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Learnova: Host and Monetize Educational Content

Mr. Ajay R. Sirsat[1], Dipali Sharma[2], Krutika Parte[3], Vivek Pal[4], Harsh Patil[5]
[1]Assistant Professor, Department Of Computer Engineering, St John's College Of Engineering and Management (Mumbai University), Palghar, Maharashtra, India.
[2,3,4,5] UG Scholar, Department of Computer Engineering, St John's College of Engineering and Management (Mumbai University), Palghar, Maharashtra, India.
Email ID: *ajays@sjcem.edu.in[1], sharmadipali2004@gmail.com[2] ,krutikaparte27@gmail.com[3] ,vivekpal2462003@gmail.com[4] , hp264674@gmail.com[5]*

Abstract
The growing reliance on digital learning environments has created a strong demand for platforms that not only manage educational content efficiently but also allow instructors to generate revenue independently. However, many of the existing online learning solutions are designed as separate modules and do not have enough flexibility in terms of content management, pricing strategies, and effective learner engagement. This paper presents the design of Learnova, a comprehensive web-based platform developed to simplify the process of sharing, creating, and monetizing content in one place. Learnova enables the following features such as publishing courses, subscription-based models, package deals, live teaching, and digital product distribution. Developed on a full-stack framework, the system provides support for secure authentication systems, secure payment systems, restricted access to content, and analytics for teachers. To improve learner engagement, the system has been developed with assessment tools, tracking systems, and discussion forums. The above-mentioned features improve learning outcomes. System performance analysis confirms that Learnova is scalable, reliable, and appropriate for teachers and learners who require a flexible and robust e-learning system.

Keywords: *E-learning platform, Learning management system, Content monetization, Online education, Web technologies, Full-stack-development*

1. Introduction
The field of education has been revolutionized by digital technologies, particularly with regard to the acquisition of knowledge. Internet technologies, cloud computing, and other digital technologies allow students to access learning anywhere and at any time, irrespective of their location in the world. The new digital education has broken the traditional Mold of the classroom being connected to a location or a time. The learner can access high-quality instruction from anywhere. This has the effect of allowing rural students to study without the need to relocate. Even working professionals can access education programs to improve their skills without affecting their professional engagements. In the last few years, especially since the COVID-19 pandemic, which caused the global education sector to shift to remote education, the need for digital education systems has been on the rise. Educational institutions, teachers, and trainers have been utilizing online education platforms to ensure uninterrupted education activities. This has highlighted the importance of digital education systems in meeting the requirements of a large number of users, providing ease of access to educational material, and ensuring the uninterrupted provision of education services. Thus, the e-learning system has evolved from being an alternative to becoming an integral part of the education system. Despite the rapid development of learning platforms, a number of critical issues remain to be resolved. Many of the existing platforms are mostly focused on content hosting and delivery, with relatively few options for customization, branding, and revenue generation. The educator could be required to rely on a variety of platforms with limiting revenue-sharing models, subscription-based models, or other platform-specific models. This could impact the educator's ability to decide on the pricing models, course structures, and other factors.

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Additionally, the educator could be required to pay certain fees to the platform providers, which could impact the educator's income and the overall sustainability of the business. In addition, the educator may lose the overall ownership of digital content through platform dependence. From the learner's point of view, learning platforms are also lacking in the way they engage learners and assist them in retaining the information learned. The learner might feel isolated with few chances to engage with other learners. When this happens, the learning process becomes a drag. However, we cannot ignore the important issues of safe payment options, privacy, and security of information.

2. Methodology

2.1. Overall System Architecture

The Learnova platform is designed using a layered system architecture that supports modular development, scalability, and simplified maintenance. This architecture is organized into clearly defined layers, namely the presentation layer, application layer, database layer, payment processing layer, and cloud storage layer. Role-based interfaces for instructors, learners, and administrators are delivered through the presentation layer, while the application layer is responsible for managing essential functions such as authentication, authorization, course management, transaction verification, and analytics processing.

