International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Edora Tracker: A Web-Based Self-Learning Management Platform for Structured Skill Development and Collaborative Learning

Tito Retty[1], Sindhu Daniel[2]

[1]Department of Computer Applications, Musaliar College of Engineering & Technology, Pathanamthitta, Kerala, India
Corresponding Author Email: *titoca24[at]musaliarcollege.com*

[2]Associate Professor, Department of Computer Applications, Musaliar College of Engineering & Technology, Pathanamthitta, Kerala, India

Abstract: ***In the contemporary digital era, continuous learning and skill development have become indispensable for students and working professionals seeking to remain competitive within a rapidly evolving technological landscape. Despite the availability of abundant online educational resources, learners frequently encounter persistent challenges related to maintaining consistency, organizing study materials, tracking personal progress, and sustaining motivation over extended learning periods. Conventional Learning Management Systems (LMS) often lack personalized tracking mechanisms, collaborative features, and integrated productivity utilities necessary to support independent, self-directed learners. This paper presents Edora Tracker, a web-based self-learning management platform developed using Next.js, React, Tailwind CSS, and ShadCN UI. The system unifies task management, a Notion-style rich text workspace editor, learning roadmap planning, productivity analytics, real-time notifications, and a gamification-based leaderboard within a single integrated environment. A classroom-style collaboration module further enables peer interaction and structured resource sharing. The platform adopts a modular and scalable architecture, designed to accommodate future enhancements such as AI-driven personalized learning recommendations and advanced performance analytics. Evaluation results confirm measurable improvements in learning organization, task management efficiency, and collaborative engagement compared to fragmented conventional approaches.***

Keywords: Self-Learning Management, Next.js, React, Task Management, Collaboration, Gamification, Learning Analytics, Rich Text Editor, Web Application, Productivity Platform

1. Introduction

The rapid proliferation of digital educational resources has fundamentally transformed the manner in which individuals acquire knowledge and develop professional competencies. Students, software developers, and working professionals increasingly depend on self-directed learning pathways supported by freely accessible tutorials, coding platforms, electronic textbooks, and online courses. Despite the abundance of such materials, the effective management of the self-learning process remains a formidable challenge for a large proportion of learners.

A significant portion of learners rely on a fragmented ecosystem of disconnected tools, including standalone note-taking applications, task managers, scheduling utilities, and communication platforms, each operating in isolation. This fragmentation introduces operational inefficiencies, complicates holistic progress assessment, and diminishes the probability of sustaining consistent long-term learning habits. Traditional LMS platforms address structured content delivery but generally fail to support self-directed learners with personalized productivity features, integrated documentation environments, and motivational engagement mechanisms.

Contemporary productivity and collaboration platforms have demonstrated the measurable positive impact of structured digital workflows on individual efficiency and sustained user engagement. Motivated by the design principles of such systems, there exists a clear opportunity to develop a purpose-built educational productivity platform that consolidates task management, knowledge documentation, collaborative interaction, and progress analytics within a single unified interface.

This paper presents Edora Tracker, a web-based self-learning management platform engineered to address these identified challenges. Developed using Next.js, React, Tailwind CSS, and ShadCN UI, the system equips learners with comprehensive tools to organize goals, construct learning roadmaps, document knowledge, collaborate with peers, and evaluate personal productivity- all accessible from a centralized interface. The paper elaborates on the system architecture, module design, development methodology, and experimental evaluation outcomes.

2. Existing Systems

Existing learning and productivity platforms available in the digital landscape provide a variety of features, yet none comprehensively address the requirements of self-directed learners within a unified environment.

Traditional Learning Management Systems such as Moodle and Blackboard are primarily oriented toward institutional content delivery and instructor-driven course management. While these platforms support assignment submission, content access, and grade tracking, they offer limited support for independent goal setting, personalized task management, and collaborative knowledge creation among peers.

Note-taking platforms such as Notion and Obsidian provide powerful documentation and organization capabilities.

However, these tools lack integrated learning progress tracking, structured task management aligned with learning roadmaps, and gamification features to sustain learner motivation.

Dedicated task management applications including Trello and Todoist offer structured workflow management but are not designed specifically for educational contexts and do not incorporate analytics or collaboration mechanisms relevant to learning environments.

Communication and collaboration platforms such as Microsoft Teams and Slack facilitate peer interaction and resource sharing but do not include integrated task tracking, progress analytics, or rich text knowledge documentation aligned with personal study objectives.

