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# Design of Personalized E-Learning With Recommendation System

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**ABSTRACT:** This research paper Personalized Learning with Recommendation System discusses the effectiveness of individual e-learning systems by comparing them with traditional e-learning systems and highlights the changes they have in technology. It describes the needs and problems of these systems by focusing on four research questions: identifying key points, reviewing the state of research, using the results of intellectual intelligence, and informing future research. Through a comprehensive review of existing literature, it provides insight into existing solutions and discusses various topics and perspectives important for self-directed learning. The report on the policy contains four modules: personalized learning, adaptive testing, learning analytics, recommended system, and summary and evaluation. Personalized education adapts the program to each individual's needs, interests, and abilities. Learning analytics involves collecting, analyzing, and interpreting data about student behavior, performance, and engagement to improve learning outcomes. Adaptive testing makes testing more accurate by adjusting test questions to the test taker's ability. Recommendations using artificial intelligence algorithms can suggest content based on user preferences and behavior and are used in e-commerce, social media, and entertainment. This research paper presents various learning styles, methodologies used, algorithms, websites, results, and future scope. In addition, it identifies avenues for future research by providing valuable resources for scholars and researchers seeking to understand, apply, and solve personal problems.

**KEYWORDS :** Traditional e-learning, Intellectual, self-directed, Engagement, Personalized Learning, Adaptive testing, Learning analytics, Recommended system, e-commerce.

## I. INTRODUCTION

In today's era with the rapid development of education, the digital age has transformed and changed the way people consume educational materials and information. At the heart of this evolution are personal learning and learning analytics, two interconnected elements that are revolutionizing education technology. Personalized learning embodies an approach that tailors learning to each student's unique needs, interests, and abilities and uses technology to provide customized learning. At the same time, educational analytics has become a powerful tool that uses data to provide an understanding of the learning process, enabling teachers and students to make decisions from data to improve learning outcomes. An important development in the field is adaptive testing, an effective assessment method that adapts to the candidate's skills. By intelligently selecting questions based on candidates' previous responses, the test is modified to provide a more accurate assessment of candidates' abilities, providing a more in-depth understanding of strengths and areas for improvement. To achieve this, recommendations powered by artificial intelligence algorithms are gaining widespread attention in various fields such as e-commerce, social media, and entertainment. These systems analyze user preferences and behavior to provide personalized recommendations, improve user experience, and facilitate decision-making. As technology continues to advance, this website of e-learning provides self-study, academic analysis, empirical reform, and recommendations that promise to improve learning, promote quality learning, and adapt it to fit everyone's learning ecosystem.

## II. LITERATURE SURVEY

The literature on personalized learning with recommendation systems has undergone profound evolution alongside technological advancements, notably the emergence of recommendation algorithms and personalized learning platforms. This literature review aims to provide insights into the methodologies, algorithms, and frameworks utilized in personalized learning platforms, emphasizing their role in tailoring educational experiences to individual learners' needs and preferences. In [1] This study investigates the effectiveness of personal strategies to improve learning and student motivation in self-directed learning. A total of 65 teachers and 700 students from Russian and Kazakh schools attended the event. Findings show that today's students are less motivated towards technical education programs and highlight the importance of individualized approaches. However, universities face implementation challenges due to the need for flexible and personalized learning models. To integrate personal ideas well, schools need to set standards, evaluate the learning process, and create lessons suitable for personal learning. The research paper titled [2] "Review and Classification of Content Recommenders in E-learning Environment" by Jeevamol Joy, Renumol Vemballivel, and Govinda Pillai provides a detailed literature review of proposed content in e-learning, which has received increasing attention due to the prevalence of online learning materials and changing teaching methods. It is aimed to personalize and update the study, and journals published between 2015 and 2020 are examined. Through this review, the various techniques, data entry, algorithms, consistency measurements, and measurement methods used in these studies have been classified and analyzed. Additionally, this article summarizes general trends in the consensus process and evaluates the strengths and limitations of selected studies. Overall, it provides a good insight into the current state of the art in e-learning content recommendations. The research paper proposes [3] detailed information about individualized e-learning systems and highlights their effectiveness in delivering specific learning outcomes compared to traditional e-learning programs. Through the use of artificial intelligence (AI), a personal machine can adjust learning content and assessment based on the learner's level of understanding and learning preferences. This study addresses the main research questions, highlighting the needs and challenges of self-directed e-learning: determining the importance of self-directed learning, analyzing research in the state, using intelligence results in self-education, and future applications. Research shows. This article provides a comprehensive review of the existing literature, provides a comprehensive review of existing personalized e-learning solutions, and discusses the various learning and thinking models required for self-study. In addition, it proposes a comprehensive curriculum consisting of five modules to facilitate self-education: data, adaptive learning, adaptive learning, suggestive, and content and assessment orientation. This study also suggests important avenues for future research and provides insight to scholars and researchers seeking to understand processes, systems, and systems. The proposed system of Hassan A. El-Sabagh [4] discusses the importance of changing e-learning environments in improving learning engagement and self-directed learning. It aims to create an environment based on student learning, evaluate its impact on student participation, and compare it with e-learning models. This study used a mixed method, using the development method to create a flexible e-learning environment and conducting experiments using a quasi-experimental research design. Student participation was measured by measuring attitudes and behaviors. The results showed that the experimental group exposed to the changing e-learning environment showed higher levels of engagement compared to the control group. These findings highlight the potential of transformative e-learning to foster student engagement. The article concludes with practical strategies for developing e-learning environments based on learning standards, improving learning outcomes, and making them more effective. Overall, the methodology and findings provided valuable information for e-learning institutions to improve and adapt the learning environment and ultimately increase student engagement. In [5] This research study discusses the challenges faced by the ESTenLigne project, which is part of the e-learning development at Sidi Mohammed Bin Abdullah University. The plan aims to provide an open, online, and flexible learning environment. Challenges include increased data management, course diversity, and large numbers of students, especially recent graduates who need effective classroom feedback. This document describes a course approval process that uses institutional policies to evaluate student activities and approve appropriate course materials. The goal is to analyze historical records and records to extract active items and then use those items to create personalized recommendations based on people's work habits and preferences. The proposal is used to implement big data, focusing on the implementation of the unified FP enhancement algorithm from the Spark framework and the Hadoop ecosystem. Experimental results demonstrate the effectiveness and feasibility of the proposed system. Additionally, this article also evaluates the performance of the Spark MLlib library by comparing it with machine learning tools such as Weka and R. Overall, this article contributes to increasing the level of increase of personal e-learning environment by solving problems and using innovative ideas. The research paper titled "On the Promise of Personalized Learning for Educational Equity" [6] addresses the challenge of meeting the diverse needs of students in schools, recognizing the influence of genetic predispositions and environment on individual relationships. Traditionally, schools rank students by academic ability, but evidence shows that this tracking creates inequalities. In recent years, driven by advances in

