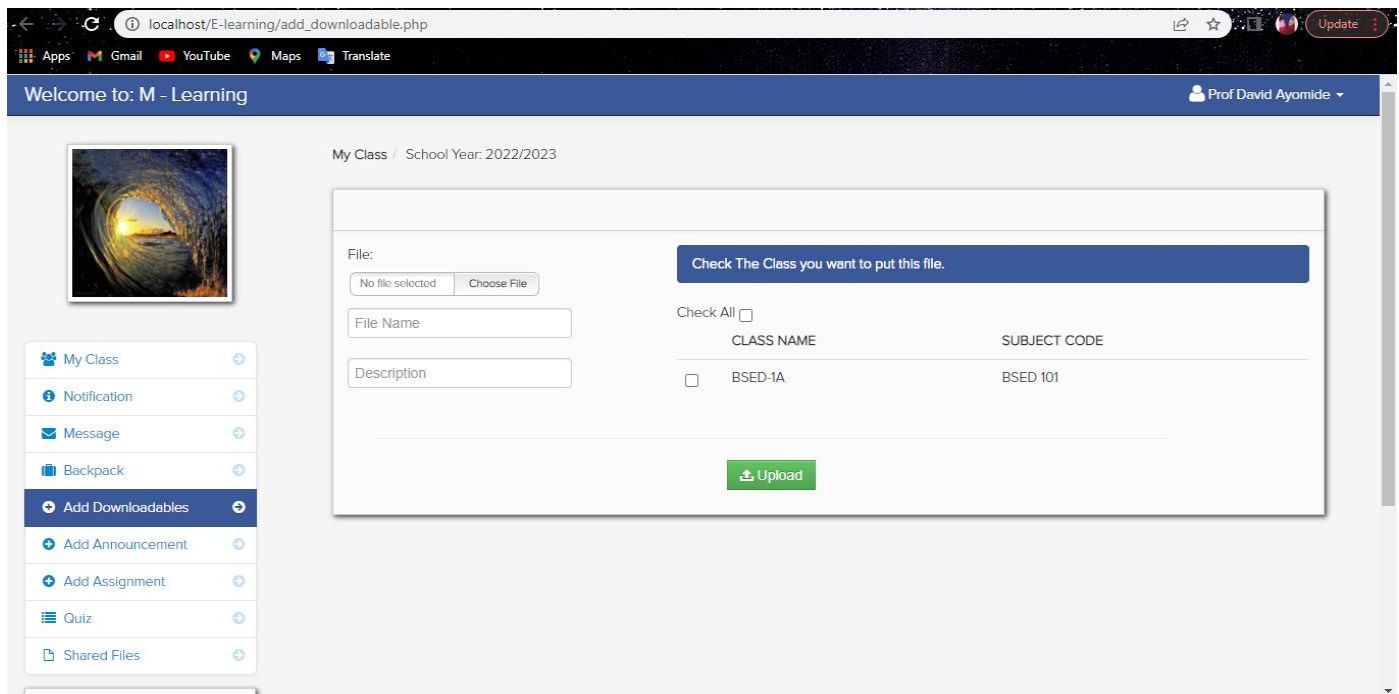


6. UPLOADING OF ASSIGNMENT AND QUIZ: The teacher can upload assignments and quizzes to his classroom.

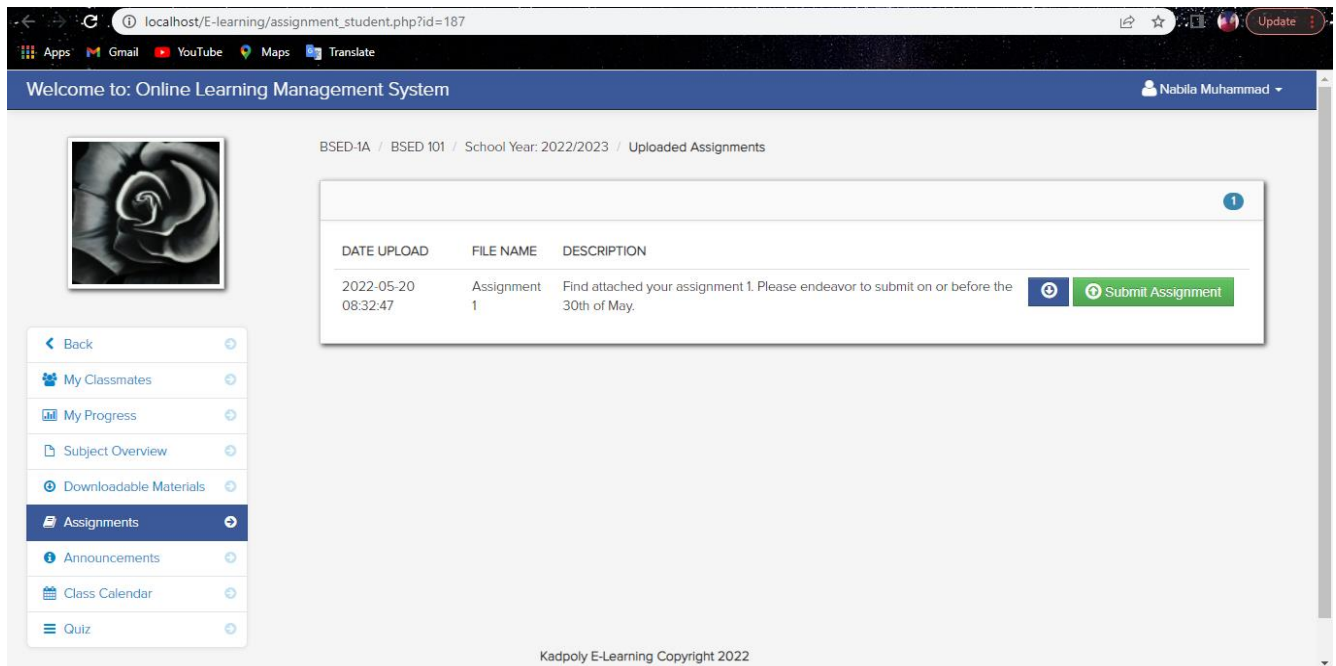




7. UPLOADING OF DOWNLOADABLE MATERIALS BY TUTORS: The tutor can add downloadable materials on the class.



8. **SUBMIT ASSIGNMENT:** On this page, a student can view and submit his/her assignment.



localhost/E-learning/assignment_student.php?id=187

Welcome to: Online Learning Management System

Nabila Muhammad

BSED-1A / BSED 101 / School Year: 2022/2023 / Uploaded Assignments

DATE UPLOAD	FILE NAME	DESCRIPTION
2022-05-20 08:32:47	Assignment 1	Find attached your assignment 1. Please endeavor to submit on or before the 30th of May.

