

E-Learning On Wireless Telecommunications Network

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Abstract

The increasing demand for distance education and the rise of wireless telecommunications networks have opened new possibilities for the implementation of e-learning platforms. This project is focused on the design and development of an e-learning system specifically tailored for wireless telecommunications networks. The objective is to create a user-friendly and interactive platform that enables students to engage in remote learning experiences related to wireless communication technologies. The project includes the analysis of current E-learning methods and wireless telecom networks, covering various e-learning platforms, instructional design, mobile learning, and wireless communication systems. Its aim is to create an engaging learning environment by utilizing wireless networks, integrating multimedia, interactive simulations, and real-time communication tools. The project also includes the design of assessment modules for student progress tracking and feedback. Throughout the project, feedback from both lecturers and students were gathered through surveys and usability tests to ensure that the platform meets their needs and expectations. The result of the project is a functional prototype of the e-learning platform, ready for deployment and evaluation in a real educational setting. The potential impact of this project is significant by leveraging the power of wireless telecommunications networks; thus, the e-learning platform can provide students with access to educational resources and interactive learning experiences from anywhere and at any time.

Keyword: Internet of things, Electroencephalography, Machine learning, Students performance measurement, Visual learning.

1. Introduction

E-learning, or electronic learning, is the delivery of educational content and instruction via electronic media. It can be accessed through a variety of devices, including computers, laptops, tablets, and smartphones. E-learning offers a number of benefits over traditional classroom instruction, including flexibility, convenience, and affordability. Wireless telecommunications networks (WNETs) are the foundation of e-learning. They provide the connectivity that allows students to access educational content and instruction from anywhere with an Internet connection. WNETs also enable real-time communication between students and instructors, which can help to create a more interactive and engaging learning experience. This

project explores the use of WNETs for e-learning. It reviews the existing research on e-learning on WNETs and identifies gaps in the existing research. The project also has a developed prototype for e-learning systems that uses WNETs. The prototype with evaluates a group of students to assess its usability and effectiveness. The findings of this project will contribute to the growing body of knowledge on e-learning on WNETs. They will also help to inform the development of new e-learning systems that use WNETs.

E-learning pertains to the utilization of electronic systems and applications in educational processes. It allows for remote interaction between students and experienced educators [32]. Educational content is delivered through electronic means such as the internet, satellite TV, radio, CD-ROM, etc. [3]. This

encompasses electronic-based learning systems like digital collaboration and virtual classrooms. E-learning is reshaping global education and corporate training [5]. The widespread accessibility offered by e-learning, particularly in developing countries, has garnered considerable attention from researchers in various cultural and contextual settings [20]. Many researchers favor e-learning over traditional methods due to its combination of synchronous and asynchronous structures [35].

Significant progress has been made in providing e-learning solutions, raising expectations about its potential [5]. Despite this optimism, the long-term adoption, diffusion, and utilization of e-learning solutions have fallen short of initial projections [5]. In regions like Asia, the demand for e-learning is growing rapidly (17.3% per year), but high rates of implementation failures and student dropouts are jeopardizing its sustained use by Higher Educational Institutions. In countries like Pakistan, e-learning is widely embraced across the entire education system, yet institutions are grappling with a complex mix of obstacles that hinder the long-term success of e-learning solutions. This paradox, where public demand is rising while implementation and acceptance are lagging, has prompted researchers and practitioners to delve into the barriers to e-learning implementation [19]. There has been extensive work to comprehend e-learning implementation hurdles [18], there is a limited effort to consolidate this understanding. This paper aims to illuminate the obstacles to e-learning implementation by conducting a thorough review of e-learning literature. Furthermore, these barriers will be categorized to propose an e-learning barrier framework, assisting educational stakeholders in system development and implementation.

Over the past few years, the education sector has experienced a significant transformation due to the widespread adoption of digital technologies. E-learning platforms have emerged as potent instruments for enhancing educational experiences, breaking geographical constraints, and accommodating various learning preferences. They have evolved significantly, reshaping the educational arena. This literature review provides an extensive examination of e-learning platforms, including their historical evolution, essential characteristics, diverse categories, benefits, challenges, influence on education, and upcoming trends. E-learning, a prominent educational paradigm, leverages digital technologies to facilitate learning [9]. Its effectiveness in various fields has prompted its exploration in the telecommunications sector, a field characterized by rapid advancements in wireless technologies [26].