technology, there has been a push for personalized learning to meet students' unique needs. Drawing on philosophical and theoretical perspectives from a variety of disciplines, including educational sciences, philosophy, psychology, and sociology, this article explores how individuals can work to promote equity in K-12 education. Differing from different definitions of justice, he argues that private education does not provide "equality of outcome" or "equality of resources", but is based on the concept of "interest" justice and aims to provide all students with the necessary skills. Join the community and live a meaningful life. In [7] This paper discusses, how the educational environment has changed significantly and how many students are choosing online courses. Even with access to good courses, students often face the problem of finding too much information, leading to experience and other problems. To solve this problem, many algorithm integrations of the self-learning recommendation model are proposed to provide customized learning in the online platform. First, the model creates student portraits from four aspects: knowledge level, learning ability, learning style, and learning effort. The association rule algorithm is then used to analyze the information content and plan the student's learning sequence. Finally, the group's intelligent algorithm is used to match each experience with individual learning to increase flexibility and adapt to the student's needs. Experimental results show that this method can recommend a good learning method to users, improve the accuracy of recommendations, and finally improve the quality and efficiency of user learning. In recent years, "education analytics" has been attracting the attention of consumers in the education technology sector. Although not universally accepted, it is generally defined as measuring, measuring, and reporting information about students and their environment for understanding and improving the environment. Learning analytics aims to improve understanding of learning behavior, provide recommendations to policymakers, teachers, and students, and improve the effectiveness of teaching. It involves various data analyses, the development of metrics, the use of learning technologies for data visualization and interpretation, and the optimization of interventions to create educational institutions. Research studies based on technological innovation facilitate changes in instruction, delivery, student learning, and assessment. With the emergence of massive open online learning and the growth of education-related information brought about by the Internet and mobile technology, learning analytics uses big data to analyze big data in the process [8]. In [9] "Recommender Systems in E-Learning" describes the role of e-learning systems in providing distance learning and rich resources to users in a fast-paced community. With the increase in online resources, users need support in choosing courses, leading to the use of recommendations in e-learning to provide personalized services through the analysis of customer preferences. This article discusses three concepts of consensus used in e-learning: consensus-based consensus, consensus-based collaboration, and knowledge-based consensus. It provides an overview of the basic principles of these technologies and their application in meeting specific requirements in the e-learning environment. By introducing these technologies, this article aims to help researchers and practitioners understand the current status and future directions of these pioneering technologies in e-learning. The research paper proposes an [10] "Systematic literature review of personalized learning terms" concept of multidisciplinary learning, personal knowledge influenced by personal knowledge, knowledge about knowledge, bias, cultural background, and environment. Learning is defined as the continuous transfer of knowledge and skills acquired through interaction and experience. Promote a personalized learning model to meet individual needs and goals. Integrating technology is considered the cornerstone of personalized learning. This article reviews the existing research literature on self-directed learning, focusing on the words used to describe learning. It highlights the importance of context in the development of individualized learning models and confirms the potential for meta-analysis of future research in this area. However, this article does not address the meta-analysis itself as it is beyond the scope of the current research. The research paper titled [11] "A systematic review and research perspective on recommender systems" by Mala Dutta, and Deepjyoti Roy examines the impact of this approach on student motivation, control, and self-evaluation and uses academic analysis to measure various student characteristics. The advantages and disadvantages of this approach are analyzed and ideas are provided to researchers and teachers to promote SRL. At the same time, "College Students' Intellectual Abilities in Flipped Classroom Teaching: Integrated Analysis of Empirical Literature" conducts an integrated analysis of how classroom teaching in blended learning affects the academic outcomes of college students. In [12] The teaching and learning process has changed over the last few years. Teachers or trainers are no longer just teachers but are also trained and coached. Students need to develop their thinking, analysis, and problem-solving skills to improve their knowledge. Learning through photography is a great way to develop these skills, and digital technology plays an important role in creating and delivering interactive videos. The demand for education has changed and parents and students are interested as online education can be accessed anytime and anywhere. BYJU'S became India's third largest unicorn in January 2020 with a valuation of \$8 billion. With peak revenue of approximately \$205 million as of March 2019, BYJU'S leads the Indian education technology industry. It has 3 million customers in India. BYJU'S solves the fundamental problems of India's education system by delivering quality content across the country to the majority of people through accessible internet. This article has been prepared to determine customer satisfaction with BYJU products. Unacademy [13] is an online learning center located in Bangalore. It initially started as a YouTube channel and later became an education