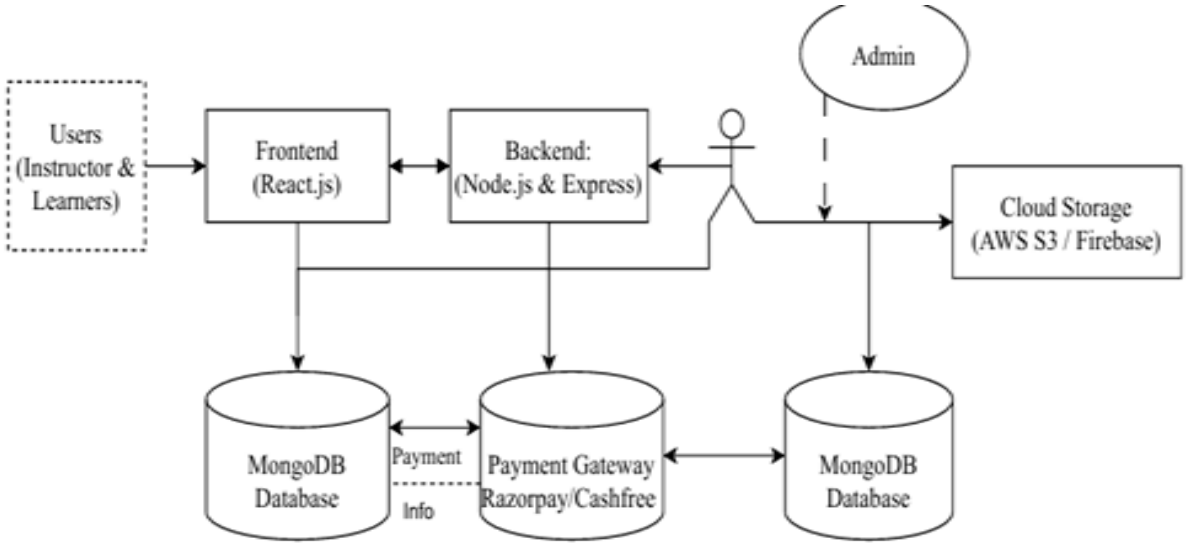

Figure 1 Overall system architecture of the Learnova platform

User information, course information, and transaction history are stored in a database, whereas multimedia data are stored in cloud storage. As demonstrated in Figure 1, secure RESTful APIs facilitate the interaction among the components of the system, ensuring the efficient and secure communication of data.

2.2.Functional Workflow of the System

The workflow of the Learnova system illustrates how users interact with the system. It starts from the registration of users up to the usage of the system. It is developed in such a way that it can maintain user authentication, content management, monetization, and learning content access control.The system starts with instructors who register and log in to the system using authentic details. Once you log in, you get access to a dashboard where you can create your own courses. You can add various materials to your courses, such as pre-recorded videos, PDF, slides, assignments, quizzes, etc. At this stage, you can also set the details of your course, including the price, description, objectives, prerequisites, etc. Once the course is created, it is made available to learners via course enrollment links provided by the system. Fig. 2. Use case diagram of the Learnova system The learners interact with the platform by taking various courses offered by the platform. The courses are divided into various categories. Once they click on

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the details of any course, they can register for the course by logging in to their accounts. The learners interact with the platform by taking various courses offered by the platform. The courses are divided into various categories. Once they click on the details of any course, they can register for the course by logging in to their accounts. The payment is made through a secure system, and once the payment is made, they can access the course on their dashboard. The interaction of all these components is demonstrated in Figure 2.