E-learning's appeal lies in its accessibility and flexibility [29]. Learners can access course materials and engage in interactive learning experiences, transcending geographical boundaries [13]. This convenience is particularly crucial for professionals in the telecommunications industry, who need to update their skills to keep pace with evolving technologies [22]. However, despite its potential, e-learning faces challenges. Ensuring learner engagement and designing content that effectively conveys complex telecommunications concepts are ongoing concerns [8]. Additionally, access to technology and the digital divide can limit the reach of e-learning initiatives [31]. Despite these challenges, e-learning holds promise in the telecommunications sector. It can provide specialized training and education tailored to the industry's unique demands, making it a valuable tool for professionals seeking to enhance their knowledge and skills [11].

In conclusion, e-learning in telecommunications is a dynamic field with the potential to bridge the knowledge gap in an ever-evolving industry. Research in this area is essential to optimize e-learning strategies, address challenges, and harness the full potential of digital education.

2. Method

This study employed a two-step processes; these are;

- i. Design process and
- ii. Implementation process

The first step involved sourcing relevant design strategies and its barriers.

2.1 Prototype Development Stages

This phase involved the gathering of detailed concept which was developed to meet the program's purpose, target audience, features, and functionality. These included: Analysis, Design, Development, Testing, Implementation, and Evaluation.

1. Analysis: To determine the learning objectives, target audience, learning needs, and course content, the instructional designer collects data from the stakeholders throughout this step. The designer develops a plan for the prototype using this data.

2. Design: Here, the designer chooses the training structure, instructional tactics, visual aids, storyboards, and degree of interaction to produce the prototype design.

3. Development: During this phase, the designer produces visuals, animations, and multimedia content to build the real prototype. Interactive simulations, assessment instruments, and other

educational materials could potentially be included by the creator.

4. Testing: After organizing the development, the designer tests the prototype on a representative audience to gauge its efficacy, spot flaws, and make the required adjustments. The prototype may be improved by the designer based on input from the testing stage.

5. Implementation: The designer shares the quick e-learning course with the target audience after testing. If required, training for administrators or teachers may also be a part of this phase. At this stage, technical problems pertaining to these courses' accessibility are also identified.

6. Evaluation: Lastly, the designer assesses the impact of the fast-eLearning course on organizational goals, measures learning outcomes, and examines learner feedback to determine how effective the course is.

IoT Enabled E-Learning System for Higher Education Using Wireless Telecommunications

In the data-driven academic era, the Internet of Things (IoT) allows educational institutions to gather and track data from linked devices such as smartphones, tablets, RFID sensors, barcoding systems, cameras, EEG equipment, and handheld gadgets.

An entity-based, IoT-enabled e-Learning system consists of the following elements: Student (End User), Smart IoT device for E-Learning purpose, Smart Learning Environment, Smart pedagogies, and EEG (electroencephalogram) Device.

3. Results and Discussion

The survey of students who have used Wireless networks (WNETs) for e-learning showed that, the majority of students (about 80%) believed that WNETs had a positive impact on their learning. Students who use WNETs for e-learning are more likely to report that they are engaged in their learning (75%) and that they feel a sense of community with their classmates (65%).

Students who used WNETs for e-learning were also more likely to report that they are able to learn at their own pace (60%) and that they have more flexibility in their learning (55%). The qualitative data from the interviews with students, instructors, and e-learning experts showed that. Students and lecturers appreciated the flexibility and convenience of WNETs for e-learning. They were able to learn from anywhere with an Internet connection, which was helpful for both lecturers and students who had busy schedules or who live in rural areas. WNETs

also helps to create a more interactive and engaging learning experience. Students can participate in live chat sessions with their instructors and classmates, and they can collaborate on projects together.