Submit Assignment

Back

My Classmates

My Progress

Subject Overview

Downloadable Materials

Assignments

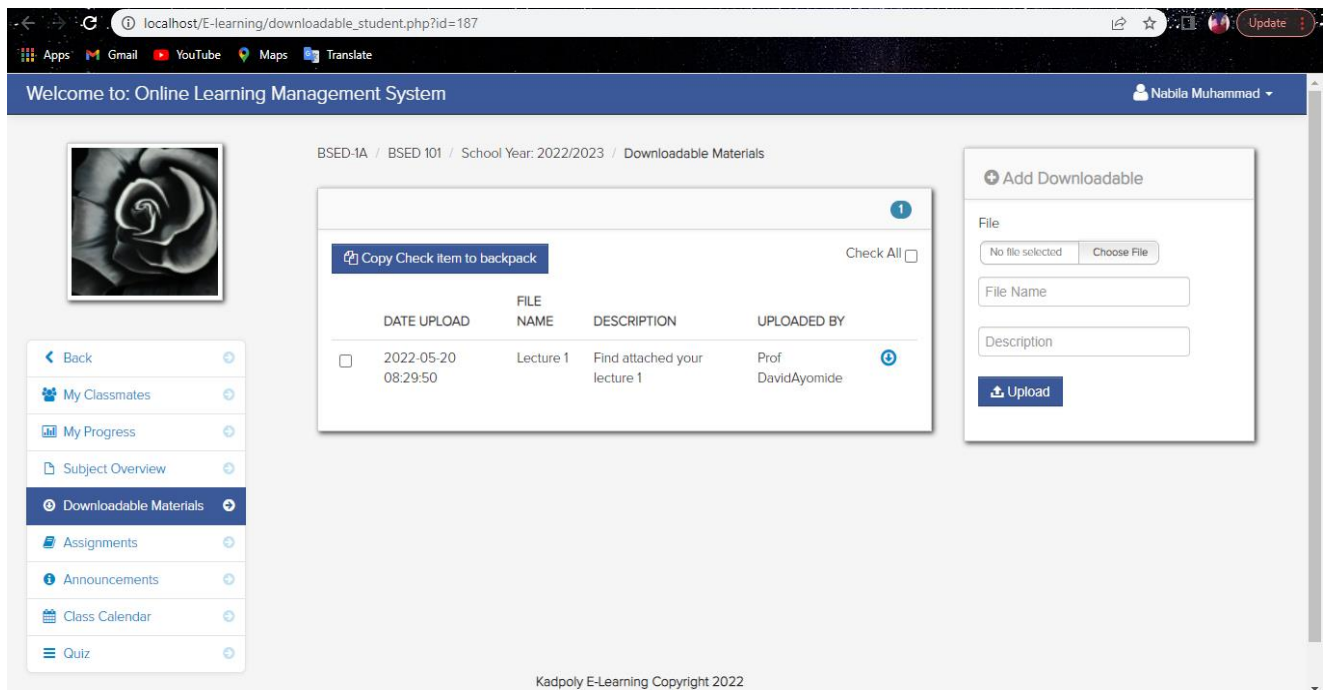
Announcements

Class Calendar

Quiz

Kadpoly E-Learning Copyright 2022

9. **DOWNLOAD MATERIALS:** Here, the students can download materials and can also upload materials where necessary.



localhost/E-learning/downloadable_student.php?id=187

Welcome to: Online Learning Management System

Nabila Muhammad

BSED-1A / BSED 101 / School Year: 2022/2023 / Downloadable Materials

Copy Check item to backpack

Check All

	DATE UPLOAD	FILE NAME	DESCRIPTION	UPLOADED BY
<input type="checkbox"/>	2022-05-20 08:29:50	Lecture 1	Find attached your lecture 1	Prof DavidAyomide