company. It provides a syllabus for civil services, banking, and other competitive and entrance exams. It works well with over 12,000 teachers. Let the children of the country learn. Everyone is trying to be successful and wants to be popular. Starting from this idea, a group of students started something new to help students. Unacademy is an online education company that provides students with sample essays and preparation services for entrance exams, banking, and other courses.

### III. METHODOLOGY

The proposed system Design of Personalized Learning with the Recommended System is used to design web-based e-learning platforms, such as selecting appropriate tools, designing user interfaces, and ensuring scalability and performance, which relies on the platform. To fulfill this, we have developed and designed a website where users can create profiles, learn courses, and explore internships they are interested in.

This research paper will focus on the best pedagogy and instructional design for web-based e-learning. This includes topics such as designing for differentiated learning, using multimedia to enhance learning, and facilitating online collaboration and discussion. Methods and tools for evaluating the effectiveness of e-learning websites in terms of student outcomes and education are good. Factors that influence user acceptance and adoption of e-learning websites, such as usability, accessibility, and social impact.

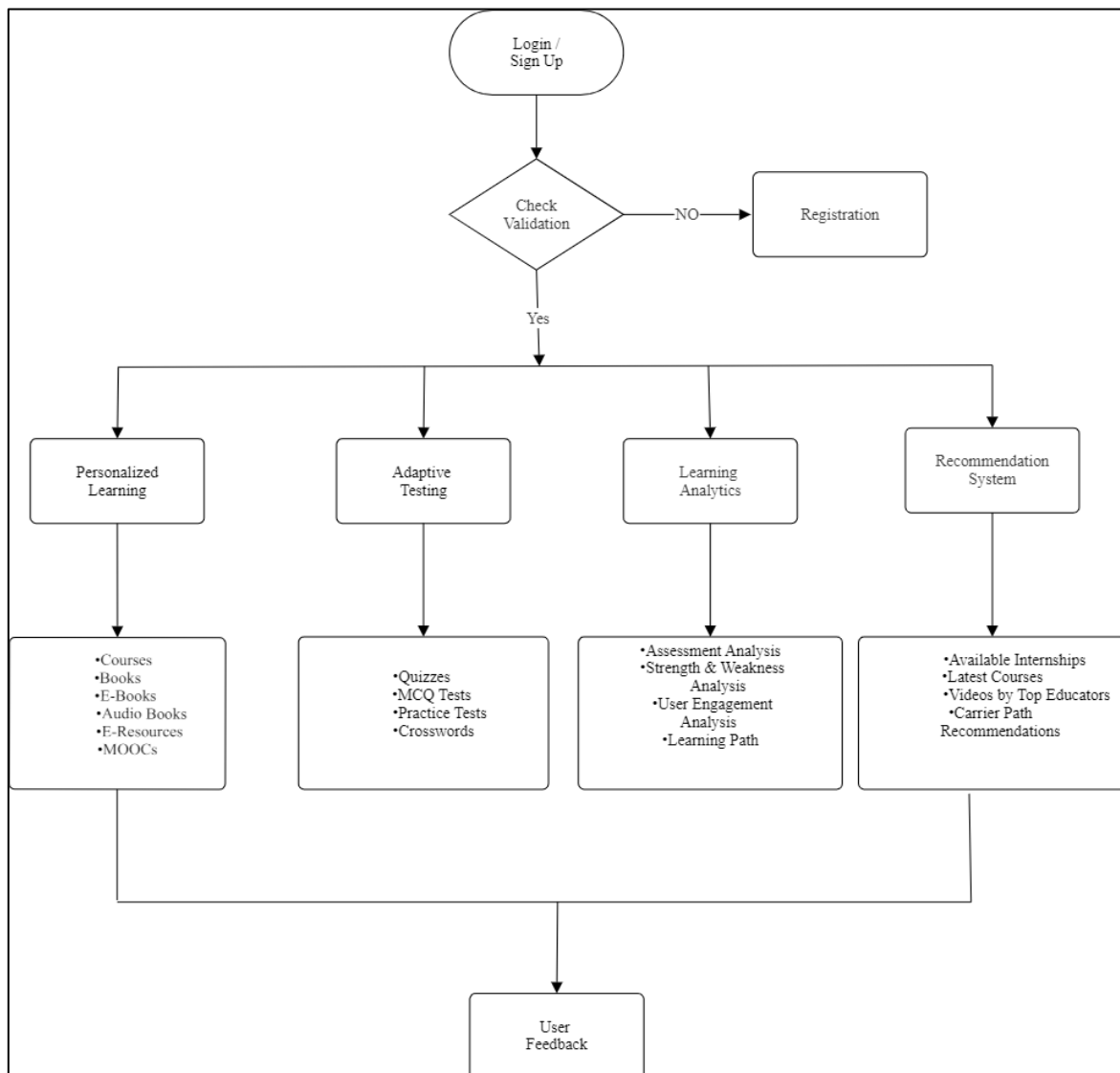


Fig No.01: Flowchart of System

In the proposed system, to access this website, users can log in or register. To log in, users need to visit the website and find the Create Account button. After creating an account and logging in to the website, they will directed to the homepage where

they can choose courses, internships, papers, quizzes, and e-books according to their interests. Users can access courses and study materials to prepare well for the exam and make their learning plans. This web-based e-learning provides insight into the design, development, and use of these platforms to support learning and development in various fields.