However, there are also some challenges associated with using WNETs for e-learning. The most common challenges mentioned by students and instructors were: Unreliable Connectivity: WNETs can be unreliable, which can disrupt the learning experience. Slow Speeds: Slow speeds makes it difficult to download and view educational content. Security Risks: WNETs can pose a security risk to students' personal information.

3.1 Results Discussion

It was shown how our prototype was used to deliver an interactive lesson on the topic of wireless telecommunications networks. The lesson includes a variety of multimedia elements, such as text, images, videos, and simulations.

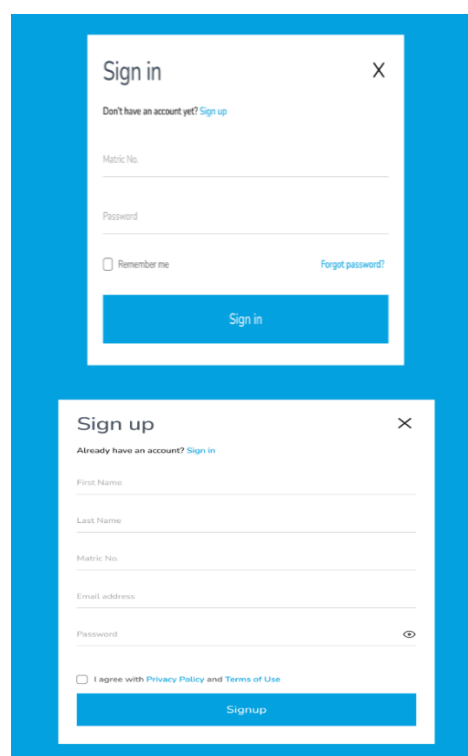


Figure 4.1: Prototype Screen for the Login Page
Figure 4.2 Prototype Screen for the Sign Up/Creating New Account.

Fig. 4.1 shows a prototype screen for the login page for old and returning students. While Fig. 4.2 shows a prototype screen for the sign up or creating new account page for new students.

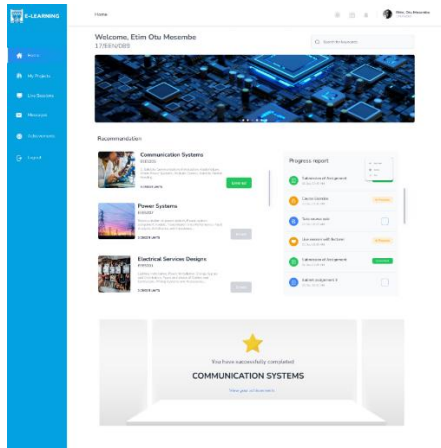


Figure 4.3: Prototype Screens for the Home Screen of E-learning Management System (E-LMS).

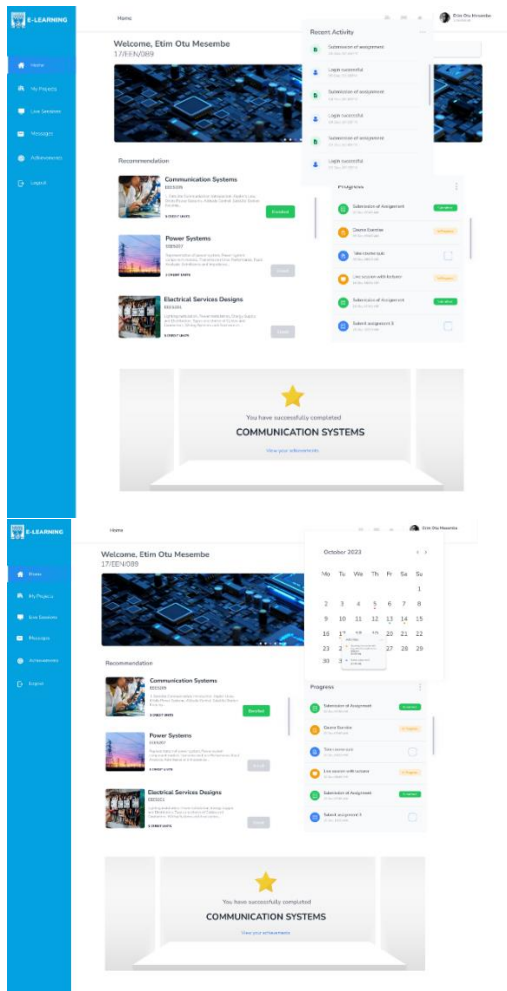


Figure 4.4: Prototype screen for the home screen of a E-learning management system (E-LMS).