Add Downloadable

File

No file selected Choose File

File Name

Description

Upload

Back

My Classmates

My Progress

Subject Overview

Downloadable Materials

Assignments

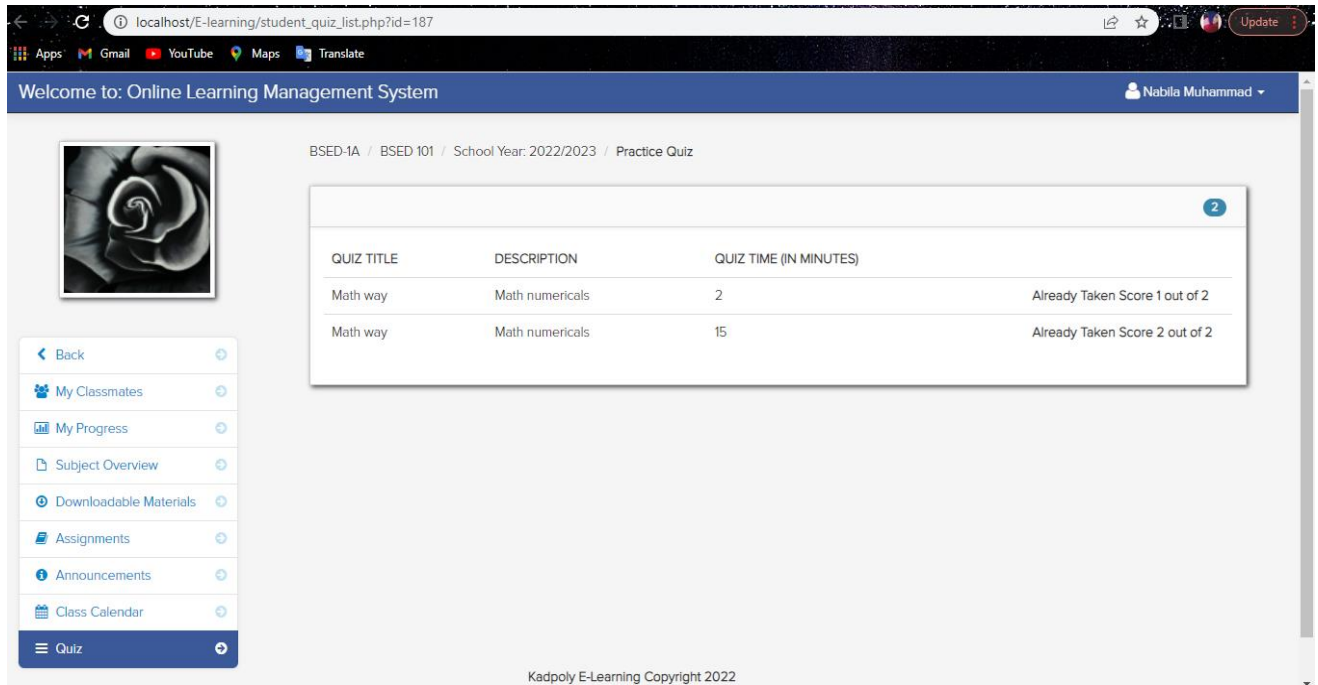
Announcements

Class Calendar

Quiz

Kadpoly E-Learning Copyright 2022

10. TAKE QUIZ: On this page, the student can take the quiz.



The screenshot displays a web browser window with the URL `localhost/E-learning/student_quiz_list.php?id=187`. The page header reads "Welcome to: Online Learning Management System" and shows the user "Nabila Muhammad". The main content area is titled "BSED-1A / BSED 101 / School Year: 2022/2023 / Practice Quiz". On the left, there is a sidebar menu with options: Back, My Classmates, My Progress, Subject Overview, Downloadable Materials, Assignments, Announcements, Class Calendar, and Quiz (selected). The main area features a table with quiz details:

QUIZ TITLE	DESCRIPTION	QUIZ TIME (IN MINUTES)	Already Taken Score
Math way	Math numericals	2	1 out of 2
Math way	Math numericals	15	2 out of 2

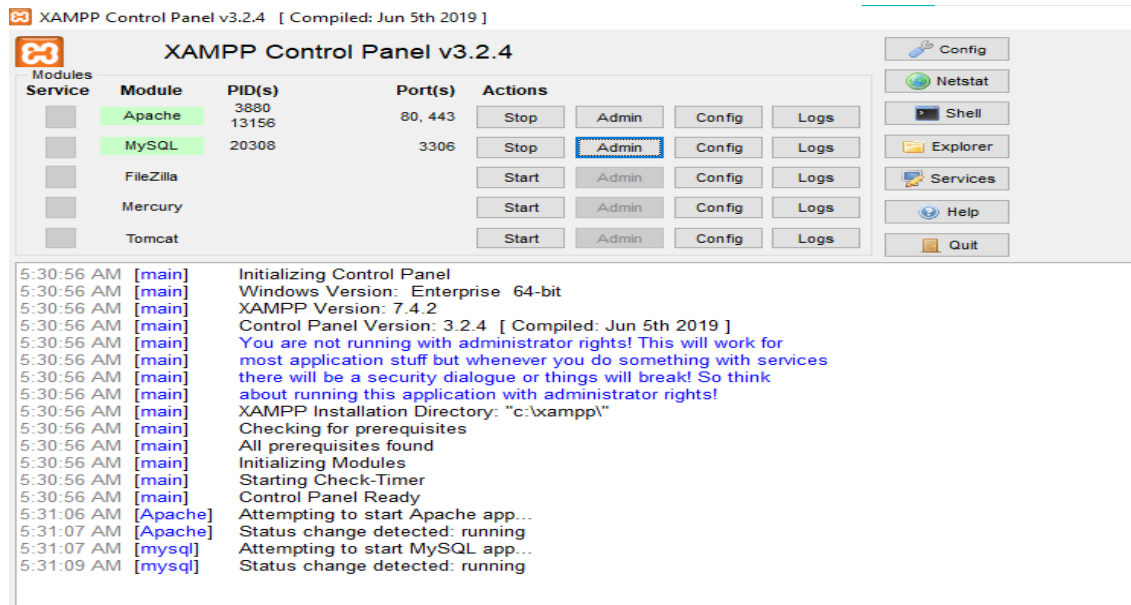
The footer of the page indicates "Kadpoly E-Learning Copyright 2022".

4.3 Implementation Problems

Along the line of this project, multiple obstacles were encountered and they made the nature of things unbearable to work with. I encountered some problems on implementing my codes. The updated version of my XAMPP does not support "mySQL" command so it brought out several errors.

4.4 Overcoming Implementation Problems

I had to uninstall and download an older version of XAMPP to support the commands.



4.5 Testing

Testing was done to verify that the system's efficiency and dependability were put to the test; during the testing phase, it was manually tested, which allowed one to see it from the user's perspective. Other types of testing, like as unit testing, allowed the application's individual functions to be evaluated and tested from the front-end through the back-end.

Table 4.1: Tests Plans (for Unit Testing, Integration Testing, and System Testing)

S/ N	TEST	PERFOR MANCE	FUNCTIONA LITY	CONTENT	AVAILABI LITY	RELIABIL ITY	NAVIGAT ION
	Sign up	High	High	Medium	High	High	High
	Login	High	High	Medium	High	High	High
	Add course	High	High	Medium	High	Medium	High
	Register course	High	High	Medium	High	Medium	High

	Post assignment	High	High	High	High	Medium	High
	Update profile	High	High	Medium	High	Medium	High
	Post materials	High	High	Medium	High	Medium	High
	Submit assignment	High	High	High	High	High	High
	Log out	High	High	Medium	High	Medium	High

Test Plan Tree

Table 4.2: Test Suite (for Unit Testing, Integration Testing, and System Testing)

Req. No.	Description	Type
R-101	When launched, the application shall stay running unless there is an intentional shutdown of the application or the platform.	Performance
R-102	On click, the system shall direct a user to every page he/she intend to go to.	Performance
R-103	Admin shall register all users on the system	Performance

Test Suite Performed

Table 4.3: Test Traceability Matrix (for Unit Testing, Integration Testing, and System Testing)

Requirement	Description	Priority	Test case	Test result
R-101	The web application shall use web server and a browser.	High	1	Pass
R-102	The web application shall include a user interface.	High	2	Pass
R-103	The system shall allow a user to sign in.	High	3	Pass
R-104	The system shall allow update and retrieval from database.	High	4	Pass
R-105	The system shall allow administrator to manage user logins.	High	5	Pass
R-106	The system shall allow administrator to add, update or delete user details.	High	6	Pass
R-107	The system shall allow tutors to upload materials, exercises and assignments.	High	7	Pass
R-108	The system shall allow students to view materials, exercises and assignments.	High	8	Pass

