Unlocked: Structured Interactive Learning

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Abstract-UnlockED is an interactive learning platform designed to guide students through courses in a structured, step- by-step manner. Unlike traditional e-learning systems, UnlockED ensures that learners progress only after mastering the current material. This is achieved through a system of modules, assessments, and unlockable content. The platform promotes effective learning by combining theoretical content with regular testing, ensuring that users build strong conceptual foundations before moving forward.

Keywords— E-learning Platform, Structured Learning, Mastery-Based Learning, Interactive Education, Online Assessment, Progress Tracking, Personalized Learning, Web- Based Application, Gamification, Learning Management System (LMS)

Problem Statement— Existing e-learning platforms lack structured progression, allowing learners to skip basic concepts and leading to poor understanding. There is a need for a system that ensures step-by-step learning with assessments to achieve mastery before advancement..

Objectives— To design a user-friendly and interactive learning platform, implement secure user authentication and personalized learning paths, enforce mastery-based progression through assessments, provide instant feedback to improve learning outcomes, maintain a structured course hierarchy (courses, chapters, modules), ensure scalability and reliability using modern web technologies, support continuous evaluation to strengthen conceptual clarity, enhance learner motivation through progress tracking, and enable future enhancements like adaptive learning and certification level. It supports user authentication, personalized dashboards, and real-time progress tracking, enabling students to monitor their learning journey efficiently.

Scope of the System - The system provides a structured e- learning platform where learners progress step-by-step through courses, chapters, and modules based on performance. It includes features like user authentication, interactive content, assessments, and real-time progress tracking to ensure effective learning. The scope also covers a web-based implementation using modern technologies for scalability and accessibility. It can be extended with features like adaptive learning, gamification, and certification to support wider academic and professional use.

System overview- The system is a web-based e-learning platform that delivers structured, module-based courses with integrated assessments. Learners can progress only after achieving required scores, ensuring mastery of concepts. It includes user authentication, progress tracking, and an interactive interface to enhance learning experience.

Dataset Description— The system stores data such as user details, course content, module information, and assessment scores in a database. It manages this data to track learner progress, performance, and access to different modules.

Data Analysis and Feature Importance—

The system performs data analysis by evaluating user performance metrics such as assessment scores, completion rates, and engagement levels to monitor learning progress and identify areas for improvement. It uses basic statistical insights to understand learner behavior and effectiveness of the platform. Key feature importance lies in mastery-based progression, module-wise assessments, real-time feedback, and progress tracking, as these ensure structured learning, increase engagement, and help learners achieve better conceptual understanding.

I. INTRODUCTION

The rapid growth of digital technology has transformed the education sector, making e-learning platforms more accessible and flexible for learners. Students can now learn anytime and anywhere, but many existing systems lack proper structure, which affects the depth of understanding.

In most traditional e-learning platforms, learners are allowed to skip topics without mastering the basics. This leads to gaps in knowledge and reduces the overall effectiveness of learning. There is a need for a system that ensures a clear and guided learning path.

To address this issue, the proposed system provides a structured and interactive learning platform where learners progress step-by-step. By integrating assessments and controlled progression, it ensures that users build strong conceptual foundations before moving to advanced topics.

II. LITERATURE REVIEW

A. Traditional E-Learning Platform

Traditional e-learning platforms such as Coursera, Udemy, and edX have made education widely accessible by offering flexible and self-paced learning. However, these systems generally provide open access to all course materials, allowing learners to skip important foundational topics. This often results in superficial learning and lack of deep understanding..

B. Mastery-Based Learning Mastery-based learning focuses on ensuring that learners fully understand a concept before moving to the next level. This approach has been proven to improve retention and conceptual clarity by enforcing assessments and minimum performance criteria. It promotes disciplined learning but is not widely implemented in most existing platforms.

C. Interactive and Adaptive Learning Modern learning systems emphasize interactivity, real-time feedback, and personalized experiences to improve engagement. Features such as progress tracking, quizzes, and adaptive content help learners stay motivated and focused. However, many systems still lack a balanced combination of structured progression and adaptive flexibility, which is essential for effective learning outcomes.

III. METHODOLOGY

A. System **Architecture** The system uses a three-tier architecture with a frontend for user interaction, a backend for processing logic and authentication, and a database for storing user and course data. It ensures smooth learning flow by managing content delivery, assessments, and progress tracking.