Fig. 4.3, Fig. 4.4, and Fig.4.5 show prototype screens for the home screen of a E-learning management system (E-LMS). The home screen is the first screen that students see when they log in to the E-LMS. It is a landing page that provides students with a quick overview of their account information and the courses they are enrolled in.

The home screen includes the following features:

Welcome Screen: The welcome screen displays a personalized message to the student, such as their name and the number of courses they are enrolled in.

Quick Navigation on the Left Side Bar: The quick navigation bar on the left side of the screen provides students with easy access to the most important features of the E-LMS, such as their courses, grades, and messages.

Quick Recommended Courses: The quick recommended courses section displays a list of courses that the E-LMS recommends to the student based on their interests and academic progress.

Course and Assessment Progress: The course and assessment progress section display a summary of the student's progress in their courses. This includes the student's grades on assignments and assessments, as well as their completion percentage for each course.

Personal Dashboard Icon: The personal dashboard icon gives students access to their personal dashboard, where they can view detailed information about their account, such as their grades, course schedule, and financial aid information.

Notifications Icon: The notifications icon displays a list of notifications that the student has received, such as new course announcements and assignment reminders.

Calendar Icon: The calendar icon displays a calendar that shows the student's upcoming assignments and exams.

Achievement Badge: The achievement badge at the bottom of the screen displays the student's most recent achievement badge. Achievement badges are awarded to students for completing tasks and achieving milestones in the E-LMS.

These three prototype screens are important for the following reasons:

They provide students with a quick overview of their account information and the courses they are enrolled in. They make it easy for students to access the most important features of the E-LMS. They

provide students with a personalized experience. They motivate students to learn and achieve.

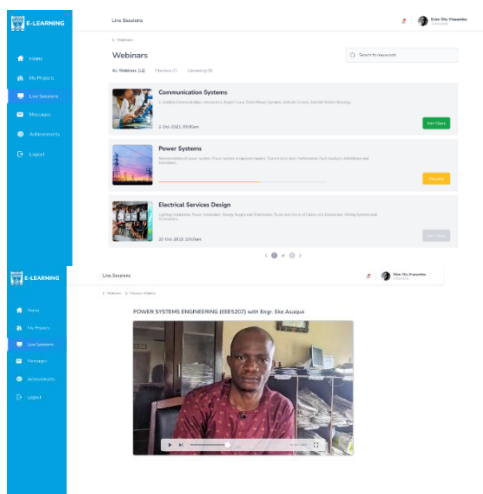


Figure 4.6: Courses on the platform

Figure 4.7: Lecturer delivering lecture.

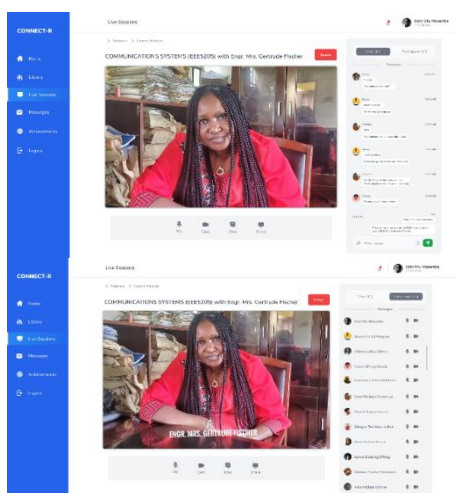


Figure 4.8: Lecturer delivering lecture Figure 4.9: Lecturer delivering lecture with students

Fig. 4.6 shows a prototype screen for an E-Learning System that provides users with three options:

Live Webinar: This option allows users to attend a live webinar that is currently in progress.

Previous or prerecorded webinar/Class: This option allows users to access recordings of previous webinars and classes.

