

# Research Paper on E-Learning Education for Educational Institutes

*Using MERN Technology and Software Engineering Approach*

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## **Abstract:**

The physical classroom learning nowadays is no longer applicable in the current COVID-19 environment. Internet and distance learning which is generally known as online education plays a vital role in the country's education system. It is undeniable that online education provides ample of benefits to young learners. Education is seen as important for every individual and country's growth. Basic objective is to design an Application Model to support E-Learning Services. The current e-learning systems in most of the educational institutions lack the appropriate infrastructures & efficacy integrated Application Model. A web application gives platform to run our e-learning material on services basis to any end users using the internet. It will provide optimum affordable price package to educational organizations for trainer and learners. We need to combine various technologies to achieve this objective. Further explains about importance of the eLearning Education features and analyses the need of e-learning. So, we need to figure out web-based application model implementation's importance for e-learning system, and which made active research on following manner: its working method, architecture design, Development tools and external interface with the application model, Software Engineering approaches. This paper describes about importance of using web environments for any institutes and learners' usage, to underscore its possible benefits and offerings in term design.

**Keywords:** E-Learning, Education System, COVID-19, Web Application Model, Software Engineering Approaches.

## Introduction:

**Definition:** A learning system based on formalized teaching but with the help of electronic resources is known as E-learning. While teaching can be based in or out of the classrooms, the use of computers and the Internet forms the major component of E-learning. E-learning can also be termed as a network enabled transfer of skills and knowledge, and the delivery of education is made to many recipients at the same or different times. Earlier, it was not accepted wholeheartedly as it was assumed that this system lacked the human element required in learning. However, with the rapid progress in technology and the advancement in learning systems, it is now embraced by the masses. The introduction of computers was the basis of this revolution and with the passage of time, as we get hooked to smartphones, tablets, etc, these devices now have an importance place in the classrooms for learning. Books are gradually getting replaced by electronic educational materials like optical discs or pen drives. Knowledge can also be shared via the Internet, which is accessible 24/7, anywhere, anytime.

**Description:** E-learning has proved to be the best means in the corporate sector, especially when training programs are conducted by MNCs for professionals across the globe and employees are able to acquire important skills while sitting in a board room, or by having seminars, which are conducted for employees of the same or the different organizations under one roof. The schools which use E-learning technologies are a step ahead of those which still have the traditional.

No doubt, it is equally important to take forward the concept of non-electronic teaching with the help of books and lectures, but the importance and effectiveness of technology-based learning cannot be taken lightly or ignored completely. It is believed that the human brain can easily remember and relate to what is seen and heard via moving pictures or videos. It has also been found that visuals, apart from holding the attention of the student, are also retained by the brain for longer periods. Various sectors, including agriculture, medicine, education, services, business, and government setups are adapting to the concept of E-learning which helps in the progress of a nation.

In the Era of Computer Technology, we need to communicate and accelerate our life with the help of Information and Technology. We all require certain types of services online, which requires less workout or interference of human being. Android phones can help to overcome the trouble of the customers of standing in queue and There is lack of research and

functionalities in the current system as well. We are in such an era today that our most of the work has been shifted too mobile and internet. The development and implementation of smart phone android application which are effective and simple than the current learning system.

➤ **Why do we need this System?**

- In the time of COVID-19 pandemic, it will help educational institutes to bring their educational content online.
- This will also track the record of each student. The problems that are traced needs to be considered and we have decided to construct such an application that would focus on problems.
- E-Learning is suited to distant learning and independent study, but can also be used in conjunction with face to face teaching which is referred to as “blended learning”. The importance of e-learning is growing in higher education.
- Key advantages of e-learning are flexibility convenience and the ability to work at any place where an Internet connection is available and at one’s own pace.
- E-learning is a viable option for those with commitments or conditions such as family.
- Learning with the use of computer is simply online ways of acquiring knowledge through the internet. The online involves the use of Google Chrome.
- E-learning has worked towards bringing learners, tutors, experts, practitioners, and other interest groups to one place. Thus, there is a good practice of knowledge sharing followed through different online platforms.
- This is important in current times as competition is rising, and the world is also growing. Hence, quick information helps in the better growth of an individual.
- The scalability of learning, content, and duration that is taken can be reasonably measured. It is beneficial to those who feel nervous and disconnected in groups.
- It helps one to learn without having to give up the comforts of the environment. You are at ease with Consistency of exposure, inputs, results, and coordination is highly ranked in E-Learning as it allows teachers a higher

degree of coverage to deliver the content regularly. This ensures consistency in learning.

➤ **Benefits of E-Learning Education System:**

- **Accessibility of System:** This system can be accessible anywhere if the user has got the mobile. If any case happens that the mobile is not with him/her then he/she can be accessed his account to any other mobile by just entering his/her email and password.
- **No Investment:** Users doesn't have to pay anything for using this system on android mobile or on computer. Everything in this system is free of cost. Even user have flexibility to use any interface there is no restriction in the system
- **Time Saving:** This system ensures that user gets the value of their time and don't have to rely upon anybody else for learning new technology.
- **Friendly User Interface:** The application that is developed would facilitate its end users with interactive graphical interfaces that would be easily adaptable
- **Transparency:** This system will provide transparency in the test conducting system as the test will be register by the user himself.
- **Maintainability:** Maintenance of the application is painless for its user. The application will need no version updates and hence require no maintenance until the user transforms the settings accordingly.