4.5.4 Test Report Summary (for Unit Testing, Integration Testing, and System Testing)

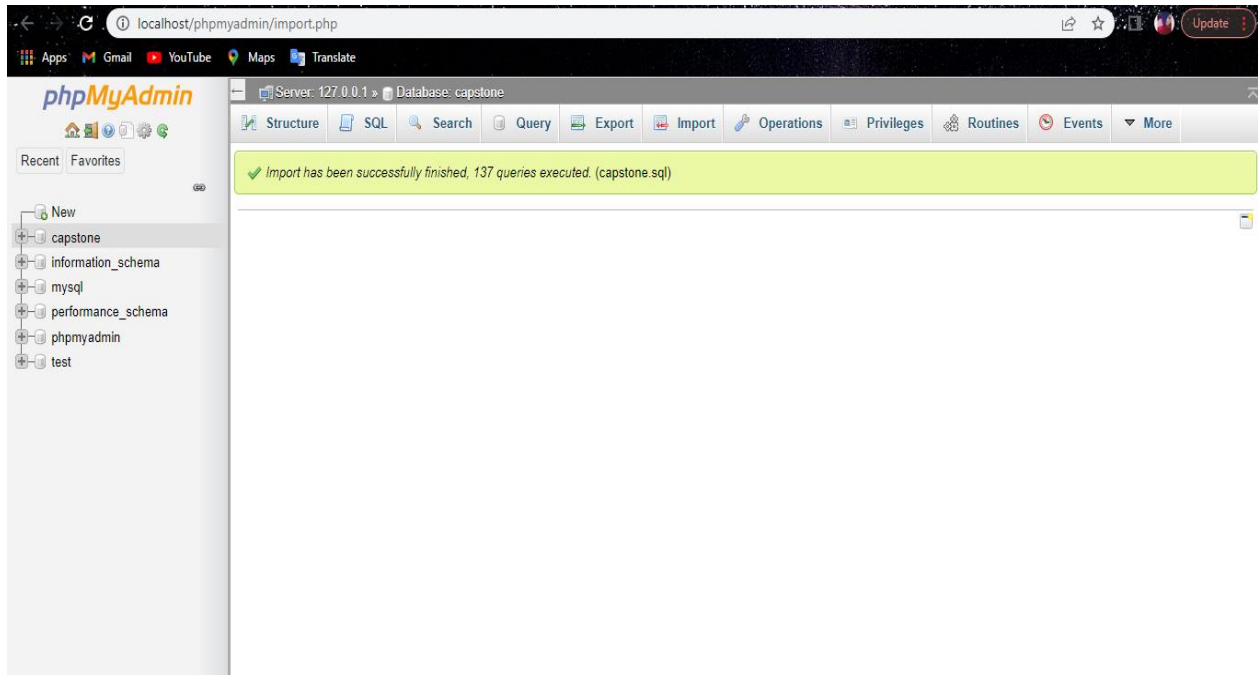
The test reports are as follows:

- Number of tests carried out = 8
- Number of tests passed = 8
- Number of tests failed = 0

4.5.5 Error Reports and Corrections

Error: I used the wrong database name while importing the SQL file, so it wasn't reflecting on the database.

Correction: I searched for the correct name and used it, which successfully imported the SQL file to the database.



4.6 Use Guide

The user guide describes how a user is going to use the system with ease to accomplish his/her goal, including all the processes involved in operating the system. To aid the successful use of this system, several steps were taken. To be able to navigate through the website, a user must first of all register/login. The full user guide is explained in Appendix E.

4.7 Summary

This chapter has covered the primary features, testing, and implementation processes of the system's development life cycle. The next chapter will offer a succinct summary of the project as a whole, with recommendations to follow.

CHAPTER 5: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Overview

This is the last chapter, which provides an overall assessment of the project, as well as information on the challenges and limitations faced throughout the project's development life cycle, as well as recommendations for how the project could be improved in the future. Finally, ideas for the project's direction will be evaluated based on the findings.

5.2 Objective Assessment

The majority of the project's objectives were met, including challenging the users' knowledge and providing feedback. More features will be added in the future to improve the app's capabilities and make it more interactive.

5.3 Limitations and Challenges

Aside from the standard limitations and challenges that every project faces due to time, scope, quality, and funding, a key constraint occurs from the gathering of information or data from the relevant personnel with a fair and objective assessment of the proposed e-learning products. Expected users were unwilling to provide input on the impact of the proposed products on them, while others preferred to provide random information that amounted to uncertain results. With the rate of high insecurity in the country, I couldn't travel to the school to gather information; rather, I had a virtual meeting and got the answers for my interview.

5.4 Future Enhancements

With the time given, there is always room for improvements. These improvements include:

- Development of an android application to run on phones.
- Issuance of certificates.
- Text to speech function.

5.5 Recommendations

The project should be developed in form of a mobile application to improve usability for mobile phone users.

5.6 Summary

This chapter brings the project documentation to an end. It covered the project's objectives, scope, risk assessments, requirements, analysis, and design, as well as the methodology used throughout the development life cycle and how it was implemented and tested in the field. It also covered adjustments that could be implemented in the near future, as well as recommendations, were evaluated. Finally, suggestions for adjustments that could be implemented in the near future were examined.

