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STUDY POINT – AN AI-ENHANCED E-LEARNING PLATFORM

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ABSTRACT

Software for managing, delivering, and keeping an eye on training or educational programs is called a Learning Management System (LMS). Most LMS systems are well oriented to the provision of courses and tracking of student performance, but often do not include functions that promote parental engagement. Parent Mode does not feature on websites such as PW and Udemy to track the learning activities of students. The proposed Learning Management System (LMS) includes an extra Parent Mode to the usual features of course management, quizzes, assignments, and progress monitoring. This feature allows parents to track the academic activities and progress of their child. The MERN stack is a combination of MongoDB, Express.js, React, and Node.js, which is used to develop scalable and efficient web applications. Parent Mode allows parents to keep a close watch on the learning progress and the academic performance of their child. This aspect gives parents more ease in keeping track and giving better academic guidance to their children.

KEYWORDS: *Learning Management System, MERN Stack, Online Education, Web Development, Student Progress Tracking.*

INTRODUCTION

Over the last few years, due to the COVID-19 pandemic, the role of web development has become much more crucial in almost all spheres of everyday life. The focus on the development of web development, its improvements, and challenges is getting more and more important, and how to enhance the functionality, security, reliability, and usability of systems where stakeholders interact with each other through the use of such applications is also a significant concern as an increasing number of people turn to web-based applications to handle their professional activities, education, shopping, and healthcare consultations. This

is in line with our focus on web-based mediums, particularly e-learning systems that are free. As a result of institutions moving to more effective online teaching and learning approaches, a high number of students have suffered an interruption in their education, as UNESCO claims [1].

A possible solution to these interruptions is the introduction of a Learning Management System, which was found by Ülker and Yilmaz in their paper [2].

This study aims to find out whether it is possible to create a simple web-based application which provides free educational services with the help of a popular web development technology stack. The proposed system will have both user and administrator free features. It also enables generation of reports. on relevant topics, where the user will be able to understand their own and others actions. It is a complete web based system that provides teachers with the opportunity to make courses and post learning materials at it and students have the opportunity to search courses, enroll, download learning material and other reading materials and give feedback on the courses that they are taking. The system administrator can also include books in the library, which will avail supporting materials that are recommended in their classes to the students, and this will be helpful in the development of free online learning. This has mainly focused on coming up with a simple learning management system to eliminate problems that arise due to network connectivity. The chosen technology stack description with a justification of the selection choice can be found in the Methodology section. There is also a proper flow chart applied in this chapter to show the backend processes of the necessary functions of the system. The objective of every important function is clarified in the section called The Proposed System with the assistance of the relevant pictures to make the understanding of each purpose easier. The primary objectives of the study are outlined in the conclusion section, which reinforces the overall aims of the research, while the Discussion section describes the anticipated results and notable findings.

LITERATURE REVIEW

The benefits and drawbacks of e-learning platforms, strategies for enhancing learning management systems, and the characteristics that make e-learning a desirable substitute for conventional teaching and learning approaches have all been the subject of several research. The work of other researchers is cited throughout this literature, and the ideas that come out of these studies are mirrored. Previous research concerning the use of the MERN stack in the development of web applications and performance optimization has been reviewed since the purpose of the current research is to investigate the way the MERN stack could be utilized to

create a web-based learning management system and how the interaction types might be possible. The elements that draw students to e-learning have been studied in a variety of areas, yielding a range of results. According to Chang, Hajiyev, and Su, students in Azerbaijan are drawn to e-learning platforms because of their comprehensive user experience [3].

Another Malaysian study by Almaiah and Man discovered that elements like perceived pleasure, relative benefits over conventional teaching methods, and compatibility have a significant impact on students' use of e-learning systems [4].

The knowledge acquired through these research has been helpful in comprehending the needs for creating a learning management system that successfully engages students. Studies pertaining to the creation of web-based applications utilizing the MERN stack, along with studies on learning management systems, have been examined in order to comprehend the proposed system's effects on system performance, as it is based on this stack. Patil et al. 's study describes the creation of a web-based program for a college utilizing the MERN stack, proving that it is possible to create a learning management system with a variety of features. Their results further support the notion that system functions may be made easily accessible [5].

Ensuring accessibility and scalability has been a major goal, and this research has been especially helpful in organizing the suggested system. When designing an e-learning system that would be both flexible and scalable, a clear understanding of how the system should be structured so that it will be the most efficient possible is necessary. In order to inform the decision to model the system to improve its performance and user experience, the literature that suggests similar design solutions has been analyzed. According to Ahmed, Sangi and Mahmood, a good adaptive e-learning model must have four main elements, namely, an adaptive model, a content model, a learner model, and a communication interface [6].