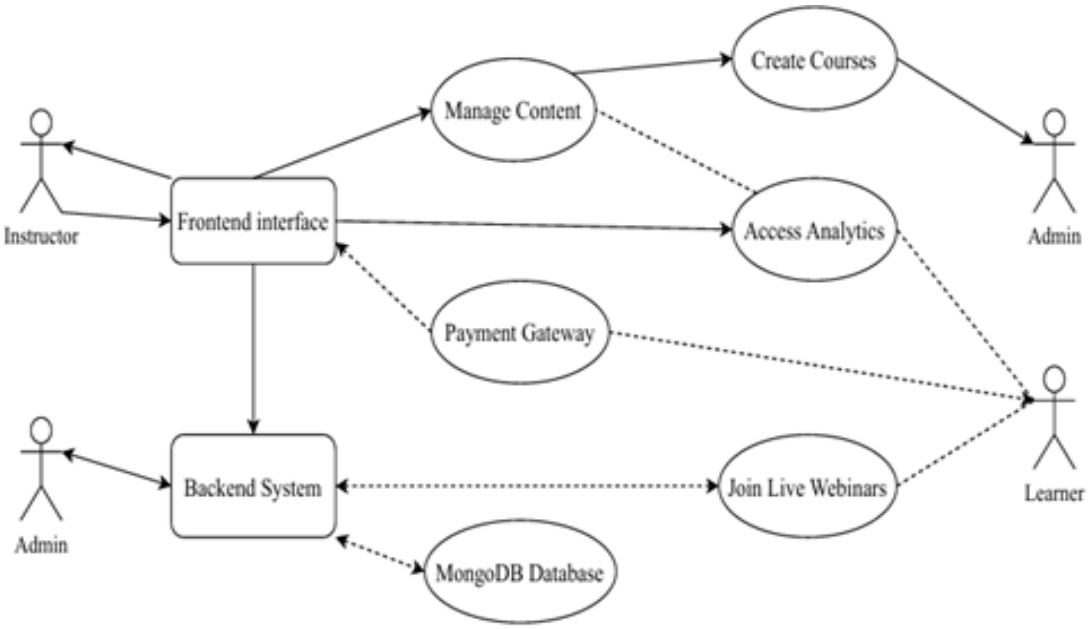

Figure 2 Flow Process

2.3.Role-Based Access Control and Security

The policy behind safety and access is quite simple: access control. People can enter based on what they need to do. This is implemented by ensuring that everyone is in their own realm. Instructors can access tools like course creation tools, content tools, analytics tools, and student tools. Students can access courses they are enrolled in along with the assessment tools. Administrators can access all tools. Security is maintained via token-based authentication using JSON Web Tokens and session management to reduce problems such as session hijacking and login issues. All communications are via HTTPS.

2.4.Payment and Content Access Control

When it comes to payment, Learnova has implemented secure payment gateways that can handle user payments in the safest way possible. When users want to access content, they do not have access to that content. However, after payment is made, they can access the course they have enrolled in. This minimizes any form of fraud because they cannot access content without paying. The whole process is shown in the flow chart in Fig.3.

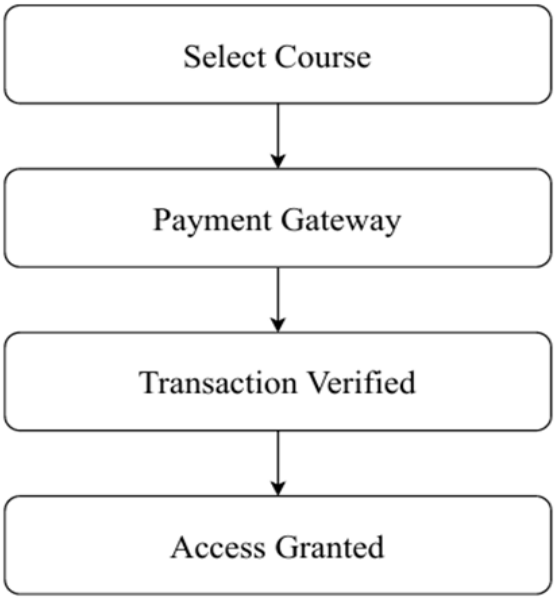

Figure 3 Payment Workflow Diagram

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2.5.Technology Stack

The technology stack is very good because it is up-to-date and can support the scalability of the system. The front end is developed with React.js, which is very good for developing interactive user interfaces. Node.js is used as the back end because it is very good at processing requests. MongoDB is used to store the data because it is very flexible in storing documents. Multimedia content is stored in cloud storage to support scalability in the future.