REFERENCES

- Adewa-Ogubaen, S., E., & Iyamu, O., S., (2005). *Using Information and communication Technology in secondary schools in Nigeria: problems and prospects*. Education Technology and society, 8(1)104-112
- Adeyanju, J. L, (1987) *Creativity Learning and Learning Styles*. Isola Ola & Sons: Zaria.
- Ajadi, T., o., et al, (2008). *E-learning and Distance Education in Nigeria*. School of Education, National Open University of Nigeria. The Turkish Online Journal of Education Technology.
- Algahtani, A.F. (2011). *Evaluating the Effectiveness of the E-learning Experience in Some Universities in Saudi Arabia from Male Students' Perceptions*, Durham theses, Durham University.
- Amer, T. (2007). *E-learning and Education*, Cairo: Dar Alshehab publication
- Codone, S. (2001) *An E-Learning Primer*, Raytheon Interactive. Available from: <http://faculty.mercer.edu>
- Eger, L (2005). *Adult education technology*. 1st ed. Pilsen: University of West Bohemia, 2005. 171s. ISBN: 80-7043-398-1
- Friesen, N. (2009). *Re-thinking e-learning research: Foundations, methods and practices*. New York: Peter Lang.
- Hedgi, N., & Heyward, L., (2004). *University e-learning contributing to life-long learning in a networked world*. E-learning 1:128-145. Retrieved from www.nationmaster.com/country/ni/internet on 3rd May, 2010.
- Islam, M.T (1997). *Educational Technology for 21st century*. Observer magazine, Dhaka, May 9, 1997, pp. 3 – 4
- Jegade, O.J (2004): *Evolving a national policy on distance education. "An agenda for Implementation"*. Education today. Vol. 8 (3). Pp14 – 29.
- Kahiigi, E.K., Ekenberg, L., Hansson, H., Tusubira, F.F., & Danielson, M. (2008). *Exploring the e-learning state of the art*. The Electronic Journal of e-Learning, 6 (2), 77-88. Retrieved from <http://www.ejel.org>
- Kalantzis, Mary and Bill Cope. (2015). "Learning and New Media" Pp. 373-387 in *The Sage Handbook of learning*, edited by D.Scott and E. Hargreaves. Thousand Oaks CA: Sage.

Keegan, L. (2020). *Complete History of eLearning From 1923 – Present Day*. Retrieved from <https://skillscout.com/history-of-elearning/>

Khoo, C., C., (1994). *Interactive multimedia for teaching, learning and presentations*.

Klein, D. & Ware, M. (2003). *E-learning: new opportunities in continuing professional development*. *Learned publishing*, 16 (1) 34-46

MacManus, R.: *E-learning 2.0: All You Need To Know*. (2007). Adresa: retrieved from http://www.readwriteweb.com/archives/elearning_20_all_you_need_to_know.php.

Mangal, S. K. & Mangal, M. (2009). *Essentials of educational technology*. PHI Learning Private Limited. New Delhi – 110001.

Marc, J. R. (2002). Book review: *e-learning strategies for delivering knowledge in the digital age*. *Internet and Higher Education*, 5, 185-188.

N. Munkhtsetseg and S. Uyanga (2013), "*Implementation of E-Learning System: Findings and Lessons Learned*," *Intelligent Information Management*, Vol. 5 No. 1, pp. 18-24.

Smedley, J.K. (2010). *Modelling the impact of knowledge management using technology*. 23, 233–250.

Stacy, K. & Liz, R. (2008). *Teaching in virtual worlds: Opportunities and challenges*. *Issues in Informing Science and Information Science and Information Technology* Vol. 5, 127-134.

Wagner, N., Hassanein, K. & Head, M. (2008). *Who is responsible for E-learning in Higher Education? A Stakeholders' Analysis*. *Educational Technology & Society*, 11 (3), 26-36

APPENDICES

Appendix A - Project Document

IN-DEPTH PROJECT DOCUMENTATION

Full Candidate Name: Muhammad Hajara Hussaini.

Student ID: BU/19B/IT/3723

Title: Design and implementation of an e-learning system (A case study of Kaduna State Polytechnic).

Course of Study: B.Sc. Computer Science

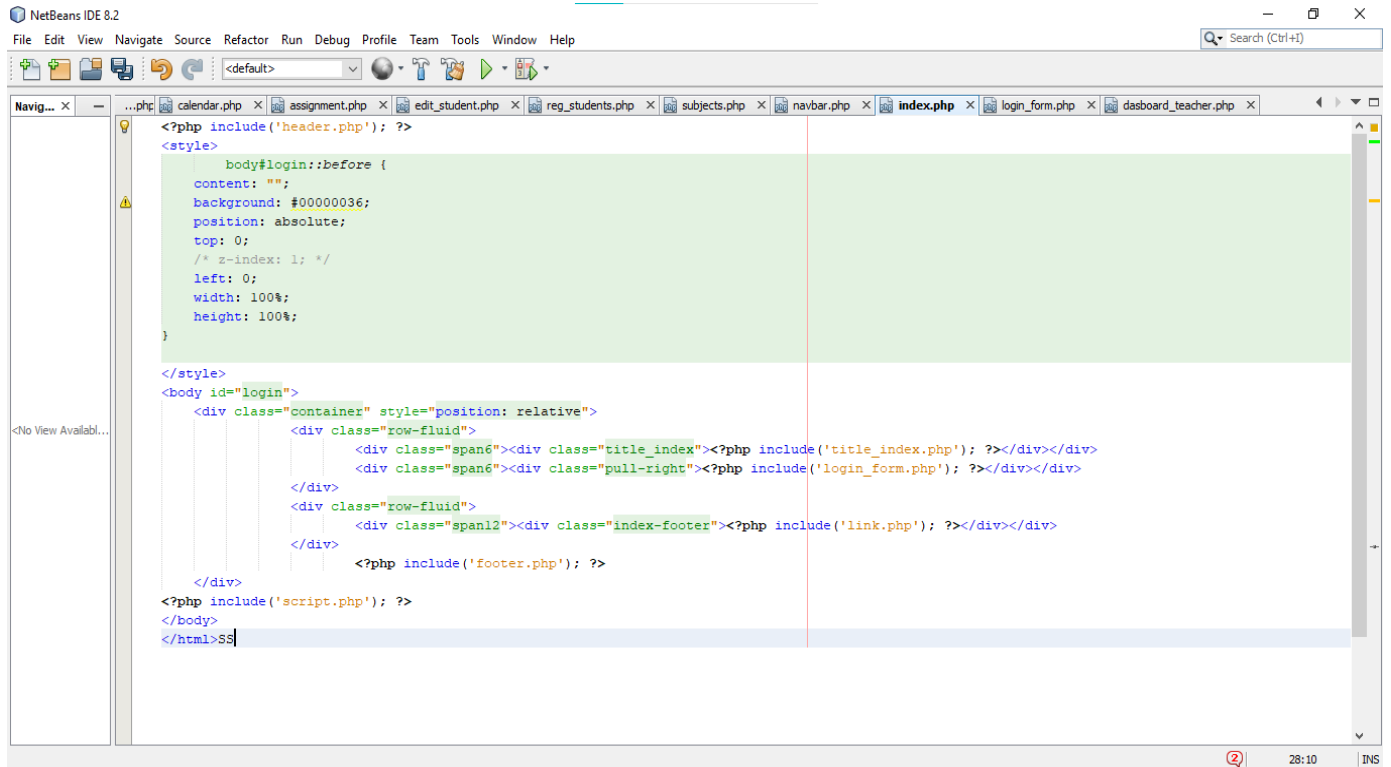
Task No.	Task Name	Duration	Start	Finish	Deliverable
1	Project plan	6 days	Jan 5 th , 2022	Jan 11 th , 2022	Work breakdown structure
2	Introduction	10 days	Jan 13 th , 2022	Jan 23 rd , 2022	Introductory chapter
3	Literature review	27 days	Jan 29 th , 2022	Feb 25 th , 2022.	Reviewed literature
4	System Analysis and Design	22 days	Feb 27 th , 2022.	March 20 th , 2022	System requirement specification which includes; Functional and non-functional requirements, UML models which includes the use case diagram, activity diagram, data flow diagram etc.

