

Navigating the Future of Education: Creating a Web-Based E-learning System for Al-Nahrain University's College of Science

Suhad A. Yousif¹, Ali Safaa Jabbar¹

¹Department of Computer Science, College of Science, Al-Nahrain University, Baghdad, Iraq

Abstract—The harsh lockdowns due to the COVID-19 disease have accelerated the move from traditional learning models to online and blended forms. Thus, all conventional face-to-face learning classroom interactions were suspended., however, it is crucial to realize that the need for blended learning is far beyond the consequences of the pandemic; blended learning is an essential component of modern education. Therefore, there is an increased need for the development and use of web or mobile applications capable of satisfying the unique needs of E-learning. In this paper, the platform's distribution is feature-rich and includes various systems such as video lectures, AI-assisted videos, text reading materials, specialized topic books, and assessment forms, covering all needs and preferences in learning. The system was developed using Scrum Agile and was developed and programmed using HTML, CSS, JavaScript, and bootstrap5 for front development, while PHP and MySQL were used for the back-end administration. The platform is made up of administrators, teachers, and students. It allowed for effective usage management from the perspective of the three parties. The web-based platform design was expected to spread the scope of the models blended and usage posture and effectiveness. accomplished in the continuous operation and utilization of video lectures and online assessment in facilitating continuous flaw lecture and student interaction.

1. Introduction

The appearance of the new illness, Covid-19, came out of nowhere. On March 11, 2020, it was classified as a pandemic by the World Health Organization. Restricting global travel, capping public meetings, and imposing full-scale lockdowns to curb the spread of this previously unknown disease is the minimum that the governments could do [1,2]. However, the traditional attendance of students at school and university was compromised. As a result, the education industry, faced with these previously unforeseen circumstances, had to change rapidly. Educators and students had to switch to online platforms. Also, the twenty-first century is an era of digital innovation, which redefines certain aspects of our existence, and education does not represent an exception.

The creation and growth of numerous web-based platforms have introduced a new epoch signaling the end of a traditional classroom as an exclusive instrument of knowledge-sharing and learning. On the contrary, it has become accessible to all, adjustable to one's individual preferences, and customizable in various aspects [3]. The existence of such platforms is possible due to the astonishing potential of the Internet, possessing the unlimited capability of equalizing people in terms of education and providing learners with the opportunity to access a vast number of resources and knowledge. The developments in the digital domain signal a significant shift towards ensuring that, nowadays, anyone, just everyone, can engage in learning and professional development without the limitations of geography and financial situation. The potential of E-learning lies in the rapid transformation of education, especially regarding educational platforms offering numerous courses, including edX and Coursera [4]. They are scalable and can serve a broad audience, from beginners to professionals. Such a digital revolution creates an environment promoting lifelong learning, constant adaptation to numerous changes, and the need for multiple new skills and knowledge. However, there are significant issues that need to be addressed to ensure the appearance of web-based platforms with enhanced accessibility to education. The context of E-learning is characterized by the limited possibility of adapting to one's pace and preferred learning paths, as well as scalability limitations and the issue of interactive tools [3]. These factors influence the capacity of educational platforms to satisfy the demands of the audience across the globe. The purpose of the paper is to address these limitations by creating an E-learning system that goes online but adapts to one's needs, engages in the educational process, and promotes interactivity. The project seeks to offer an informed perspective on the current state of education and combine it with the integration of state-of-the-art technologies, making a serious contribution to the digital learning environment by making education more accessible, appealing, and effective across the globe.

In the following section, Section Two, prior research and developments are detailed. Section Three outlines the proposed Web-Based E-learning system, emphasizing key aspects of software engineering. Conclusively, Section Four presents the Conclusion.