This project is developed by using Python Language. The dataset is going to be used to train and test whether the model of machine learning achieves the objectives of the project. The XAMPP server is for making a database and HTML/CSS for front-end design as it provides the fundamental framework and formatting, guaranteeing visually captivating arrangements and adaptable design. PHP and MySQL form the backbone of backend development, facilitating dynamic functionality and efficient data management, ensuring robust performance and seamless interaction with databases.

#### IV. IMPLEMENTATION

##### User Sign-In Page

Our web application has a login screen, which is standard in most web applications. To achieve this, instead of writing the same code over and over again, we use PHP and CSS to create control strategies that can be reused across the application. The login.js file contains the Firebase authentication code and connects to the front end. CSS files define the layout, alignment, and color scheme of the home page.

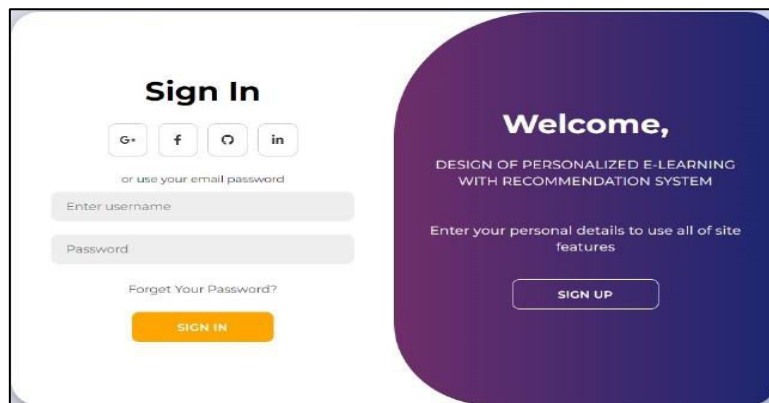


Fig No.02: Sign-In Page

##### User Account Creation

Creating an account requires the user to find the "Sign Up" option, which is usually located next to the login button. They need to provide details such as name, email address, and phone number and create a password. They may need to verify their account using the verification code sent via email or text message. After verification, they accept the terms and conditions and complete the registration process. They can then log in using the steps outlined previously.

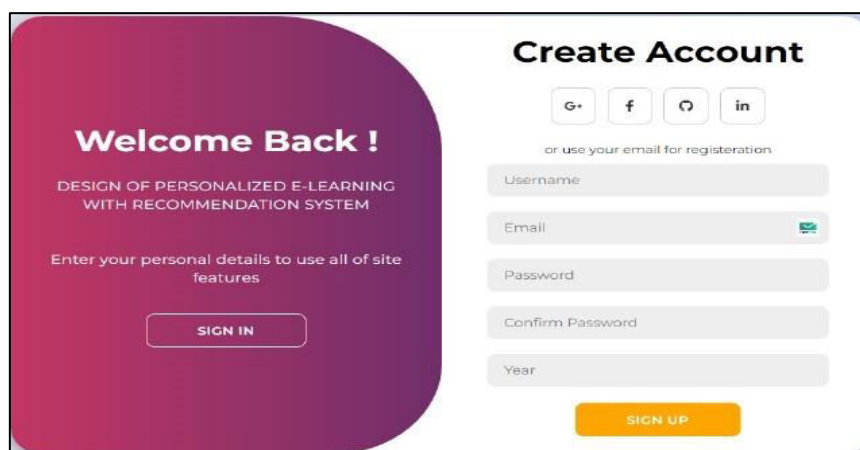


Fig No.03: Create Account

## Homepage

The homepage serves as a comprehensive gateway to its diverse educational offerings and resources. At the top, users find a navigation menu, enabling seamless access to different sections such as Courses, Subjects, Exams, and more. Below this, a prominent banner rotates, showcasing featured courses, upcoming events, or special promotions. A search bar facilitates quick exploration, allowing users to find specific courses, internships, or topics of interest. Featured courses are highlighted prominently, offering a glimpse into popular or recommended learning opportunities across various subjects.