Adaptive model stipulates the system adaptation methods. The content model is focused on learning objectives and resources forms. The learner model is a repository of information that describes the learner and facilitates life long learning. Communication interface facilitates communication between the students and the e-learning system. The Shareable Content Object Reference Model (SCORM) is used to structure the content model [7].

RESEARCH GAP ANALYSIS

Most of the existing research works on learning management systems revolve around two groups of stakeholders:

Current Research Focus:

Stakeholder	***Coverage***	***Examples***
Students	*85%*	*Progress-tracking, personalization*
Teachers	*65%*	*Organizational content, assessment*
Parents	*5%*	*no highered focus*

Main Gap Discovered:

Most college students' parents are not unable to see the progress of their children due to lack of time.

Absence of attendance record, grade notifications, Leaderboard, career guidance.

OBJECTIVE

The main aim of the Study Point initiative is to develop and introduce a smart online Learning Management System that enhances online learning experience to students as well as openness to both parents and teachers. The system was developed on the MERN stack with the aim of developing an effective and scalable platform. To create a web-based Learning Management System that will provide students with convenient access to learning resources and the possibility to buy them, as well as allow the instructors to upload and control courses. To add options to track learning outcomes of the students, including quiz, assignments, performance analytics. The objective is to implement a Parent Dashboard module that will provide parents with real-time information about the academic performance of their child, attendance, and learning progress. To put up automated academic alerts that inform parents about critical academic developments, such as declining grades or performances. To improve stakeholder communication, by providing a direct interaction channel, which would unite parents, teachers and administrators.

SCOPE

This paper will deal with designing and deploying a web-based learning management system that would support parents, teachers, and students in the process of learning. The advantage of the proposed platform is to create a one-stop shop where instructional resources can be created, distributed, and consumed efficiently. The system is built using the MERN Stack and ensures scalability, performance, and flexibility that are demanded by the contemporary web apps.

Teachers can design and administer courses, upload instructional resources, and evaluate student achievement using tests and tasks with the help of the platform. Students will be able to take courses according to their interests and access instructional materials in an organized way. The system also monitors student development in order to improve the learning outcomes.

The introduction of Parent Dashboard is one of the essential elements of the proposed solution that allows parents to track the academic progress, attendance, and performance metrics of their child. This feature aims at enhancing transparency and parental involvement in higher education.

The system also facilitates interaction among stakeholders by providing them with updates on academic performance, major news and education opportunities. Moreover, the ability of the platform to work with a substantial amount of course material and provide services to a large number of users makes it appropriate to schools and the work of freelance teachers.

This study, however, merely dwells on the development and introduction of the LMS platform and its basic features. The scope is not related to such advanced features as institutional integration, connectivity with external academic databases, and full-scale AI-based customized learning systems, which may be considered in further research.

METHODOLOGY

A. System Architecture The proposed LMS will have the three-tier architecture which guarantees the modularity, scalability and efficient data flow. The layers include:

Frontend (Client-Side): *The frontend was written in React.js, and it offers a responsive and dynamic user interface. It receives user interactions, renders course content and interfaces with the backend with RESTful APIs.*

Backend (Server-Side): *The backend is developed using Node.js and Express.js and it processes application logic, deals with HTTP requests and provides authentication and authorization. It acts as a communication between the frontend and the database.*

Database: *A NoSQL data base, MongoDB, is used to store user data, course information and progress metrics. Its less schema nature is flexible in managing all types of data and*

relationships. This architecture provides a distinction of concerns, which makes its maintenance, and scalability easy.

Tools and Technologies The LMS has been developed using the following tools and technologies:

React.js: *React is a JavaScript library used for building user interfaces, enabling the creation of reusable UI components and efficient management of application state.*

Node.js: *JavaScript runtime, which enables the execution of code on the server-side, which makes it possible to implement a high-performance application and scalability.*

Express.js: *Minimalistic web framework based on Node.js, which makes it easy to make servers and routing.*

MongoDB: *is a document-oriented NoSQL database which pro-vising scalability and flexibility in data modeling.*

Mongoose: *MongoDB and Node.js schema definition and data validation Object Data Modeling library, Mongoose.*

JSON Web Tokens (JWT): *The JWT is used to secure authentication, such that the user sessions are safely controlled.*

Redux*: State management Library (JavaScript) applications, React.js is used with it to manage the state of an application.*

Axios: *An HTTP client based on promises that are used to make API calls between the frontend and the backend.*

Cloudinary: *Cloudinary is an image and video management service that is available as a cloud-based service to store and serve media content.*

Git and GitHub: *Code management and collaboration code hosted service, respectively.*

PROPOSED SYSTEM

The system suggested is a Learning Management System (LMS) along with the purpose to create a community of people interested in the idea of free education. Two main types of users

in this system are the students who are interested in enjoying the benefits of free access to study materials, and the instructors who would be willing to structure courses in such a manner that any person who is interested in a particular subject can learn at his/her free will. Also, the administrator, in charge of administration related duties, is also a user, since he/she is registered in the system and given a special login.