2. Related Work

Extensive bodies of scholarly literature have been produced on the landscape of web-based E-learning, exemplifying its central typology in the 21st century's academic realm. The outbreak of the COVID-19 pandemic, in a particular milieu, has demonstrated that the issue of E-learning platforms will become even more relevant in the twenty-first century due to mass disruptions. Alfayez, Zainab Hameed, and Iman Mohsin Hassan [3] amid the COVID-19 pandemic, a noteworthy study developed a web-based learning platform for the University of Basrah, designed to sustain education during crises. Employing an agile methodology, the system featured multimedia lectures, interactive quizzes, and digital certification, aimed at fostering engagement between students and teachers. The platform accommodated administrators, teachers, and students, proving its versatility. An evaluative study confirmed its effectiveness, underscoring the critical role such systems play in ensuring educational continuity amidst disruptions. This contribution is significant for its practical application and insight into e-learning adaptability. Technological Innovations in E-learning, Al-Imarah, A., Gordon Gillespie, H., & MacKenzie, J. [5] emphasized how web-based solutions have revolutionized the experiences students receive. They conceptualize a shift from a structured and standardized to an interactive, and individual-assisted approach. The reviewers also pressed the critical import of further research to ease navigation in a dynamic E-learning environment, in which technologies are rapidly advancing; therefore, it is not always easy for students across the world to obtain access to them, or motivate students. Evolution and trends in E-learning by Hsu, Y. C., Ho, H. N. J., Tsai, C. C., Hwang, G. J., Chu, H. C., Wang C. Y., & Chen, N. S. [6] analyzed technology-based learning studies over ten years and concludes that multimedia and interactive learning are profound trends. This measure is a striking confirmation of the trend accelerating in the future, aiming at enabling more engaging and valuable learning for the international student body. Broadening the E-learning Definition Sangrà, A., Vlachopoulos, D. & Cabrera, N. [7] proposed a new inclusive definition of E-learning, that may cover all its shapes and forms, embracing the full scope of technology-assisted learning. With this definition, it is easier to comprehend that E-learning must not be a mere digital twin of traditional academic studies. Novel experiences were offered, to try diversifying supplies to meet diversified preferences.

3. Proposed Web-Based E-learning System

When it comes to system development, the seven critical points of software engineering will significantly ensure that a robust, efficient, and scalable system is developed. Figure 1 shows the general concept of our proposed system.

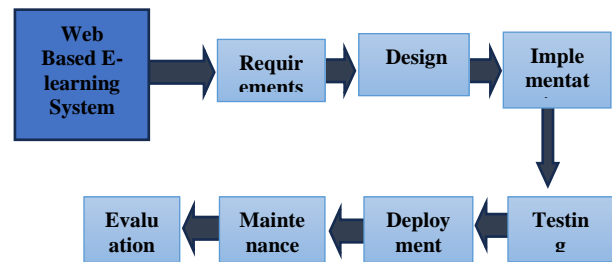


Fig. 1: Seven Critical Points of Software Engineering

In the upcoming sections, a thorough examination of the proposed system depicted in Figure 1 will be presented. This analysis will encompass all facets of the model pertinent to software engineering, offering an in-depth insight into its architecture and features.

3.1 System Requirements

The system requirements for a web-based E-learning platform will need to cover the following aspects to be defined: **first**, for whom we are building the system. Identifying the target audience is key to the customization of system-design and extending the range of functionalities. Are we talking about students, or are we talking about the teachers, or perhaps, we need to meet both of these categories? **Second**, one will also need to specify the list of features that must be embedded in the platform to perform the main functions. The main functionality here may suggest the capacity to develop a course, the ability to upload videos, or passing quizzes. One must outline each of these features to fully understand the end-user's expectations and goals. **Third**, one will need to choose the technology that occupies the best technical capabilities and expertise of the development team. ASP.NET and SQL Server or PHP and MySQL. The right choice will imply the performance, scalability, and further cost of maintenance of the platform requirement Analysis.

3.2 System Design

Created high-level design that streamlines processes, provides an outline of the software system and its components, and defines interfaces. Figure 2 represents the block diagram for a web-based E-learning system is a structured representation of the system user interaction flow, and database management process involved.

The description of the diagram is as follows. It provides the main component of a web-based E-learning platform, with user interaction and content management at the center. At the heart, users are the interaction points with "display course", "contact", "home", "login", and "signup". The interaction points form the virtual circle that enables users to navigate through the platform's offerings. Additionally, the users are of two designs: student and admin. The latter has the functions, "update", "delete" and "insertion". These suggest the capability of the admin in content management to the viability

of the platform. It also means course content can constantly be updated, and student's inquiries can easily be managed for informed experience.

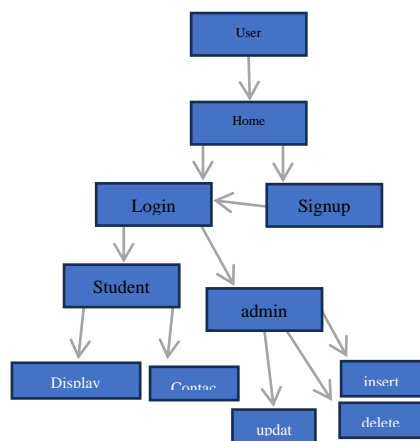


Fig. 2: Structured Representation for Web-Based E-learning system

A.