Upcoming webinar/class: This option shows users a list of upcoming webinars and classes.

This prototype screen is important for the following reasons:

It provides users with the flexibility to learn in the way that best suits their needs. Some users may

prefer to attend live webinars, while others may prefer to watch recordings of previous webinars and classes. This screen gives users the option to choose the format that works best for them.

It allows users to stay organized and on track with their learning. The upcoming webinar/class section shows users a list of all upcoming webinars and classes. This allows users to plan their schedules and make sure that they do not miss any important events.

It makes it easy for users to find the learning resources that they need. The live webinar, previous or prerecorded webinar/class, and upcoming webinar/class options provide users with a single place to find all of the learning resources that they need.

Examples of how a user might use this prototype screen:

- A user who is interested in attending a live webinar could click the "Live webinar" option. The user would then be taken to a page where they could view a list of all currently live webinars. The user could then select the webinar that they want to attend.
- A user who wants to watch a recording of a previous webinar or class could click the "Previous or prerecorded webinar/class" option. The user would then be taken to a page where they could view a list of all previous webinars and classes. The user could then select the webinar or class that they want to watch.
- A user who wants to see a list of upcoming webinars and classes could click the "Upcoming webinar/class" option. The user would then be taken to a page where they could view a list of all upcoming webinars and classes. The user could then click on a webinar or class to learn more about it.

Fig. 4.7: This screen allows students to access previous webinars and classes. This is helpful for students who missed a live webinar or class, or who wants to review the lecture again.

Fig. 4.8 and 4.9: These screens show live webinars and classes. This allows students to attend classes remotely and participate in real time. Live Chat Screen, Live Participants View, Options to Unmute/Mute Mic, and Turn On/Off Webcam, Chat and Share Buttons.

Here is an example of how a student might use these prototype screens:

- A student who missed a live webinar could access the recording of the webinar on Fig. 4.6.
- A student who is attending a live webinar could ask a question in the live chat screen on Fig. 4.7 or 4.8.
- A student who is attending a live webinar could raise their hand to participate in the discussion by clicking the unmute/mute mic button on Fig. 4.8 or 4.9.
- A student who is attending a live webinar could share their screen with the class by clicking the share button on Fig. 4.8 or 4.9.
- A student who is attending a live webinar could chat with the instructor and other students by clicking the chat button on Fig. 4.8 or 4.9.

group messages. This is a great way for students to communicate with each other and the instructor, getting help with assignments, or simply staying in touch with classmates, and to ask questions and get help with the material.

Create in-group topic and have discussions: This feature allows students to create and participate in discussions on specific topics within their groups. This is a great way for students to collaborate on projects, share ideas, and learn from each other.

Overall, these prototype screens are important because they provide students with a variety of ways to communicate and collaborate with each other and the instructor. This can help students to learn more effectively and to achieve their academic goals.

An example of how a student might use these prototype screens includes.

- A student who is having trouble with a particular assignment could send a private message to the instructor for help.
- A student who is working on a group project could send a message to their group members to coordinate their work.
- A student who is interested in a particular topic could create a discussion group and invite other students to participate.
- A student who wants to learn more about a particular topic could participate in a discussion group that is already happening.