5	Implementation	32 days	Apr 3 rd 2022	May 4 th 2022	Source codes
6	Testing	9 days	May 5 th 2022	May 14 th 2022	System, unit and integration testing.

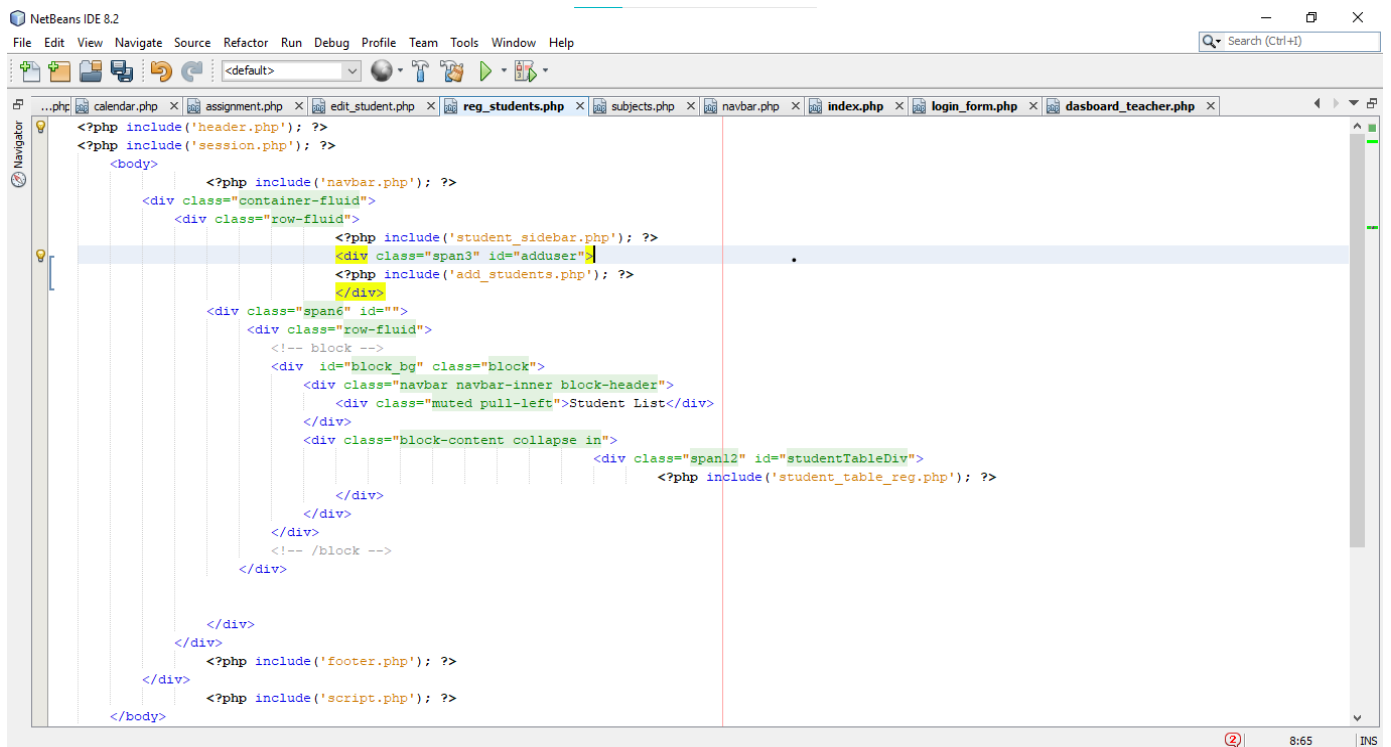
Appendix B - Proceedings of Interview

- Q1. Would you like a colourful and vibrant interface?
- Q2. Are the students exposed to the use of computers in the school for educational purposes?
- Q3. Would you prefer online or offline tests?
- Q4. Do you prefer to read materials or watch videos?
- Q5. How many faculties and departments does the school have?
- Q6. How many academic staffs are there in the school have?
- Q7. What challenges do you face while using papers for assignment submission?