## **Objectives of the System:**

In order to achieve the aim of the system, it is necessary to achieve the objectives of the system. E-Learning is a learning process with the combination of content that is both delivered digitally and through face-to-face learning. E-Learning contributes to the shifts from traditional face-to-face learning to the use of web technological tools which enhances collaborative learning and presents an entirely new learning platform for students. eLearning has also been the principal form of distance education but now, it is also changing the instructions on higher education as it is now becoming a global agent in higher education. Advancements in technology learning have contributed to the enhancements of generations of face-to-face learning and generations of distance education. As to it, when eLearning

develops, it has begun to use different approaches to address diverse goals. The other objectives are summarized below:

- This system is basically consisting of only one phase i.e. the web application. These web applications is internally sub divided into two part first admin and second the user's. All the interaction of users will be done through web app with his interface after the login and same for the admin.
- As the discussion begins with the verification of email, first an application is required through which user can facilitate for registering.
- Secure data center is required to store and fetch the data as per requirement because if the data is not secure then anyone can use the database and miss use the database which is not better for this application.
- To begin with web-based learning system throughout learning process an internet connection is essential.
- Still there is a question of gathering user information. Before taking test, online user must have to register first and his/her email and password for learning platform.

### **Learning Objectives:**

The proposed system will allow the developer to attain relevant knowledge and concepts in specializing web-based software development and authoring tool. The objectives are disreputably emphasized on its concepts and ideas rather than trained expertise. The developer would have to undergo various sections of software development, project management, human computer interaction, usability factors along with the mechanisms of development principles so as to produce highly reusable quality software on time. But the prime aim to undergo web computing concepts is to increase preferred output with user satisfaction within less effort and time to encounter an easy solution for the E-learning platform.

The following objectives listed below are of prime importance to the developer: -

- ↳ Gaining knowledge of web-based development, web technology and XML.
- ↳ Learning the concepts of Services such as Web Services, Location Based Services.

- ✚ Learning how to deal with web-based software and development along with its database management.
- ✚ Implementation and integration of database services with web applications.
- ✚ Understanding HCIU- Design guidelines and principles to ensure system being developed will be usability and quality product.
- ✚ Understanding of data gathering methods and its actual implementation.
- ✚ Better understanding of project management concepts i.e. scheduling, budgeting, cost estimation, work break down structure, Gantt chart, Pert chart etc.
- ✚ Learning queries for updating data from the web to server.
- ✚ Learning and Practices of MongoDB Query.
- ✚ Learning and practices of the Express and React.

## The Major Goals of E-Learning System

There are certain goals when it comes to eLearning and some of these are points below:

- Enhance the quality of learning and teaching.
- Meet the learning style or needs of students.
- Improve the efficiency and effectiveness.
- Improve user-accessibility and time flexibility to engage learners in the learning process.
- E-Learning is vast and an expanding platform with huge prospective in higher education. Since there are many challenges in making eLearning effective, it is important to know how to manage it and access to the resources.
- Take a minute and just imagine if one is not having the roadmap to guide from start to finish is actually like plunging into eLearning without an effective strategy because learners would be lost in the learning content.

## Limitations of the System

The proposed system will be beneficial in several ways. The “**E-Learning Web Application**” is about providing educational content online. So, its basic scope is limited to

the types of users (i.e., Students). The **E-Learning Web Application** will save a lot of time and gives immense knowledge about the technology.

Limitations are always a part of every project. The project scope is limited to a confined boundary as listed below:

- ✍ The system is being developed for only web-based system.
- ✍ To validating the user must use a valid email address.
- ✍ The customer will need the internet connection.
- ✍ The application will run after installing any web browser in a computer.

## Assumptions Made

This system is although easy to use in terms of its functionalities but even then, there are some assumptions that need to be made before the development of the system:

- ✍ Users need to have basic knowledge of using web internet.
- ✍ Good knowledge of English and basics of Internet is required, i.e., user needs to be a computer literate.
- ✍ The user who would be using the web app, is expected to have a computer system with good internet connection.

## Conclusions

It can be concluded that eLearning is an innovation in the current era as it clearly has an impact on the Education 4.0. Since it is very useful and becoming more popular, eLearning is a good solution to create an active platform for learning. Therefore, it is important to understand on setting the right eLearning goals to enhance better teaching and learning for both educators and students.

At the end it is concluded that we have made effort on following points:

- A description of the background and context of the topic and its relation to work already done in the area.
- Made statement of the aims and objectives of the project.

- The description of Purpose, Scope, and applicability.
- We define the problem on which we are working in the project.
- We describe the requirement Specifications of the system and the actions that can be done on these things.
- We understand the problem domain and produce a model of the system, which describes operations that can be performed on the system.
- We included features and operations in detail, including screen layouts.
- We designed user interface and security issues related to system.
- Finally, the system is implemented and tested according to test cases.

**Future Scope of the System:** In a nutshell, it can be summarized that the future scope of the project circles around maintaining information regarding:

- We can give more advance software for E-learning Management System including more features.
- We will host the platform on online servers to make it accessible worldwide
- Integrate multiple load balancers to distribute the loads of the system
- Create the master and slave database structure to reduce the overload of the database queries.
- Implement the backup mechanism for taking backup of codebase and database on regular basis on different servers.
- The above-mentioned points are the enhancements which can be done to increase the applicability and usage of this project. Here we can maintain the records of assignment and result of Student.

Also, as it can be seen that now-a-days the players are versatile, i.e. so there is a scope for introducing a method to maintain the E-learning Management System. Enhancements can be done to maintain all the Assignment, Student, TEACHER, QUIZ, QUESTION. We have left all the options open so that if there is any other future requirement in the system by the user for the enhancement of the system then it is possible to implement them. In the last we would like to thank all the persons involved in the development of the system directly or indirectly. We hope that the project will serve its purpose for which it is developed there by underlining success of process.



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