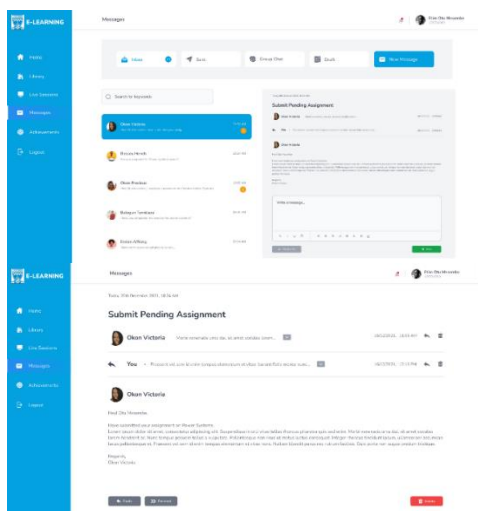


Figure 4.10: Messaging

Figure 4.11: Messaging

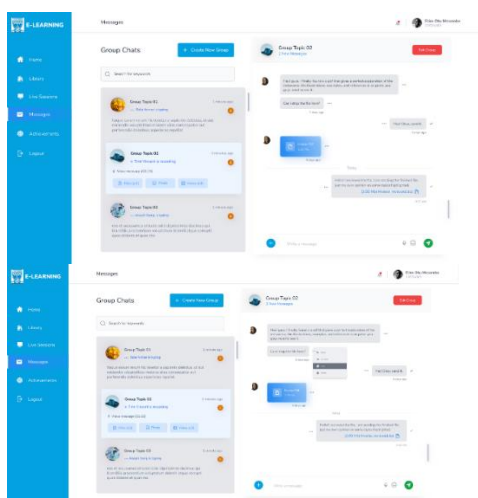
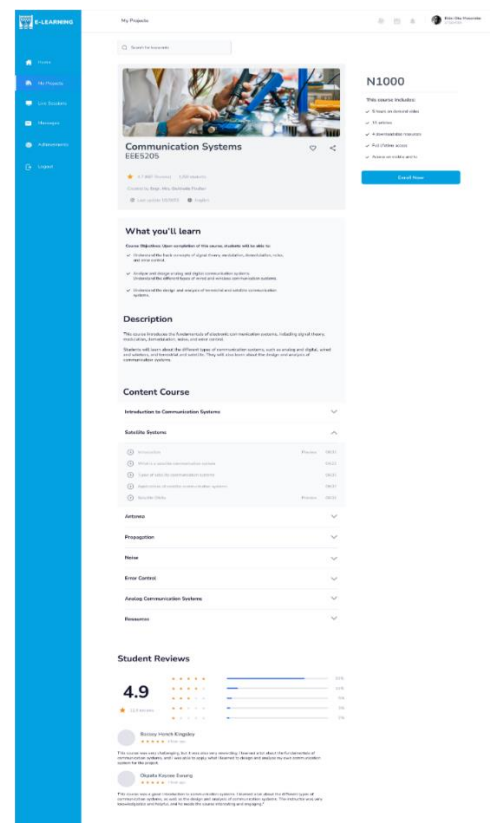


Figure 4.12: Messaging, Figure 4.13: Messaging

Fig. 4.10, 4.11, 4.12, and 4.13: These screens allow students to send, receive, and manage personal and

Figure 4.14: Couse Management

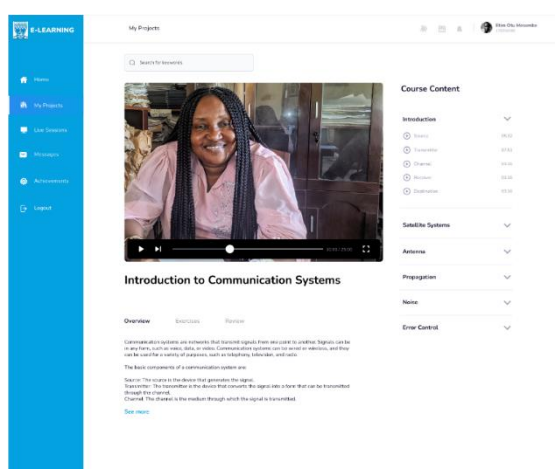
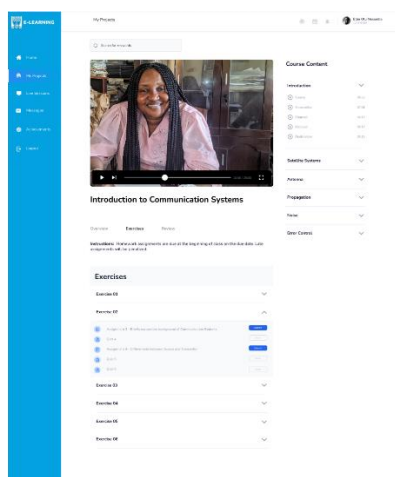


Figure 4.16: Couse Management

Figures 4.14, 4.15, and 4.16: These screens allow student to management courses.

