



FPT ACADEMY INTERNATIONAL
FPT – APTECH COMPUTER EDUCATION

MAPLEARN EDU

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Batch No: T2.2410.E0

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MAPLEARN EDU

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Content

MAPLEARN EDU	1
Content	3
Acknowledge	6
Synopsis	9
Review 01.....	11
Problem Definition	12
I. Problem Definition.....	12
Problem Statement	12
1. Context	12
2. Current Problems	13
3. Consequences	13
4. Need for Solution.....	13
II. Identify the Problem.....	15
III. Proposed Solutions	17
IV. Database System Requirements	22
V. Description of Functions	24
VI. Additional Features Implemented by Our Team.....	31
Customer Requirements Specifications.....	45
II. Customer Requirements Specifications	45
1. Student.....	45
2. Teacher	52
3. Admin.....	56
Review 02.....	67

Architecture and design of the Application	68
I. Architecture and design of the Application	68
1. Application Architecture	68
2. Data Flow Diagram.....	69
Entity Relationship Diagram	75
II. Entity Relationship Diagram.....	75
1. ERD	75
2. ERD Properties	76
Table Design.....	81
III. Table Design	81
1. Table Design	81
2. Relationship Diagram.....	90
Site Map	91
IV. Site Map	91
Algorithm	92
V. Algorithm	92
1. Algorithm Administrator	92
2. Algorithm Teacher.....	93
3. Algorithm Student	94
Review 03.....	95
Screen Shoots	96
I . Screen Shoots.....	96
1. Homepage	96
2. Courses.....	98
3. Course Details	100
4. Exams	104
5. Login.....	106
6. Register	108

Testing Document	110
II . Tesing Document.....	110
Final Checklist	111
III . Final Checklist.....	111
Acknowledgments and Declaration.....	116

Acknowledge

As we approach the culmination of our **MapLearn Edu** Project, we are filled with a profound sense of accomplishment, enthusiasm, and gratitude. This project has been far more than a mere academic requirement—it has been an immersive journey that has enhanced our technical proficiency, strengthened our problem-solving abilities, and deepened our appreciation for teamwork and collaborative development.

Throughout this journey, we have encountered numerous challenges, from conceptualizing the platform architecture, designing the user interface, implementing complex interactive features, optimizing the learning experience, to ensuring secure and seamless payment integrations for various channels including Momo, ZaloPay, VNPay, bank transfers, and mobile recharge cards. Each obstacle was a valuable learning opportunity, pushing us to adapt, innovate, and grow while preparing us for the demands of the professional IT industry.

Heartfelt Gratitude to Our Mentors and Supporters

First and foremost, we extend our sincerest gratitude to the Project Team at FPT Aptech for providing us with this incredible opportunity. This project has been an ideal convergence of theoretical knowledge and hands-on application, allowing us to immerse ourselves in the intricacies of modern web development, including full-stack development, responsive design, AI integration, and online learning systems. The structured guidance, abundant resources, and continuous support provided by the Project Team have been instrumental in shaping our approach and execution.

We are especially thankful to our lecturer, **Mr. LÊ THANH NHÂN**, whose dedicated mentorship, patience, and technical insight have been pivotal to our success. His guidance through complex challenges, from refining the UI/UX design, debugging interactive features, to implementing AI-powered learning assistants and automated

assessment systems, has motivated and inspired us throughout the project. Without his expert direction, this Project would not have achieved the professional level it has today.

A Salute to Our Team and Classmates

To our amazing teammates in Team 01, this journey would not have been possible without your collaboration, creativity, and perseverance. The countless brainstorming sessions, the debugging marathons, and the celebratory moments after successfully implementing AI-driven recommendation systems, interactive quizzes, and payment integrations have made this project not just an assignment but a transformative experience.

Our teamwork exemplified the true essence of collaboration, where ideas merged, perspectives aligned, and collective effort turned a conceptual platform into a fully functional, feature-rich web application. Through this project, we have honed our communication skills, strategic delegation, and synergistic problem-solving abilities, proving that great outcomes stem from collaboration as much as from individual expertise.

A Heartfelt Thanks to Our Families and Friends

We also deeply appreciate the unwavering support of our families and friends. Their patience, encouragement, and understanding during long hours of coding, testing, and refining features—from AI-based course recommendations to interactive lesson analysis tools—have been invaluable. They have been our silent cheerleaders, motivating us to persevere and innovate.

A Project That Transcends Learning

The MapLearn Edu Project has been a remarkable platform, seamlessly integrating cutting-edge technologies to deliver a full-featured online learning ecosystem. We have designed a website that not only sells courses but also provides

AI-powered learning guidance, interactive exercises, exam simulation systems, and multi-channel payment options, catering to Vietnamese students nationwide.