3. System Requirement

To ensure that Learnova works properly, you need to have good hardware and software that can support its performance. It is designed to increase horizontally to ensure that it is always available to serve the users even if they all need to access it at once.

3.1.Hardware

During the installation of Learnova, a development environment or a cloud server can be set up. For the development environment, a computer with an Intel i5 processor, 8 GB RAM, and 100 GB of storage capacity is required. For a cloud server to be set up for multiple users, virtual cloud servers are required.

3.2.Software aspect

Moreover, communication take place between clint and server in Lernova it is optimized for speed and efficiency by advance web programming technology .It is assumed that the client supports HTML5, CSS3, and JavaScript in relation to the client side of the system . In relation to the server side of the system, Node.js is used to enable effective communication between the client and server. For storing user data, courses, and transaction history, it makes use of MongoDB, while multimedia content is hosted on cloud storage. To store user data, courses, and transaction history, it uses MongoDB. To store multimedia content like course videos, it uses cloud storage. To ensure that financial transactions in Learnova are secure, it uses a trusted third-party API to enable payment gateway services.

4. Design and Implementation

4.1.Start

When user access the Learnova application through web browser then this system become active.in Simple word when user start this website or run this website then

- Backend get started
- Database get connected
- Interface of user become ready
- The system got started.

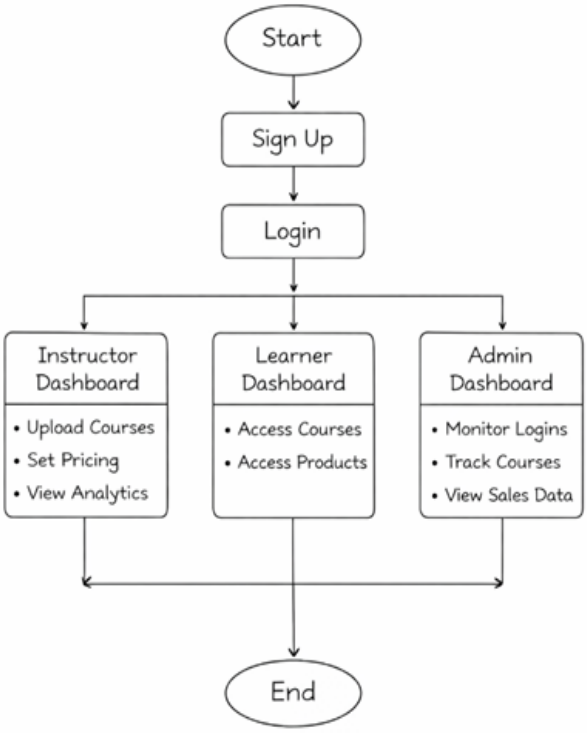

Figure 4 Flowchart

4.2.Sign Up

The first time a user wants to use the Learnova application, they will be asked to create an account. The user will be prompted to enter their name, email address, and password during the registration process.The input validation techniques will check the accuracy of the provided email, the password's strength, and ensure all the provided information is accurate. When information that has been provided is verified them data is in the database using hash function .At the time this processes are completed the user account will be created and ready for use.

4.3.Login

Users who have registered must login using their credentials to access the website features. In the login processes comparing email and password which is stored in the database only if credential match, the system generates a secure authentication token that establishes an active session. This also prevents common security risks such as unauthorised access

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and session hijacking of the overall system.