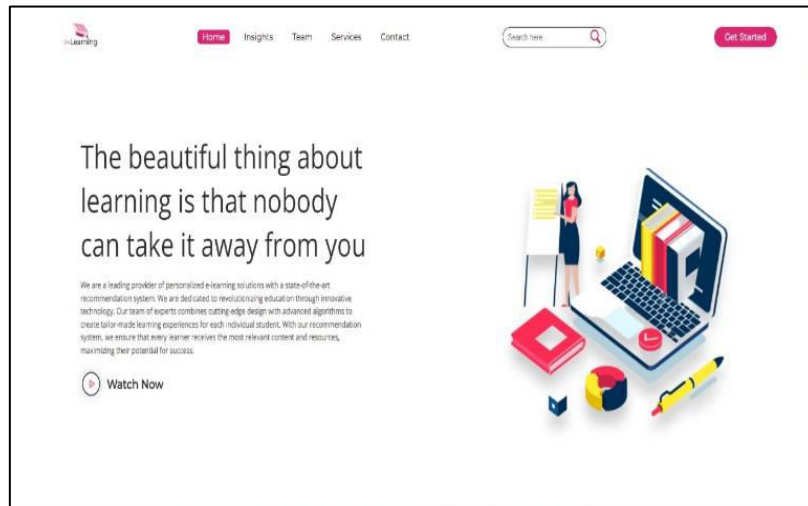


Fig No.04: Homepage

## Personalized learning

When designing personalized learning pages, you should consider user interests, keywords, and discussion points. Make sure pages adapt to different learning styles, provide progress tracking, and use the same design for access across devices. Integration of multimedia, adaptive assessment, and feedback now helps create a dynamic and personalized learning environment. This website recommends relevant courses, educators, and resources to users, helping them embark on a customized learning journey. Also, users receive personalized recommendations based on their progress, performance, and areas of improvement.

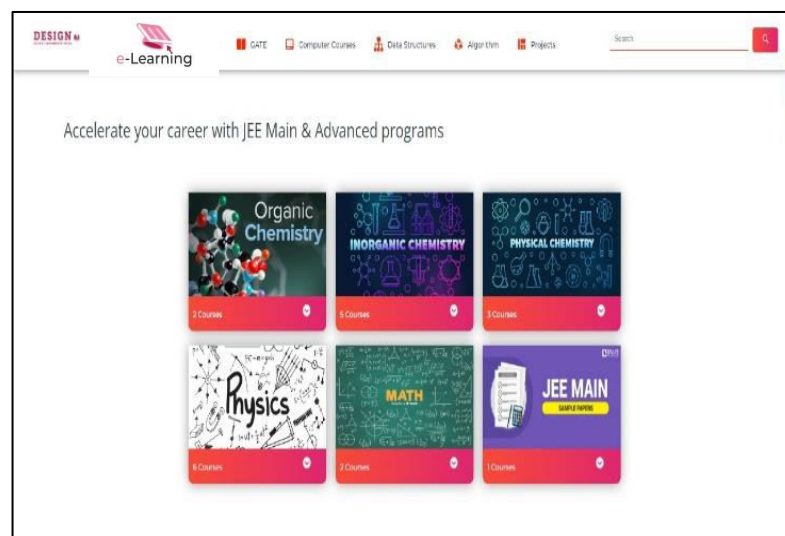


Fig No.05: Personalized Learning Page

### Learning Analytics

Creating an academic research page will create a platform where academic information can be analyzed and presented effectively. Emphasize clarity and focus, such as charts and graphs, to convey insights. Provide user-friendly navigation to explore different metrics such as progress, engagement, and performance. Use filters and customization options to allow users to customize analysis based on specific parameters. Consider incorporating predictive analytics to predict future learning outcomes. Provide clear descriptions of the content to enhance interpretation ensure the design is appropriate for teachers and students and provide better understanding in decision-making.