Fig. 1. Proposed System Architecture

B. Mathematical Model

The learning progression in the UnlockED system is based on user performance in assessments. The progression function can be represented as:

$$P=f(S,A,M) \quad (1)$$

where P represents progression status, S is the assessment score, A is the minimum required score (e.g., 70%), and M represents the current module. A learner is allowed to unlock the next module only if the condition $S \geq A$ is satisfied.

To evaluate learner performance, the system calculates the average score across assessments: $\bar{S}=n1\sum i=1nSi$

C. System Modules

1) **User Authentication Module :** Handles secure login and registration using Gmail authentication, ensuring personalized and safe access to the platform.

2) **Course Management Module** : Manages creation and organization of courses, chapters, and modules in a structured format for easy navigation.

3) **Learning Module**:Delivers interactive content to users in a step-by-step manner, ensuring smooth and guided learning.

4) **Assessment Module**: Conducts quizzes and evaluations for each module, requiring a minimum score to proceed further.

5) **Progress Tracking Module** : Monitors user performance, displays progress, and provides feedback to help improve learning outcomes

IV. IMPLEMENTATION

A. Technologies Used

The UnlockED system is developed using modern web technologies, with React.js, HTML5, CSS3, and JavaScript (ES6) used for building a responsive and interactive frontend. The backend is implemented using Java Spring Boot to handle business logic, user requests, and system operations. MongoDB is used as the database to store user information, course content, and assessment data. For secure authentication, Google OAuth (Gmail login) is integrated to provide personalized access. Additional tools such as Node.js, GitHub, Maven, and Postman are used for development, version control, dependency management, and API testing.

Machine Learning Model: The UnlockED system uses a rule-based approach instead of a machine learning model. It processes user data such as assessment scores and progress to evaluate learning. Learners can proceed only if they achieve the required score (e.g., 70%). Performance is analyzed using metrics like average score and completion rate to ensure effective learning..

V. RESULTS AND EVALUATION

The implementation of the UnlockED platform demonstrated successful integration of all core components, including user authentication, structured course modules, assessments, and progress tracking. Functional testing conducted with a sample of 30 students showed a **100% success rate** in system operations such as login, module navigation, and assessment handling.

VI. COMPARISON: EXISTING VS PROPOSED SYSTEM

TABLE I

Learning	Existing system	Proposed system
Leaning approach	Unstrucured	Step by step
Content access	Can skip topics easily	Content unlocked after passing test
Concept understanding	Often superficial	Deep conceptual understanding
Assessments	Optional	Mandatory
Progress tracking	Basic	Real time
Personalization	Limited	Enhanced

VII CHALLENGE

1. Technical Challenges

Integration of React, Spring Boot, and MongoDB, along with secure authentication and smooth data flow

2. Design Challenges

Creating a balanced mastery-based system with proper module structure and assessment difficulty.

3. User Experience Challenges

Ensuring engagement while maintaining strict progression; lack of flexibility for advanced users.

VIII.FUTURE ENHANCEMENT

1. Adaptive Learning

Introduce personalized learning paths based on user performance and prior knowledge.

2. Gamification Features

Add rewards, badges, and leaderboards to increase motivation and engagement.

3. Advanced Features

Include admin dashboard, certificate generation, and offline access for better usability.

IX .CONCLUSION

The UnlockED platform successfully demonstrates the effectiveness of a structured and interactive learning system. By implementing a mastery-based progression model, it ensures that learners build strong conceptual understanding before advancing to higher levels. The integration of assessments, real-time feedback, and progress tracking improved student engagement and performance. Overall, the project highlights how technology can enhance learning by making it more disciplined, effective, and user-focused. Future improvements can further expand its impact and usability.

mobile deployment and multilingual support.

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X I .REFERENCES

[1] J. Anderson and L. Rainie, "The Future of Digital Learning Systems," Pew Research Center, 2021.

[2] D. Clark, "E-Learning and the Science of Instruction," Wiley, 2016.

[3] M. Albelbisi and Y. Yusop, "Factors Influencing Learners' Self-Regulated Learning Skills in MOOCs," IEEE Access, 2019.

[4] S. Hrastinski, "What Do We Mean by Blended Learning?" Taylor & Francis, 2019.

[5] Coursera, "Online Learning Platform Overview," 2024.

[6] Udemy, "E-Learning and Skill Development Platform," 2024.

[7]