Overall, all users have CRUD operations, a search feature, and a report generation functionality. In cases where users want to alter the current data under the management of the system, they must affirm their intentions before the alterations are implemented. Moreover, all the core functions have the support of at least one file type uploading. The following are the functions of the individual:

A. User Management

The site offers a centralized registration of various classes of users such as students, instructors and guest users. In the sign-up process, the user will choose his/her position as a Student or Instructor and enter some basic details that include first name, last name, email, and password. Once they successfully go through the authentication process, the system will automatically redirect the user to his or her respective dashboards, depending on the role he or she chooses. When a user types in as a student, he or she is taken to the Student Dashboard where they can enroll into courses, access learning materials, take quizzes, and monitor their academic progress.

Figure 1: User Registers.

The platform will be structured to accommodate three categories of users: students, parents, and instructors with their respective roles and features. The first user is the instructor is at the center stage. They have the ability to add, update and delete courses to make the content remain relevant and useful. The performance of all the students is also monitored by the instructors through the analysis of the student progress, scores, and participation. They also prepare and give quizzes and assignments to assess the knowledge of students and to engage

them. The site also contains feature of resume analyzer, which enables students to refine their resumes by getting suggestions on how to make them better and presentable to the job opportunities.

The second user is student who can use various sections like quizzes, assignments, and course materials. They are able to buy courses according to their interests and study at their own level. With the help of these features, students can frequently test their knowledge, perform tasks and monitor their own progress systematically.

The third user is the parent that is intended to retain parents in the education of their child. The performance of their child such as progress, their scores and general activity on the platform is easily monitored by parents. In case parents want to contact the instructors, they may make an appointment with the teacher, and the student will be properly interacted with and guided.

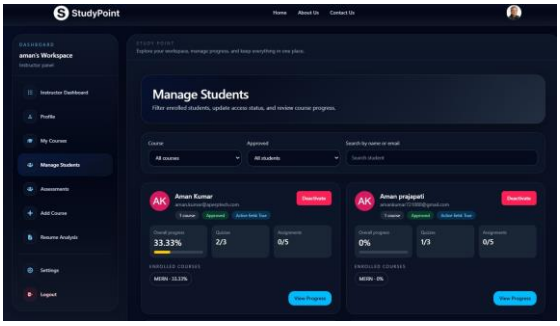

Figure 2: Instructor Dashboard.

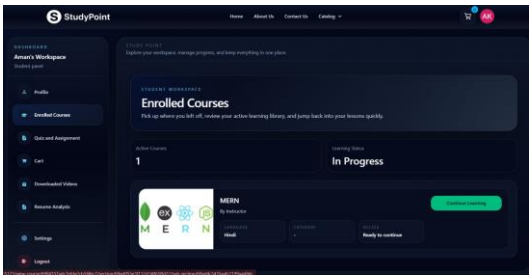

Figure 3: Student Dashboard.

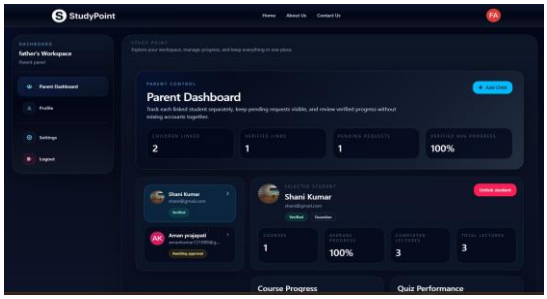

Figure 4: Parent Dashboard.

B. Course Management

AI-based Quiz Generation and Assessment.

The platform offers the capability of using AI to generate the quiz to enhance the learning and assessing process. The system automatically develops quizzes, which are based on course contents and learning materials. These quizzes aid in testing the knowledge of the student on various topics. The learners will be able to take quizzes on the site. Once they submit the questions, their answers get automatically evaluated by the system. Depending on the performance, the results are produced immediately. The system also gives feedback to enable students to know their weaknesses and strengths. This assists learners to concentrate on areas where improvement is required. The quiz scores are saved in the system to be used in the future. These performance reports allow students, instructors and parents to monitor academic progress.