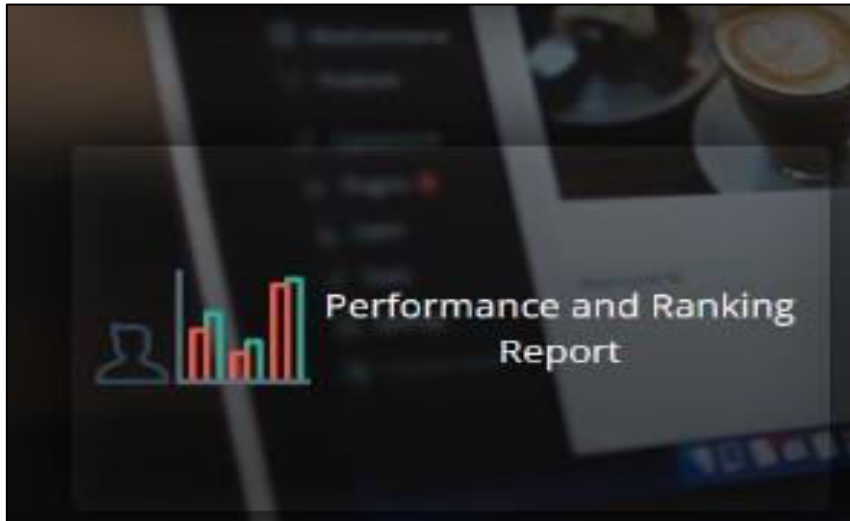


Fig No.06: Learning Analytics

### Adaptive Testing

When creating responsive web pages, focus on creating user relationships that adjust to individual responses. Make sure the layout is clear and concise, including progress indicators and navigation controls. To maintain a competitive appearance, create an algorithm that dynamically adjusts the difficulty of the query based on the user's performance, including instant feedback, time management, and switching to different device types. Given the sensitivity of testing-related data, data security and privacy measures are important. It is continuously testing and improving the interface to improve user experience and overall experience.

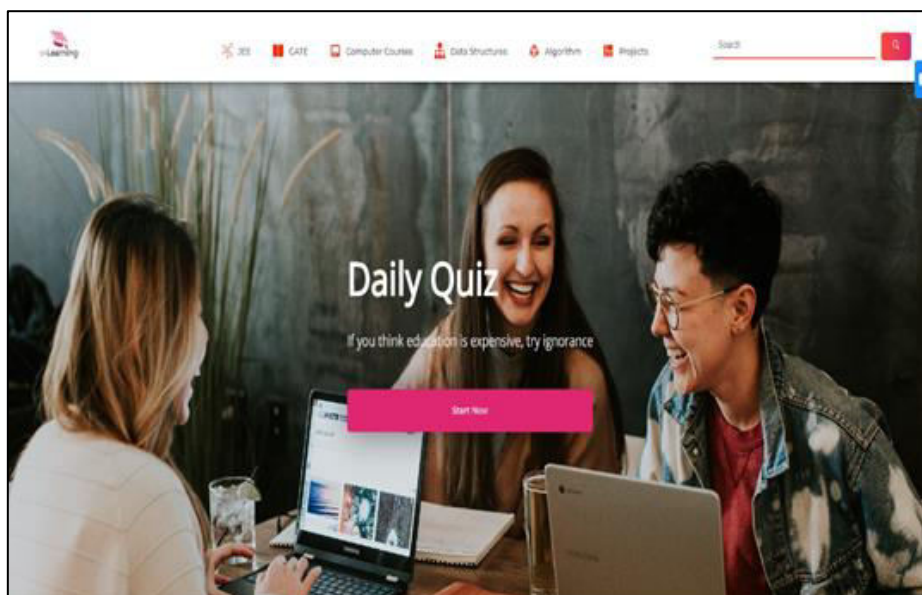


Fig No.07: Adaptive Testing



### Recommendation System

Designing recommendation pages involves creating an interface that recommends relevant content based on user preferences. The emphasis is on user-friendly layouts, clear navigation, and personalized recommendations. It is combined with algorithms that analyze the user's behavior, preferences, and historical data to create recommendations at the right time. Give users the option to provide feedback to further improve the system. Follow design standards across devices and ensure seamless integration into the entire user experience. A clear explanation of proposed standards can increase user confidence. Proposed algorithms are constantly updated and improved to adapt to changing user preferences.