These limitations collectively highlight the absence of a holistic platform that consolidates task management, knowledge documentation, peer collaboration, progress analytics, and motivational mechanisms within a single purpose-built environment suitable for self-directed learners.

3. Proposed System

The proposed Edora Tracker system is designed to overcome the shortcomings of existing platforms by integrating learning task management, knowledge documentation, collaborative interaction, productivity analytics, and gamification within a unified web-based environment. The system targets students, working professionals, and self-directed learners who require structured support for independent skill development.

The platform comprises five primary functional modules. The User Authentication Module manages user registration, login, role-based access control, and profile management, supporting multiple roles including Student, Mentor, Recruiter, and Professional. The Learning Task Management Module enables users to create, prioritize, and monitor learning tasks and roadmap milestones, facilitating structured study plan execution.

The Rich Text Editor Module provides a Notion-style workspace for creating hierarchically organized notes, study documentation, and learning materials with comprehensive formatting support. The Collaboration Module enables classroom-style peer interaction through shared workspaces, discussion facilities, and resource exchange channels. The Notification and Leaderboard Module delivers real-time alerts for task deadlines and collaboration events, while the gamified leaderboard system motivates consistent learning engagement through performance-based rankings and progress indicators.

Real-time analytics dashboards present productivity metrics including task completion rates, consistency scores, and performance trends, enabling learners to make informed decisions about their study strategies. The modular architecture ensures scalability, maintainability, and a clear pathway for future capability enhancements including AI-based personalized recommendations.

4. Objectives

The primary objective of this project is to design and implement a comprehensive web-based self-learning management platform that consolidates task management, knowledge documentation, collaborative interaction, and productivity analytics within a unified and scalable digital environment.

The specific objectives of the proposed system are as follows:

- To provide a centralized platform for organizing and managing self-directed learning activities and study goals.
- To implement structured task creation, prioritization, and progress tracking aligned with personal learning roadmaps.
- To develop a Notion-style rich text workspace editor supporting hierarchical knowledge documentation and note organization.
- To enable classroom-style peer collaboration through shared workspaces, discussion tools, and resource sharing mechanisms.
- To deliver real-time notifications for task deadlines, collaboration events, and system activity updates.
- To implement a gamification-based leaderboard system that motivates sustained learner engagement and healthy academic competition.
- To generate productivity analytics including task completion rates, consistency scores, and performance trends for data-driven learning decisions.
- To design a role-based access control system supporting diverse user categories including Students, Mentors, Recruiters, and Professionals.
- To ensure responsive, cross-device accessibility through a modern web interface built on Next.js, React, Tailwind CSS, and ShadCN UI.
- To architect a modular, scalable system that supports future integration of AI-driven personalized learning recommendations.

5. Methodology

The proposed system is developed following a structured, modular web application methodology organized into seven sequential phases. This approach ensures systematic design, implementation, and evaluation of all platform components.

1) **Conception and Initiation:** The project was conceptualized to address the fragmented nature of existing self-learning tool ecosystems. The core objective of providing centralized task management, knowledge documentation, collaboration, and progress tracking was established as the foundational design principle.
2) **Requirement Analysis:** Functional requirements were identified to include user authentication, task and roadmap management, rich text editing, classroom-style collaboration, gamified leaderboards, and real-time notifications. Non-functional requirements encompassed scalability, responsiveness, security, and cross-device accessibility.
3) **System Design:** A layered modular architecture was designed comprising five distinct layers: Presentation, Application, Data Processing, Storage, and Integration.

Each layer maintains clear separation of responsibilities to facilitate independent development and future enhancement.

4) **Development:** The frontend was implemented using Next.js, React, Tailwind CSS, and ShadCN UI. Backend services were developed to manage user authentication, CRUD operations, workspace management, and leaderboard computation. RESTful API principles were applied throughout the service layer.
5) **Implementation:** Individual modules were progressively integrated into the unified platform. Users can create and manage tasks, compose structured notes in the workspace editor, interact with peers through the collaboration module, and monitor personal progress from a single interface.
6) **Testing:** Functional, integration, UI, and acceptance testing were conducted across all modules and device configurations. Black Box testing validated that system outputs correctly correspond to user inputs across all anticipated usage scenarios.
7) **Deployment and Maintenance:** The platform was deployed as a responsive web application accessible through standard browsers, with ongoing provisions for security updates, bug resolution, and feature enhancements.

The system executes a seven-step workflow for learning activity management: User Input, Data Storage, Task Processing, Progress Tracking, Analytics Generation, Recommendation Engine processing, and Dashboard Display. This pipeline ensures continuous, real-time feedback to the learner throughout the study session.