4.4.Role-Based Dashboard Allocation

Once login sucessful, the system identifies the assigned role of user for e.g (Teacher,Student).Based on this role the user redirect to the appropriate dashboard. Learnova support 3 primary user roles

- Instructor
- Learner
- Administrator

These roles have specific access control privileges allocated to them in the system using the role-based access control method.

4.5.Dashboard for instructor

Users who have successfully authenticated as instructors are redirected to the Instructor Dashboard by the system. An instructor can manage courses by using the dashboard's many features. The dashboard's allow teachers to:

- Make courses and post materials such as quizzes, assignments, PDF files, and video lectures.
- Assign pricing structures that will allow courses to be monetized.
- Monitor performance indicators such as course completions, and student enrolments.

Instructors can monitor the performance of their own courses and manage them independently with the dashboard.

4.6.Dashboard for Learners

Users who have been authenticated as learners are redirected to the Learner Dashboard by the system. Learners can access a variety of features that allow them to access course content through the dashboard. The features of the dashboard enable learners to:
1)Explore courses by subject and instructor.
Enroll in courses to access purchased content.2)Track academic performance like course completions and results.The learner dashboard is intended for easy access of learning resources in a captivating way that encourages continuous study.

4.7. Admin Dashboard

Users with the Admin role are able to access the Admin Dashboard, which offers full control and management of everything in the system and all activities such as show information like how many users have logged in, register how many of them enroll for how many courses. The administration functions include:

- Monitoring login activities in order to identify unusual and suspicious activities.
- Monitoring and managing course uploads.
- Analysing transactions and revenue data.
- Managing user accounts and resolving technical and operational issues.

4.8.Complete

The session may terminate when the user has finished all the tasks such as uploading files, enrolling in classes, and performing administration tasks. However, the system will remain active and ready to perform more tasks and respond to the user's commands. The session will remain active until the user decides to log out.

4.9.Instructor Module

The instructor module assists instructors in creating and managing their courses by uploading videos, documents, quizzes, assignments and other materials . Additionally, the instructor can use this module to create membership plans, bundle multiple courses, and conduct live webinars. Advanced content management features, such as access configuration, content scheduling, and draft preservation, are also available in the instructor module.

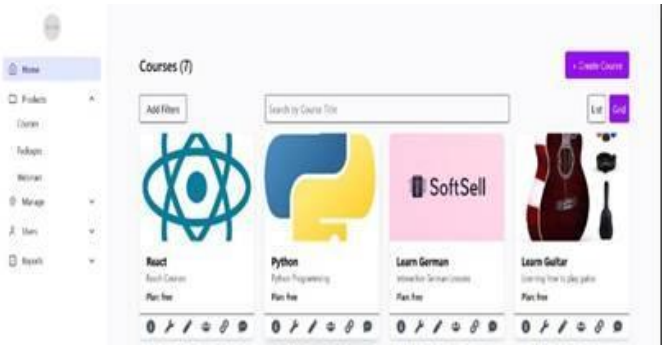

Figure 5 Instructor Module

Additionally, the instructor can use this module to determine the cost of their courses, bundled courses, or membership plans. The analytics dashboard also gives the instructor access to real-time information

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about revenue distribution, learner engagement, enrolment trends, etc. With this information, the instructor can maximize the effectiveness of the courses by optimizing the delivery of the content.

4.10. Module for Learners

This module is made to give the learner the tools they need to access courses, including the ability to see and access to uploaded documents, videos, quizzes, assignments, and more. Learners can access courses through link sharing by instructor Additionally, the Learner can use this module membership plans, bundle multiple courses (product), and attend live webinars.