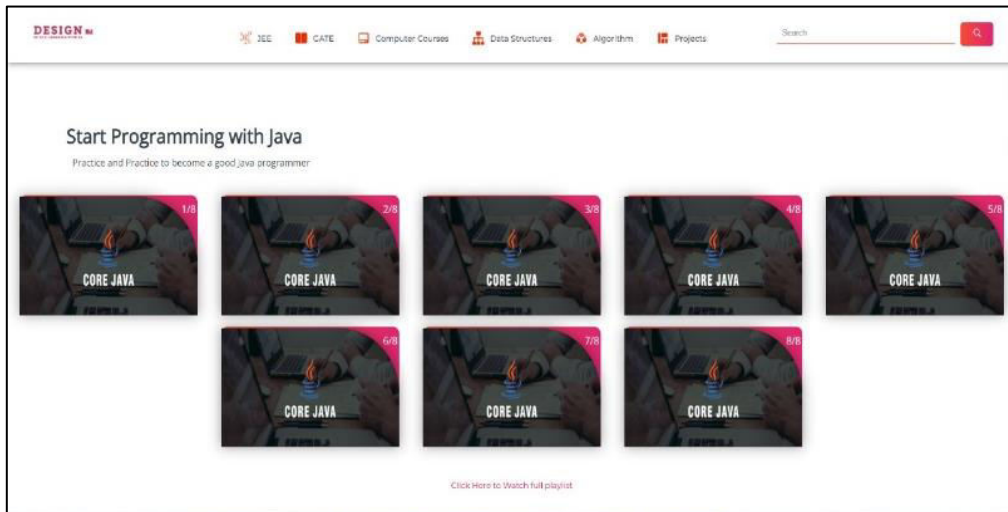


Fig No.08: Recommendation Page

### User Feedback

Feedback strategies in e-learning are an important part of supporting communication between students and teachers and provide insights to improve learning. This process includes many types of feedback, including assessment, appraisal, review, and performance evaluation. Assessments such as exams, quizzes, and assignments allow teachers to measure students' understanding and progress while providing students with feedback on their performance. This feedback can help students identify areas for improvement and support learning goals. This feedback allows teachers to adjust their teaching strategies and adapt to students' needs, ultimately increasing the effectiveness and engagement of e-learning.

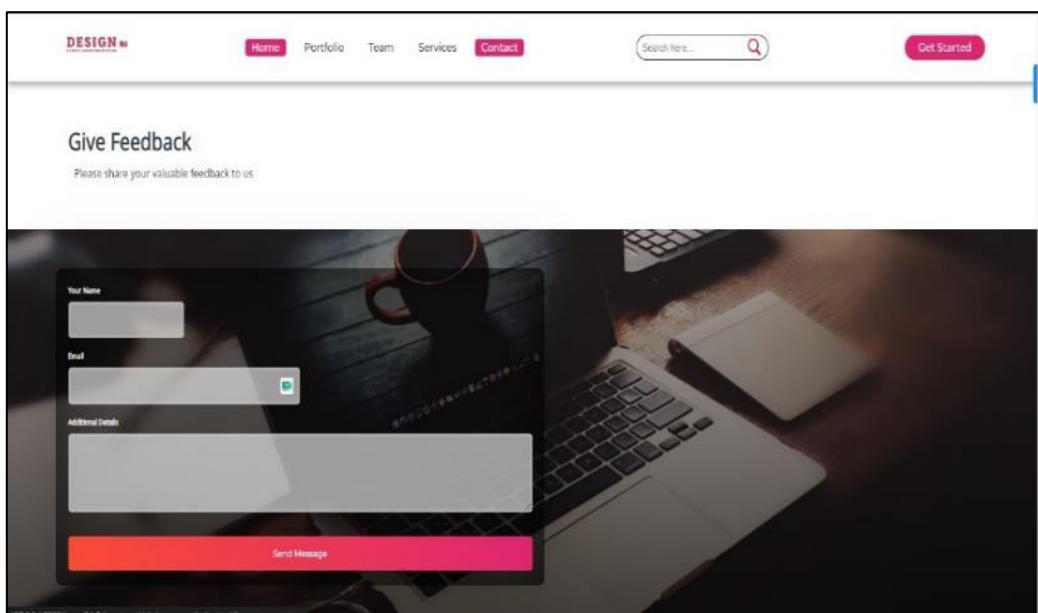


Fig No.09: Feedback Page

### V. RESULTS & DISCUSSION

After a detailed and attentive examination, we concluded that Personalized Learning with a Recommendation System differentiates itself from other e-learning systems through significant features like the insertion of e-books, e-resources, reports, and internships. While e-books offer digital versions of traditional books, allowing students to access them anytime and anywhere, electronic products contain more digital content such as books, videos, and simulations to support learning. Available internships allow students to find it more easily and apply it. Reporting is a way to assess student progress and understanding, encouraging feedback and self-directed learning. Together, these elements form the foundation of a robust and flexible e-learning environment that enables students to engage with quality and adaptable learning content. In addition, it identifies avenues for further research, providing valuable resources for scholars seeking to solve individualized learning problems. Overall, this research study provides a comprehensive study of the role of supporters in self-directed learning and demonstrates its implications for education and future directions.