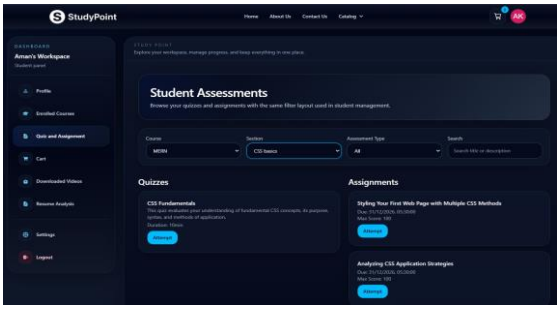

Figure 5: Quizzes

Resume Analyzer

The site also has a Resume Analyzer service that assists the students to enhance their employment preparedness. This is a tool that enables students to post their resumes into the system. The system scans the resume and determines whether it is adhering to the usual industry standards or not. It verifies such key matters as formatting, skills, experience, and the relevance of keywords. In the course of the analysis, the system identifies the suitability of the resume to be used in the job applications. It also determines gaps or weak areas in the resume. The site then gives recommendations on how to make the resume better as a whole. These tips can assist the students to rectify their errors and build their careers. With this feature, students are able to make better job seeking resumes. This tool aids career preparation and enhances the likelihood of the students being selected to an interview.

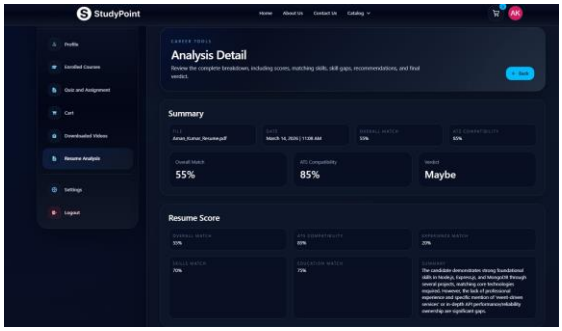

Figure 6: Resume Analyzer.

C. Course Material Management

This function is responsible for handling the creation of new courses and uploading course materials to existing courses. It also manages the process that allows users to download course content from the courses in which they are enrolled. To create a new course, teachers who are interested must use the "Add New Course" option, where they are required to enter the necessary details to set up the course. Once a course has been created, the teacher can then upload relevant course materials associated with that particular course. During the uploading process, the teacher will be required to provide the necessary information related to the material.

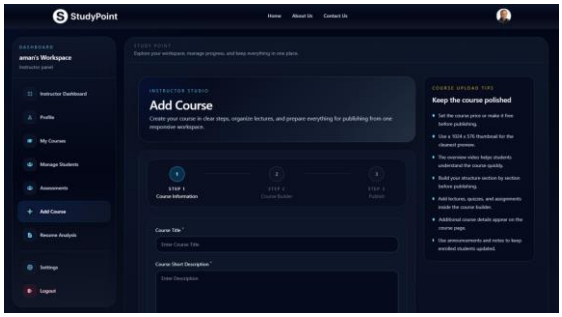

Figure 7: Add Courses.

DISCUSSION

The amount of students who are learning through learning management systems that focus on delivering learning, such as this one, is expected to increase tremendously. This is because generally, systems that deliver instructional services in a reliable and consistently available fashion are attracted by students. The growing population of users of these platforms is also likely due to the present trend in the educational institutions that prefer online learning. Similarly, the more the teachers are willing to support and market the idea of education, the more teachers using learning management systems are expected to rise. The accessibility of

an internally hosted library will also have the potential to attract and retain a significant number of users since the ability to access more reading materials at no cost is rather beneficial.

CONCLUSION

1.Review

This paper explored the increasing significance of online learning systems and the place of Learning Management Systems in the contemporary educational environment. According to previous studies, the majority of LMS platforms are student-centered and teacher-centered, and the role of parents in higher education is not significant. As more and more people are embracing digital education, the platforms required are those that enhance transparency, accessibility and contact between all stakeholders in the learning process.

2. Objectives

The principal aim of the study was to develop and design Study Point, an AI-enhanced web-based learning management system to assist students, teachers, and parents. The system is expected to offer the management of courses, progress tracking and interactive learning capabilities and also add Parent dashboard to enhance parental visibility of the student academic performance.

3. Key Findings

The evolution of the proposed platform proves that the advancement of the modern web technologies could be successfully utilized to create the educational systems that are both scalable and interactive. The system will be in a position to serve many users and be efficient in data management through the MERN Stack. The fact that it includes things like quizzes, assignments, progress monitoring, and parental access assists in making the overall learning process more meaningful and enhances communication between stakeholders.

4. Implications / Applications

The suggested platform is applicable in online learning institutions, independent educational platforms, and universities. Parent Dashboard feature also enables parents to track attendance, grades and academic performance which enhances transparency and accountability in learning process. The system can also assist teachers to handle course materials and assess student progress in a more effective way. The platform can be improved in the future by adding enhanced AI-based personalization and recommendation systems to enhance adaptive learning experiences.

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