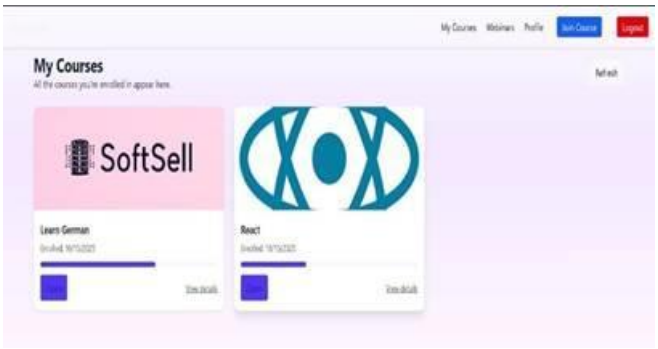

Figure 6 Learner Module

Advanced content management features, such as access configuration, content accessing, and draft preservation, are also available in the instructor module. Additionally, the Learners can use this module to determine the cost of courses, bundled courses, or membership plans if they have links of some other courses also . The analytics dashboard also gives the instructor access to real-time information about revenue distribution With this information, the instructor can maximize the effectiveness of the courses by optimizing the delivery of the content. The Learner can also use the live webinar features to interact with the instructor in real-time through dynamic communication.

4.11. Administrator

Centralized control over users, content, and platform transactions is provided by the admin module. Administrators control user access permissions, monitor system activity generally, and make sure the platform runs efficiently. With access rights dynamically assigned to ensure secure usage, they are in charge of upholding user accounts, keeping an eye on course content, and validating payment transactions. In order to keep an eye on platform performance, spot anomalous activity, and maintain operational stability, the module also includes activity tracking and system analytics. Mechanisms for access control and content moderation also guarantee adherence to security guidelines and platform policies.

Figure 7 Administrator Module

5. Comparison with Existing Platforms

Table 1 Comparative Evaluation of Online Learning Platforms

Feature	Coursera	Udemy	Learnova
Instructor Branding Control	Limited	Limited	Full
Revenue Control	Commission-based	Commission-based	Full
Dual-role Architecture	No	Marketplace	Yes
Independent Pricing	Limited	Limited	Yes
Integrated Analytics	Basic	Basic	Advanced

As shown in Table 1, Learnova provides greater flexibility in instructor autonomy and monetization control compared to existing platforms.

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6. Results and Discussion

The Learnova platform was subject to a thorough evaluation in terms of its performance criteria. These criteria include the responsiveness of the system, its ability to scale up or down in terms of performance, security enforcement, reliability of transactions, and the effectiveness of user engagement. The performance evaluation was conducted in a simulated environment. The purpose of the performance evaluation was to assess the stability of the Learnova platform in terms of its efficiency in delivering services in a secure environment. The performance of the Learnova platform was found to be consistent in terms of its ability to handle core functionality. The average time taken by the system to respond was found to vary between 300-350 milliseconds for critical operations such as user authentication, dashboard rendering, course access, and multimedia access. The scalability of the Learnova platform was also evaluated in terms of its ability to handle a large number of users without compromising its performance. The metrics related to the Learnova platform in terms of its ability to scale up or down in terms of performance were found to be efficient. The database query execution time was found to be efficient. The Learnova platform has been implemented in a cloud environment, which has been found to provide the necessary elasticity in terms of its ability to scale up or down in terms of performance. The payment processing module of the Learnova platform was rigorously tested in terms of its reliability. The reliability of the payment processing module was found to be high, with a transaction reliability of almost 99%. This has been achieved through the payment gateway integration. Once the transaction was validated, the access control permissions were found to be updated in real time. The failed transactions did not result in any changes to the access control permissions. This has been achieved through the payment gateway integration. The payment gateway integration has been found to provide the necessary security in terms of its ability to handle failed transactions.

Conclusion and Future Work

This paper proposes a comprehensive platform named Learnova, specifically designed for the hosting and monetization of educational content. The platform incorporates learning management, payment processing, and learner interactions, thus addressing the major shortcomings of existing e-learning platforms. The planned future developments include the implementation of artificial intelligence-based course recommendations, the development of a mobile app, gamification features, language support, and the use of blockchain for verifying content ownership.

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