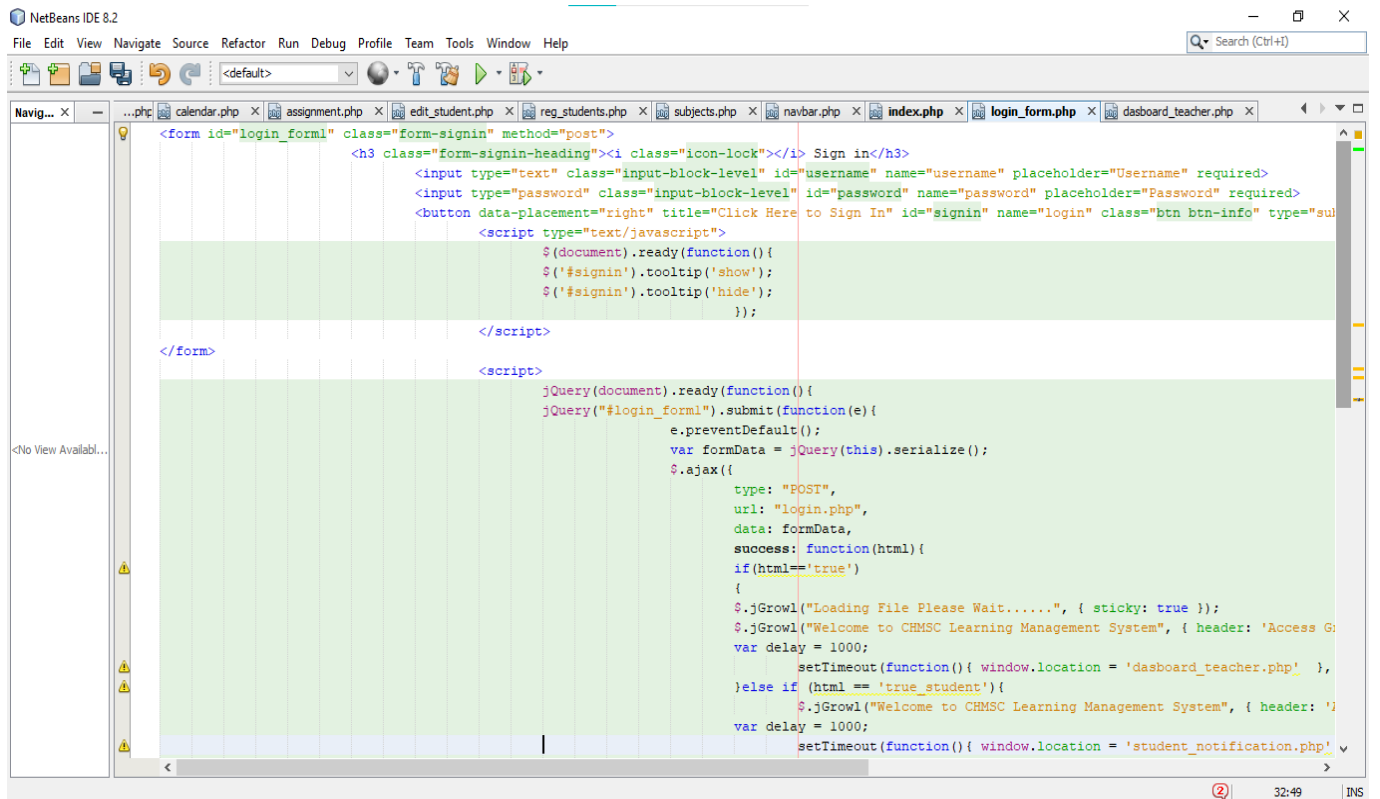
Appendix C – Source Codes



```
<?php include('header.php'); ?>
<style>
    body#login::before {
        content: "";
        background: #00000036;
        position: absolute;
        top: 0;
        /* z-index: 1; */
        left: 0;
        width: 100%;
        height: 100%;
    }
</style>
<body id="login">
    <div class="container" style="position: relative">
        <div class="row-fluid">
            <div class="span6"><div class="title_index"><?php include('title_index.php'); ?></div></div>
            <div class="span6"><div class="pull-right"><?php include('login_form.php'); ?></div></div>
        </div>
        <div class="row-fluid">
            <div class="span12"><div class="index-footer"><?php include('link.php'); ?></div></div>
        </div>
        <?php include('footer.php'); ?>
    </div>
<?php include('script.php'); ?>
</body>
</html>SS
```



```
<?php include('header.php'); ?>
<?php include('session.php'); ?>
<body>
    <?php include('navbar.php'); ?>
    <div class="container-fluid">
        <div class="row-fluid">
            <div class="span3" id="adduser">
                <?php include('add_students.php'); ?>
            </div>
            <div class="span6" id="">
                <div class="row-fluid">
                    <!-- block -->
                    <div id="block_bg" class="block">
                        <div class="navbar navbar-inner block-header">
                            <div class="muted pull-left">Student List</div>
                        </div>
                        <div class="block-content collapse in">
                            <div class="span12" id="studentTableDiv">
                                <?php include('student_table_reg.php'); ?>
                            </div>
                        </div>
                    </div>
                </div>
            </div>
        </div>
        <?php include('footer.php'); ?>
    </div>
    <?php include('script.php'); ?>
</body>
```



```

NetBeans IDE 8.2
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Search (Ctrl+F)

...php | calendar.php | assignment.php | edit_student.php | reg_students.php | subjects.php | navbar.php | index.php | login_form.php | dashboard_teacher.php

<?php include('header_dashboard.php'); ?>
<?php include('session.php'); ?>
<body id="class_div">
    <?php include('navbar_teacher.php'); ?>
    <div class="container-fluid">
        <div class="row-fluid">
            <?php include('teacher_sidebar.php'); ?>
            <div class="span6 id="content">
                <div class="row-fluid">
                    <!-- breadcrumb -->
                    <ul class="breadcrumb">
                        <?php
                            $school_year_query = mysqli_query($conn,"select * from school_year order by school_year DESC");
                            $school_year_query_row = mysqli_fetch_array($school_year_query);
                            $school_year = $school_year_query_row['school_year'];
                            ??
                        <li><a href="#"><b>My Class</b></a><span class="divider"></span></li>
                        <li><a href="#">School Year: <?php echo $school_year_query_row['school_year']; ?></a></li>
                    </ul>
                    <!-- end breadcrumb -->
                <!-- block -->
                <div class="block">
                    <div class="navbar navbar-inner block-header">
                        <div id="count_class" class="muted pull-right"></div>
                    </div>
                    <div class="block-content collapse in">
                        <div class="span12">
                            <?php include('teacher_class.php'); ?>
                        </div>
                    </div>
                </div>
            </div>
        </div>
    </div>
</body>
</div>

```

```

NetBeans IDE 8.2
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Search (Ctrl+F)

...php | calendar.php | assignment.php | edit_student.php | reg_students.php | subjects.php | navbar.php | index.php | login_form.php | dashboard_teacher.php

<?php include('header.php'); ?>
<?php include('session.php'); ?>
<body>
    <?php include('navbar.php'); ?>
    <div class="container-fluid">
        <div class="row-fluid">
            <?php include('assignment_sidebar.php'); ?>
            <div class="span9 id="content">
                <div class="row-fluid">
                    <!-- block -->
                    <div id="block_bg" class="block">
                        <div class="navbar navbar-inner block-header">
                            <div class="muted pull-left">Assignment File Uploaded List</div>
                        </div>
                        <div class="block-content collapse in">
                            <div class="span12">
                                <table cellpadding="0" cellspacing="0" border="0" class="table" id="example">
                                    <thead>
                                        <tr>
                                            <th>File Name</th>
                                            <th>Description</th>
                                            <th>Date Upload</th>
                                            <th>Upload By</th>
                                            <th>Class</th>
                                        </tr>
                                    </thead>
                                    <tbody>