Beyond coding and design, this project has taught us perseverance, adaptability, and meticulous planning. Every feature implemented, from AI-assisted video analysis and automated quiz generation to secure payment gateways, has contributed to our growth—not just as developers, but as innovators, problem-solvers, and future IT professionals.

Looking Forward to New Horizons

As we conclude this chapter, we see it as a stepping stone toward greater opportunities. The technical skills, practical experience, and lessons learned from MapLearn Edu will serve as a solid foundation for future projects and innovative challenges. With renewed confidence and passion for technology, we eagerly anticipate applying our knowledge to more complex systems, AI-integrated applications, and professional web development projects.

With heartfelt thanks and excitement for the future,

Team 01

Synopsis

MapLearn Edu also provides a comprehensive course management system for students, allowing them to browse, enroll, and track their progress in various subjects. The platform includes a detailed dashboard where students can monitor completed lessons, upcoming quizzes, and overall performance, enabling them to take a more structured and self-directed approach to learning. By integrating exam-like question formats and interactive exercises, students gain confidence in their knowledge and develop critical thinking and analytical skills necessary for high-stakes exams.

In addition to supporting students, **MapLearn Edu** is designed to facilitate collaboration with teachers and content creators. Educators can contact the platform administrators to propose and develop new courses, contribute learning materials, and create interactive lessons. This functionality encourages a dynamic and continuously evolving course library, ensuring that students always have access to high-quality, up-to-date educational content tailored to their learning needs.

The platform also leverages artificial intelligence to enhance learning efficiency. AI algorithms analyze students' performance data to suggest the most suitable courses and learning paths, highlight key topics in video lessons, generate automated quizzes, and provide detailed feedback on answers. These features help students identify knowledge gaps, reinforce important concepts, and focus their study time effectively, making the learning process more personalized and adaptive.

From a technical standpoint, **MapLearn Edu** is a full-stack web application built with responsive design principles to ensure seamless accessibility across desktops, tablets, and mobile devices. The system integrates interactive user interfaces, real-time content updates, AI-driven analytics, and exam simulation tools, providing students with a modern, engaging, and intuitive learning environment. Through this project, students gain practical experience in web development, UI/UX design, system

architecture, and collaborative problem-solving, bridging the gap between classroom theory and real-world application.

Ultimately, **MapLearn Edu** offers a holistic and transformative educational experience. By combining online course delivery, AI-assisted learning, interactive exercises, and exam simulations, the platform not only supports students in achieving academic success but also equips them with critical skills in technology, self-directed learning, and digital literacy. This project represents a significant step toward modernizing education for Vietnamese students, preparing them for future academic challenges and careers in the IT and educational technology sectors.

Review 01

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 12 of 116

Problem Definition

I. Problem Definition

Problem Statement

Secondary and high school students in Vietnam are facing many difficulties in accessing comprehensive learning resources, professional exam preparation systems, and personalized learning paths. Most existing online platforms only provide fragmented content, lack realistic exam simulations, and do not integrate artificial intelligence to support performance analysis, study plan recommendations, or automated test generation. As a result, students struggle to identify their weaknesses, lack confidence in examinations, while teachers lack convenient tools to develop and distribute online courses. Therefore, there is a strong need for a comprehensive online learning platform that not only supports students in improving their knowledge and skills but also enables teachers to collaborate and expand high-quality educational content—this is the goal of MapLearn Edu.

1. Context

Vietnam's secondary and high school education system is increasingly focusing on innovation and technology adoption to improve learning quality. However, teaching and learning activities still mainly rely on traditional methods such as textbooks and face-to-face lectures. In the digital era, students require a modern, flexible learning environment that supports both knowledge acquisition and preparation for critical examinations such as high school entrance exams, national graduation exams, and university competency assessments.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
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Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 13 of 116

2. Current Problems

- Learning resources are fragmented and unstructured, forcing students to search across multiple channels.
- Few platforms provide comprehensive exam preparation systems that realistically simulate exam structures, difficulty levels, and time pressure.
- Most existing e-learning platforms lack AI integration for study path recommendations, performance analytics, automated test generation, or detailed solution explanations.
- Students have limited opportunities to practice diverse question formats, receive timely feedback, and monitor their progress effectively.
- Teachers face challenges in creating, updating, and sharing interactive online courses due to the absence of efficient content management and collaboration tools.

3. Consequences

These limitations make it difficult for students to identify and overcome weaknesses, reduce their confidence when facing exams, and negatively impact learning efficiency. At the same time, teachers cannot fully maximize their teaching potential and have limited means to expand their reach to students nationwide.