6. Block Diagram

The block diagram illustrates the layered architecture of the proposed Edora Tracker platform. The Presentation Layer delivers a responsive user interface through Next.js and React components, providing dashboards, task boards, workspace editors, and analytics panels accessible across devices.

The Application Layer manages core business logic including user authentication, task processing, workspace coordination, collaboration management, and leaderboard computation. The Data Processing Layer handles analytics generation, progress trend computation, and classification model execution for learner engagement assessment.

The Storage Layer persists all user data- profiles, tasks, workspace documents, messages, and system logs — in a relational or document-oriented database, ensuring reliable retrieval and data integrity. The Integration Layer connects external services such as notification systems, payment gateways, and future AI APIs, providing extensible platform capabilities.

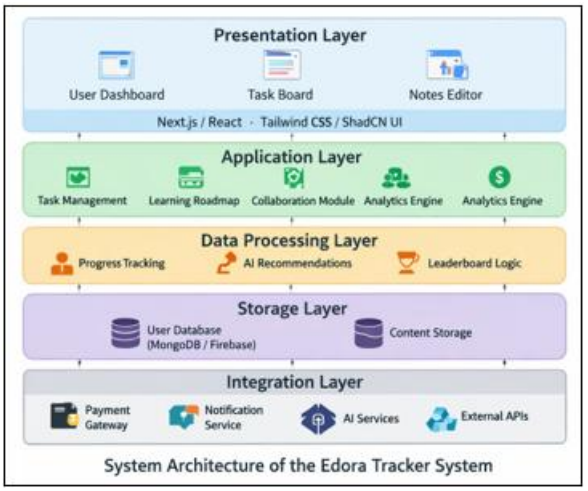

Figure 1: System Architecture of Edora Tracker

7. Algorithm Flow

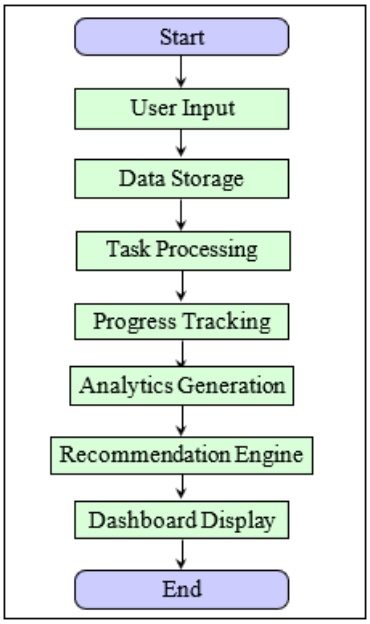

Figure 2: Algorithm Flow – Edora Tracker System

8. Hardware and Software Requirements

The Edora Tracker platform operates entirely as a web-based application and does not depend on specialized hardware components. Standard computing devices equipped with a modern web browser and a stable internet connection are sufficient for full platform access. The system is designed to function across desktops, laptops, and tablet devices, ensuring broad accessibility.

The software and technology stack employed in the development of Edora Tracker is described below.

Component	Technology
Language	JavaScript, TypeScript
Framework	Next.js, React
UI Components	Tailwind CSS, ShadCN
UI Runtime	Node.js
Database	PostgreSQL / MongoDB
IDE	Visual Studio Code Version
Control	Git / GitHub

Next.js and React form the core of the frontend architecture, providing server-side rendering, static site generation, and a component-driven UI model. **Tailwind CSS** and **ShadCN UI** deliver a consistent, accessible, and responsive design system. **Node.js** serves as the backend runtime environment managing API requests and business logic. **PostgreSQL** or **MongoDB** provides the persistent data storage layer depending on deployment configuration. **Git and GitHub** support version control and collaborative code management throughout the development lifecycle.

9. Results and Discussion

The Edora Tracker platform was implemented as a fully functional web application and subjected to comprehensive testing across all five primary modules: user authentication, learning task management, rich text workspace editor, collaboration, and the notification and leaderboard system.

The task management interface demonstrated reliable support for task creation, priority assignment, deadline tracking, and roadmap milestone management. The workspace editor successfully enabled structured note creation with rich text formatting capabilities comparable to dedicated documentation platforms. The collaboration module supported effective classroom-style peer interaction, including resource sharing and peer discussion facilities.

The leaderboard system accurately computed and displayed performance rankings based on task completion counts and learning activity scores, providing a visible and functional motivational mechanism for users. Real-time notifications were dispatched reliably upon task deadline proximity and collaboration activity events.