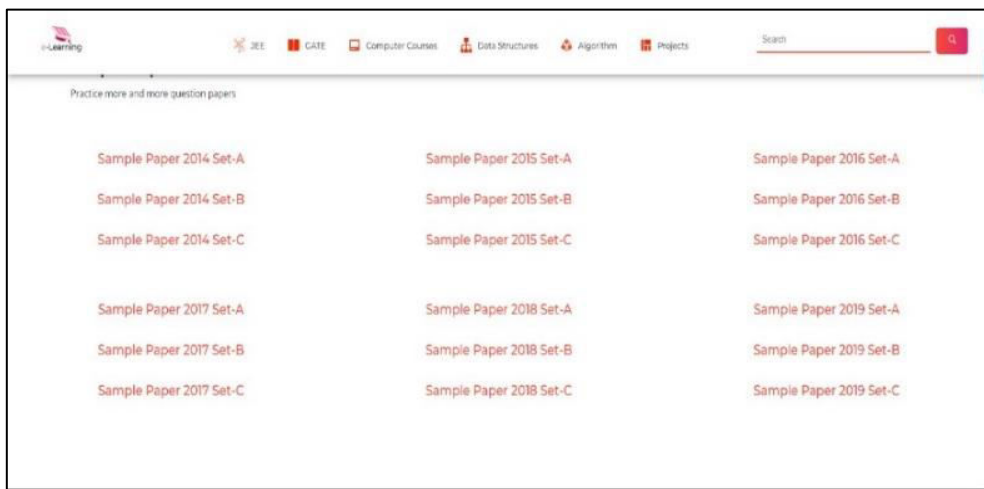


Fig No.10: E-resources Page

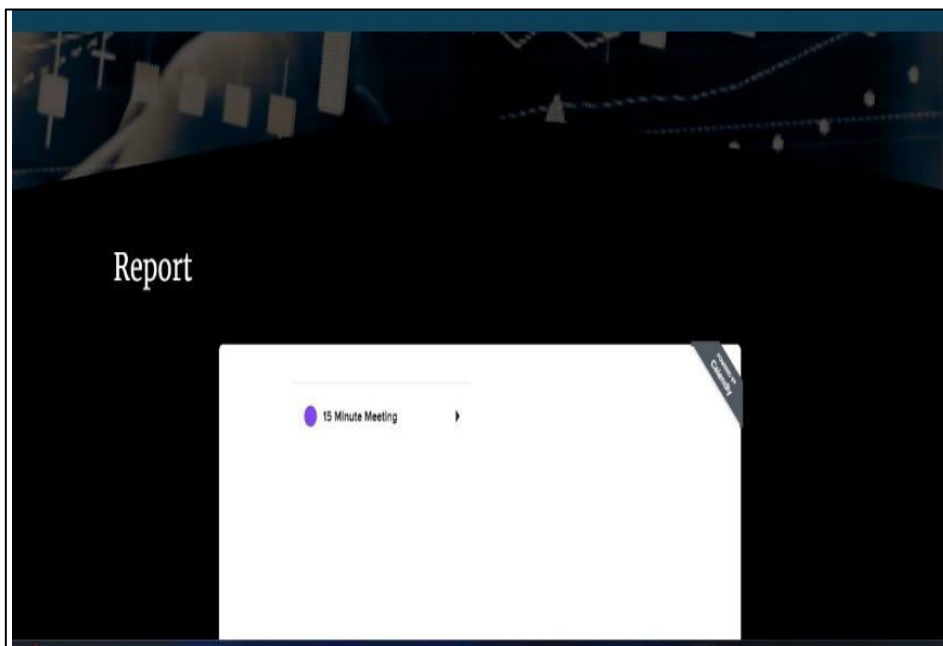
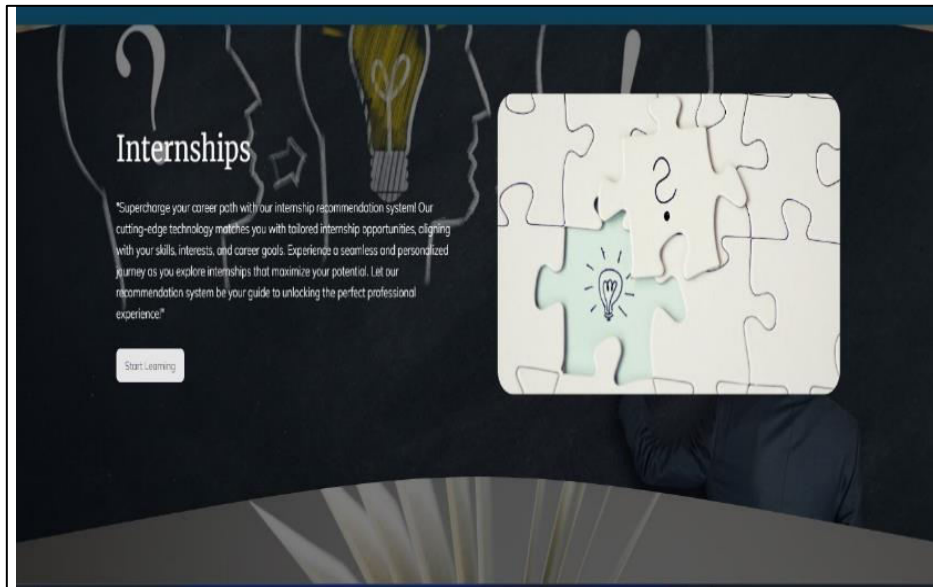


Fig No.10: Report Page



**Fig No.10: Internships Page**

## VI. CONCLUSION

The personalized learning platform with a recommendation system has been developed to revolutionize the educational experience including more features such as learning analytics and adaptive testing. The platform offers a tailored learning journey for users as it provides primary functions such as personalized lesson planning, learner progress tracking, recommendation-based content delivery, and seamless communication channels. These features are designed to optimize learning outcomes, minimize barriers, and elevate user engagement for both learners and educators. Also, the Personalized Learning with Recommendation System distinguishes itself from other e-learning systems through significant features like the insertion of e-books, e-resources, reports, and internships. Together, these elements form the foundation of a dynamic and flexible e-learning environment, empowering students to engage with educational content effectively and adaptively.

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