3.3 System Implementation:

As we shall subsequently discuss, our implementation journey culminated in building a sophisticated web-based E-learning system. We shall track each segment of the paper here to guarantee a comfortable and stress-free learning journey. Our paper was overwhelmingly split into Front-end and Back-end. The front end was crafted using HTML, CSS, JavaScript, and Bootstrap 5 to actualize a user-friendly interface. The backend, on the other hand, involved undertaking a robust development using PHP and MySQL idealistic towards efficient data management and content delivery.

3.3.1 Front End and Backend

In essence, the homepage serves as a gateway for both the user and the administrator by providing a short yet comprehensive description of what the website has to offer. Ideally, it is designed to ensure that the user enjoys a smooth user experience throughout the various devices by calming out the colors to guarantee satisfaction. The most central role of the homepage is to guide the user by offering a brief of what to expect and how to transverse the diverse services, as well as ease in reporting any concerns through an issue-reporting homepage feature. One of the most interesting aspects of the homepage is its fielding technology, which uses artificial intelligence to provide the user with pointers and trends about their likes and preferences based on their activity. Overall, the homepage balances utility, user-friendliness, and innovation by creating a conducive and enabling

environment for interaction that encourages them to explore and write reviews.



Fig 3: Front End Home Page

Login and sign up

The login page acts as an essential checkpoint for using the site features by ensuring safe access for both the users and the administrators and preventing entry without authorization. It also allows the user to authenticate to the site and permits distinct permissions depending on the group they fall into. To the user, the website provides an option to create a new account, which will enable them to register and log in to access the site features. Once this is complete, the user can share the content and access services according to their preferences. The administrator account permits its owner into higher permission to manage the site's security and content. This involves managing the user accounts, and the permissions they hold, and ensuring security measures that will prohibit anyone's access to unauthorized levels or breaches. The login page thus serves the purpose of fidelity between the users and the administrator, ensuring that sensitive information and services are only availed to qualified people. It presents a gateway to a secure environment of exposure from where the user can engage with certainty that their data and clearance are safeguarded.



Figure 4. Login and sign-up page

B. Courses Page

The page acts as an extensive educational resource that presents users with a dynamic range of courses using differing educational approaches. As a result, users are availed of various options, including traditional textbooks, explanatory videos, and even detailed explanations. The topics ensure that the users can learn in a structured, planned, and prioritized manner. There is depth to be covered in each topic, and ultimately, the users become more enlightened in terms of the subject. The short and conclusive topics enable the user to pace themselves and read one topic at a time before embarking on the next one. It ensures that the users have understood the information being questioned as they would not move to an advanced topic before conclusively understanding the previous one. Furthermore, the users are able to evaluate their learning by answering questions in the form of quizzes. It serves as feedback where the users can gauge the extent to which they have comprehended a certain topic and the areas where they need to revisit before attempting the final examination. In summary, the page is a rich resource that provides the users with various learning options that suit varying needs.

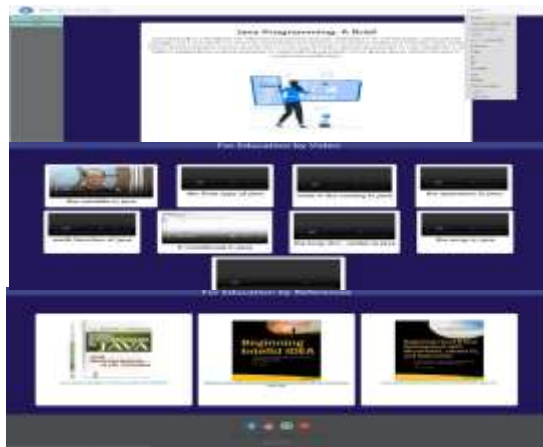


Figure 5: Courses Page

Following completion of any selected course, your knowledge can be evaluated through quizzes that test your

understanding of the material covered. Ultimately, your learning outcomes will be assessed, and a grade will be assigned to reflect your proficiency.