```

```

<?php include('header_dashboard.php'); ?>
<?php include('session.php'); ?>

<body>

    <?php include('navbar_student.php'); ?>

    <div class="container-fluid">
        <div class="row-fluid">
            <div class="span9" id="content">
                <div class="row-fluid">
                    <!-- breadcrumb -->

                    <ul class="breadcrumb">
                        <?php
                            $school_year_query = mysqli_query($conn,"select * from school_year order by school_year DESC") or die(mysqli_error($conn));
                            $school_year_query_row = mysqli_fetch_array($school_year_query);
                            $school_year = $school_year_query_row['school_year'];
                        ?>
                        <li><a href="#"><b>My Class</b></a><span class="divider"></span></li>
                        <li><a href="#">School Year: <?php echo $school_year_query_row['school_year']; ?></a></li>
                    </ul>
                    <!-- end breadcrumb -->

                </div>
            </div>
        </div>
    </div>

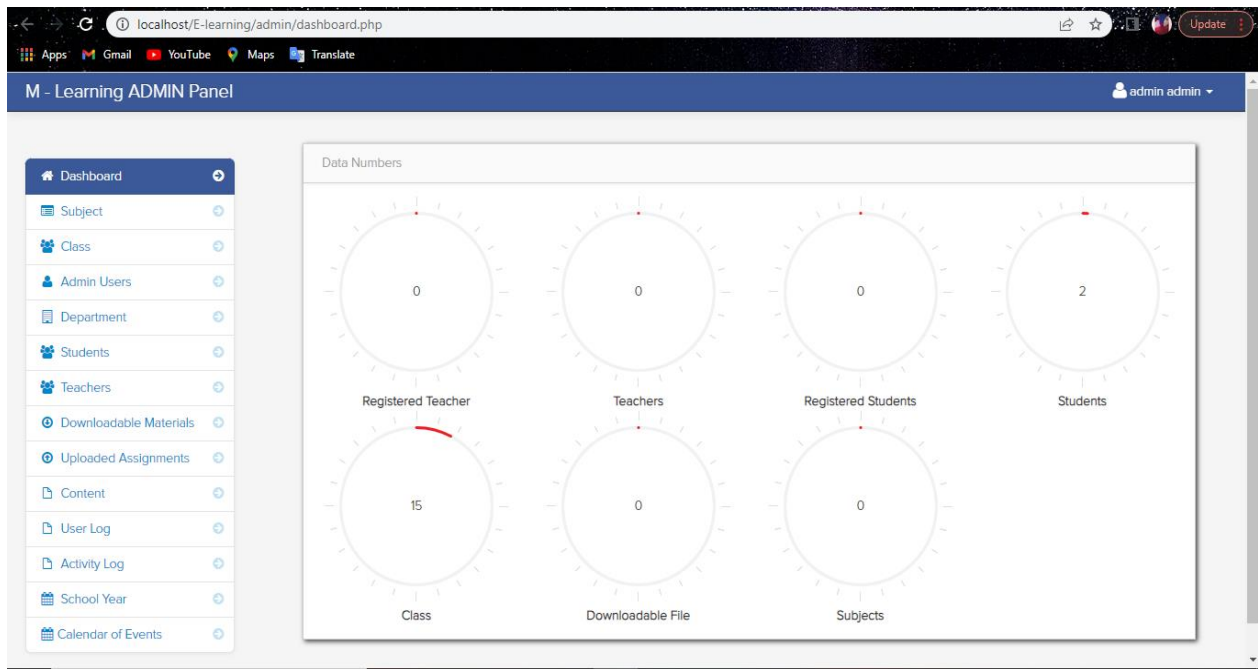
    <!-- block -->
    <div class="block">
        <div class="navbar navbar-inner block-header">
            <div id="" class="muted pull-right">
                <?php $query = mysqli_query($conn,"select * from teacher_class_student
                    LEFT JOIN teacher_class ON teacher_class.teach
                    LEFT JOIN class ON class.class_id = teacher_cl

```

See enclosed Compact Disk (CD) for complete code.

Appendix D – Test Cases

ADMIN PAGE



LOGIN PAGE

The screenshot shows the 'E - Learning' login page for the 'KADUNA STATE POLYTECHNIC E-LEARNING SYSTEM'. The page features a background image of a laptop and books. The main heading is 'E - Learning' with the tagline 'KADPOLY EXCELS: Excellence, Competence and Educational Leadership in Science and Technology'. On the right side, there are two login forms:

Sign in

Username: Hajara
Password:
[Sign in]

New to KAD POLY E-LEARNING SYSTEM

[Sign up]
[I'm a Student] [I'm a Teacher]

STUDENT SIGN UP PAGE

KADUNA STATE POLYTECHNIC E-LEARNING SYSTEM

E - Learning

KADPOLY EXCELS:
Excellence, Competence and Educational
Leadership in Science and Technology

Sign up as Student

ID Number

Firstname

Lastname

Class

Password

Re-type Password

☒ Sign in

[Click here to Login](#)

TEACHER SIGN UP PAGE

KADUNA STATE POLYTECHNIC E-LEARNING SYSTEM

E - Learning

KADPOLY EXCELS:
Excellence, Competence and Educational
Leadership in Science and Technology

Sign up as Teacher

Firstname

Lastname

Department

Username

Password

Re-type Password

☒ Sign in

[Click here to Login](#)

Appendix E – User Guide/Manual

1. SYSTEM OVERVIEW

The application is a web-based application which means it only run-on web browsers like google chrome, safari, opera etc. The e-learning system would function in such a way that a user would register with the system via the admin, followed by signing in. When signing in, the user will input relevant information depending on the questions prompted by the sign in page.

2. ADMIN PANEL

The admin takes charge of registering the subjects to be taken, the classes, departments, the students and the teachers. The admin can also view the records of the downloaded materials and uploaded assignments. The admin also takes the responsibility of viewing contents, user logs, activity logs and preparation of calendar of events.

3. STUDENT PANEL

When the student logs in, the page will display some options to choose which are my class, notification, message and backpack. The button “My Class” leads to the various classes the student is added to. This page displays various options with the labels: My classmates, my progress, subject overview, downloadable materials, assignments, announcements, class calendar and quiz. Any option selected will redirect the student to the chosen page.

4. TEACHER PANEL

When a teacher logs in, the page will display some options to choose which are my class, notification, message, backpack, add downloadables, add announcements, add assignment, and add quiz. Any option selected will redirect the teacher to the chosen page.

On