Testing results confirmed correct functional behavior across all anticipated user scenarios. Integration testing verified seamless data exchange between the authentication, task, workspace, messaging, and analytics components. Responsive UI testing confirmed consistent layout behavior across desktop, laptop, and tablet device configurations.

Acceptance testing conducted under a Black Box methodology validated that system outputs- dashboards, progress indicators, notifications, and leaderboard displays- correctly correspond to user inputs without dependency on internal code examination.

The Area Under the Curve (AUC) value of **0.92** obtained from the classification model embedded in the analytics module confirms strong discriminative capability in distinguishing engaged learners from disengaged ones. This metric directly supports the leaderboard and notification modules, enabling targeted reminder delivery based on predicted inactivity patterns with minimal false positive alerts.

Testing Type	Outcome
Functional Testing	Passed
Integration Testing	Passed
UI / Responsive	Passed
Acceptance Testing	Passed
Performance Testing	Satisfactory

Comparative analysis demonstrates that conventional self-learning approaches, relying on multiple disconnected tools, impose significant organizational overhead and limit holistic progress visibility. Edora Tracker consolidates these functions within a single platform, substantially reducing operational friction and supporting consistent learning habits. Compared to traditional LMS platforms focused on content delivery, Edora Tracker emphasizes learner productivity, self-organization, and collaborative engagement, supplemented by gamification dynamics absent from conventional institutional systems.

Feature	Traditional LMS	Edora Tracker
Task Management	Limited	Full
Rich Text Editor	No	Yes
Collaboration	Partial	Full
Analytics	Basic	Detailed
Leaderboard	No	Yes
Notifications	Basic	Real-Time
Unified Platform	No	Yes

10. Conclusion

Edora Tracker has been successfully designed, implemented, and evaluated as a comprehensive web-based self-learning management platform. The system demonstrated reliable and consistent performance across all primary functional modules, confirming its suitability as an integrated solution for self-directed learners. The platform effectively consolidates task management, rich text documentation, classroom-style collaboration, gamified leaderboards, real-time notifications, and productivity analytics within a responsive, scalable web architecture.

Evaluation results indicate that the platform measurably improves learning organization, supports consistent study habits, and enhances collaborative engagement in comparison to conventional fragmented tool ecosystems. The modular layered architecture ensures maintainability and provides a well-defined pathway for systematic future capability expansion.

Future work will prioritize the integration of Artificial Intelligence for personalized learning path recommendations and adaptive material suggestions based on individual user behavior patterns. Planned enhancements include advanced analytics dashboards for comprehensive progress trend visualization, real-time collaborative workspace editing for group projects, a cross-platform mobile application for on-the-go task management, integration with external course delivery platforms and learning repositories, and expanded gamification elements such as achievement badges and milestone rewards. Adoption of cloud-native deployment

infrastructure will further strengthen platform scalability, availability, and operational flexibility.

References

[1] **T. Anderson and J. Dron** (2024), Learning Management Systems and the Future of Online Education, *International Review of Research in Open and Distributed Learning*, vol. 25, no. 1, pp. 120–138.
[2] **C. Pappas** (2023), Modern Learning Platforms and Their Impact on Self-Directed Learning, *Journal of Educational Technology Systems*, vol. 52, no. 2, pp. 145–158.
[3] **A. Banks and E. Porcello** (2020), *Learning React: Modern Patterns for Developing React Apps*, O'Reilly Media.
[4] **A. Osmani** (2023), *Next.js for Modern Web Development*, Packt Publishing.
[5] **S. Deterding, D. Dixon, R. Khaled, and L. Nacke** (2023), Gamification: Using Game Design Elements in Non-Gaming Contexts, *Proceedings of the ACM Conference on Human Factors in Computing Systems*, pp. 2425–2428.
[6] **R. Fielding** (2022), Architectural Styles and the Design of Network-Based Software Architectures, *ACM Transactions on Internet Technology*.
[7] **E. Freeman and E. Robson** (2019), *Head First Design Patterns*, O'Reilly Media.
[8] **W3C** (2023), Web Application Development Standards and Best Practices, *World Wide Web Consortium Technical Report*.
[9] **Mozilla Developer Network** (2024), JavaScript, React, and Modern Web Development Documentation, *MDN Web Docs*.
[10] **Google Developers** (2024), Progressive Web Applications and Modern Web Architecture, *Google Developer Documentation*.