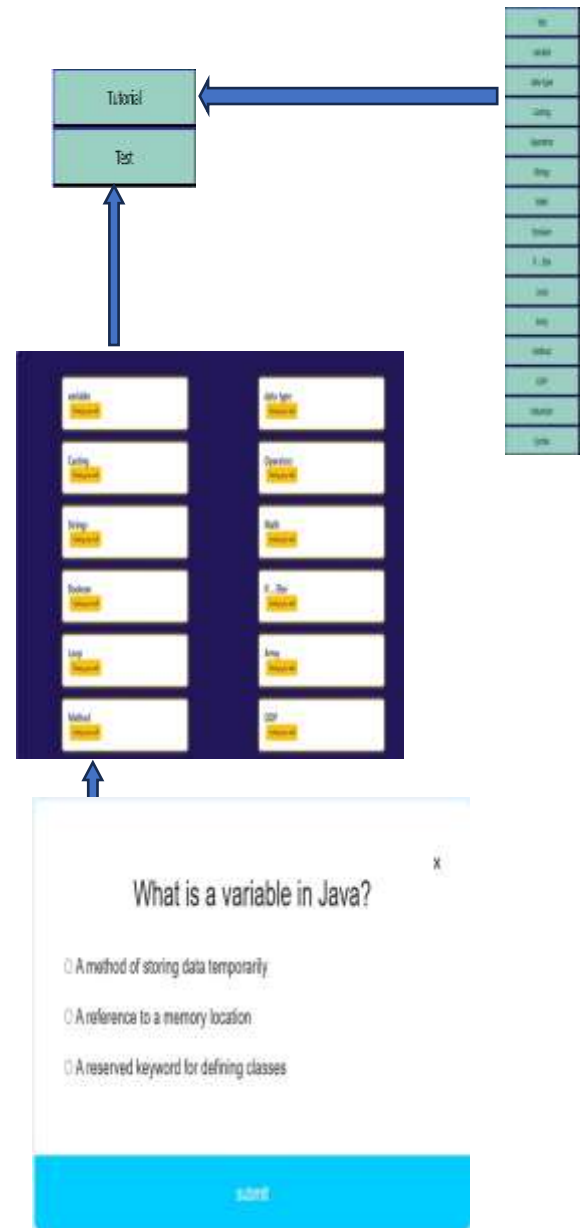


Fig 6: Tests Page

Finally, the Admin page shown in Figure 7 can be responsible for the following points

- User Authentication: Create a page to authenticate administrative users securely.
- Database Design: Create a table to store course-related information.
- Admin Dashboard: Create an interface that is user friendly.
- Course Management: Add course to a table with course fields.

- Content Management: Add, edit or delete course content (text, photo, resource).
- File Uploads: Ensure a robust file upload capabilities along with the course.
- Permissions: Implement the authorization for users based on their admin roles.
- Testing: Make sure the admin page has no security and functional vulnerabilities. Documentation: Write a document to show how to use the admin page for the admin.



Fig. 7 Admin Page

3.4 Testing:

Extensive use was made to the localhost server to ensure the functionality of the site can test the site if it can access it from any device and at a fast speed and to all prohibited problems. Moreover, we gave a site analysis tool was also provided to check all.

3.5 Deployment:

After completing the previous steps was released for use in the production environment for a free server called Infinity to test comprehensively.

3.6 Maintenance:

Developed a dedicated form for the user to communicate with us about any problem that appears. Making the necessary updates to the program, the information system updates, and bug fixes.

7.3 Evaluation:

Performance of the software against it is intended goals, and collecting feedback for our user for improvement.

4. Conclusion

This study outlines the development of an online learning system designed to facilitate and organize E-learning activities at Al-Nahrain University/College of Science amidst the COVID-19 pandemic. Despite the existence of numerous platforms offering educational content, they often deliver only superficial knowledge and lack credibility from the perspective of students. To address this gap, the study introduced a dedicated web-based learning platform aimed at supporting the educational needs Al-Nahrain university students during the health crisis. Detailed specifications for the E-learning system were established, leading to its creation using technologies such as HTML, CSS, PHP, and MySQL. This system offers lectures tailored to specific university subjects in various formats, including texts and videos, and provides the opportunity for students to participate in E-tests following the lectures. The E-learning platform's development and integration involved technical acumen, design constructs, as well as a solid understanding of the end-user's needs and choices. Software development and design principles enabled this paper's developers to provide an E-learning platform that was functional and secure and included in its application and usership all the industry users. Several additional improvements can be implemented into the system to expand its capability. One idea is to include a real-time module that allows students and teachers to interact live through webinars. Furthermore, Automated Question Generation can be designed.

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