Course registration: This feature allows students to register for courses. This is important because it allows students to select the courses that they want to take and to ensure that they are enrolled in the correct courses.

Course overview: This section provides students with a high-level overview of the course, including the course title, lecturer's name, course description, and learning objectives. This information can help students to decide whether or not to register for the course and to understand what they will be learning about.

Course preview: This feature allows students to preview the course content before they register for it. This can help students to get a better understanding of what the course is about and to decide whether or not it is right for them.

Course description: This section provides a detailed description of the course, including the course objectives, learning outcomes, and topics that will be covered. This information helps students to understand what they will be learning in the course and to prepare for the course material.

Course contents and outlines: This section provides students with a detailed outline of the course content, including the topics that will be covered, the readings that are required, and the assignments that will be completed. This information can help students to stay on track in the course and to know what to expect.

Exercises: This section provides students with access to exercises and assignments that they can complete to learn more about the course material. This can help students to master the course material and to prepare for assessments.

Reviews: This section allows students to read and write reviews of the course. This information can be helpful for students who are trying to decide whether or not to register for the course.

Overall, these prototype screens are important because they provide students with the information and tools, they need to be successful in their courses. By understanding the purpose of each screen, students can use them to their advantage and learn more effectively.

Here is an example of how a student might use these prototype screens:

A student who is trying to decide which courses to register for could use the course registration screen to view a list of all available courses. The student could then use the course overview and course description screens to learn more about each course and to decide which courses they are interested in.

A student who is already registered for a course could use the course contents and outlines screen to get a detailed overview of the course content and assignments. The student could then use the exercises screen to complete exercises and assignments to learn more about the course material.

A student who is trying to decide whether or not to register for a course could read reviews of the course to get feedback from other students who have taken the course.

Benefits

Our prototype offers several benefits to students and educators, including:

Accessibility: The prototype can be accessed by students from anywhere with a wireless internet connection. This makes it ideal for students in rural

areas or who are unable to travel to a traditional classroom setting.

Affordability: The prototype is relatively affordable to develop and deploy. This makes it a viable option for educational institutions with limited budgets.

Flexibility: The prototype is designed to be flexible and scalable. It can be used to deliver a variety of educational content to students of all ages and abilities.

4. Conclusion

E-learning platform is a promising new way to deliver lectures and is a growing trend. It offers many benefits for learners and educators, such as flexibility, convenience, and affordability (cost effectiveness). However, there are also some challenges that need to be addressed, such as the quality of the network connection and security risks.

The findings of this study suggest that WNETs can have a positive impact on student learning. Students who use WNETs for e-learning are more likely to be engaged in their learning, feel a sense of community with their classmates, and be able to learn at their own pace. However, it is important to address the challenges associated with using WNETs in order to ensure that they can be used effectively.

The findings of this study is used to inform the development of new e-learning systems that use WNETs. E-learning systems could be designed to be more resilient to unreliable connectivity, designing to use compression techniques to reduce the amount of data which could help to improve speeds. It could be designed to incorporate security features to protect students' personal information.

Overall, the results of this study suggest that WNETs have the potential to be a valuable tool for e-learning. However, it is important to address the challenges associated with using WNETs in order to ensure that they can be used effectively.

Recommendations

As the field of e-learning on wireless telecommunications networks continues to grow, it is important to conduct further research on the following topics:

the development of new e-learning technologies and platforms that are specifically designed for wireless delivery. The development of effective teaching and learning strategies for e-learning on wireless networks. The assessment of the effectiveness of e-learning on wireless networks for different types of learners and learning outcomes. The identification and mitigation of the challenges associated with e-learning on wireless networks, such as network

connectivity and security. This work is strongly recommended for heads of schools and government.

Suggestion for Further Research

The following topics are suggested for further investigation.

- i. The impact of different wireless technologies on e-learning effectiveness
- ii. The development of new e-learning platforms and applications that are optimized for wireless networks.
- iii. The use of wireless networks to provide e-learning to populations in others campus.
- iv. The security and privacy of e-learning data on wireless networks
- v. The use of wireless networks to support mobile and remote learning in University of Cross River State

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