4. Need for Solution

There is a pressing need for a modern, comprehensive online learning platform that combines course delivery, professional exam preparation, and personalized study plans. Such a platform must:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 14 of 116

- Provide multi-subject, structured, and accessible learning resources.
- Simulate real exam conditions to help students practice time management and problem-solving skills.
- Integrate AI to recommend study paths, analyze performance, suggest courses, and support students throughout the learning process.
- Equip teachers with convenient tools to create, manage, and distribute online courses, while encouraging collaboration within the educational community.

With this orientation, **MapLearn Edu** is developed to address the current limitations, enhance student learning outcomes and confidence, while offering teachers the opportunity to deliver and expand high-quality courses—ultimately contributing to the modernization of Vietnam's education system.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 15 of 116

II. Identify the Problem

1. Limited Access to Comprehensive Learning Materials

Many students struggle to find a single platform that combines all necessary learning materials for secondary and high school education. Existing resources are often fragmented across textbooks, online videos, and separate practice websites, making it difficult for students to access structured and complete courses. This lack of centralized learning slows progress and reduces the efficiency of exam preparation.

2. Insufficient Exam Simulation and Practice Opportunities

Traditional learning methods do not replicate the structure and variety of real exams. Students have limited exposure to multiple-choice questions, multiple-answer selections, true/false exercises, fill-in-the-blank problems, and drag-and-drop tasks. Without realistic simulations, students cannot practice under exam conditions, which affects confidence, time management, and performance during actual tests.

3. Lack of Personalized Learning Support

Current platforms rarely provide adaptive learning paths or personalized guidance. Students often receive the same content regardless of their proficiency level, learning speed, or individual goals. This lack of personalization prevents students from focusing on their weaknesses, mastering key concepts, and optimizing study time.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 16 of 116

4. Absence of AI-Powered Learning Assistance

There is a growing need for AI-assisted learning to analyze performance, generate quizzes, summarize video lessons, and provide detailed feedback on answers. Most existing platforms do not integrate these intelligent features, which limits students' ability to self-assess, receive targeted guidance, and improve efficiently.

5. Challenges in Teacher Collaboration and Course Development

Teachers and content creators face difficulties in creating, updating, and sharing interactive lessons. Existing platforms do not provide easy-to-use tools for collaboration or content management, preventing the continuous improvement and expansion of available courses.

6. Technical and Usability Limitations

Many platforms do not fully support responsive web design, multimedia content, real-time updates, or cross-device accessibility. Performance issues, lack of scalability, and poor user experience can hinder learning engagement and reduce the effectiveness of online education.

7. Limited Engagement and Motivation for Students

Traditional methods and many current online platforms lack interactive features that engage students actively. Without interactive exercises, AI guidance, and gamified elements, students may lose interest, resulting in lower participation and reduced learning outcomes.

8. Absence of Integrated E-commerce Functionality

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 17 of 116

For platforms that sell courses online, providing secure, convenient, and diverse payment options is essential. Many existing educational websites either lack payment integration or support only limited methods, making it difficult for students and parents to purchase courses and access learning resources.

III. Proposed Solutions

1. Development of a Single-Page-Application (SPA) with Responsive Design:

To ensure an optimal learning experience, fast loading times, and seamless navigation, the platform will be developed as a Single-Page Application (SPA). This modern web approach allows dynamic content loading without requiring page refreshes, resulting in a smooth and uninterrupted browsing experience.

Additionally, the platform will feature a fully responsive design, ensuring compatibility across multiple devices, including:

- **Desktops and laptops** for students accessing full course content and teachers managing their classes.
- **Tablets for school** for students and parents who prefer flexible learning on-the-go.
- **Smartphones** for quick access to courses, practice tests, and progress tracking anytime, anywhere.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No.01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 18 of 116

This cross-device compatibility will enable students to access course information, purchase learning packages, and interact with the platform anytime, anywhere, without experiencing layout distortions or functionality limitations. The website's adaptive design will ensure aesthetic consistency and usability across all devices, regardless of screen size.

Furthermore, adopting modern front-end frameworks like Next.js will enhance performance, scalability, and maintainability, ensuring that the platform remains future-proof, capable of supporting new features such as AI-powered learning assistance, real-time exam simulations, and teacher-student interaction modules.

2. Providing Comprehensive and Detailed Course and Book Information:

To enhance student decision-making and engagement, the platform will feature a well-organized catalog, systematically categorized into sections such as:

- **Courses by Subject:** Mathematics, Physics, Chemistry, Biology, English, etc.
- **Courses by Level:** Middle school, high school, university entrance preparation.
- **Book and Study Material:** Textbooks, reference books, exam preparation guides, and workbooks.

Each course or book will have a dedicated, detailed page displaying:

- ✓ **Title & Description** – A concise overview of the course or book, its purpose, and learning outcomes.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 19 of 116

- ✓ **High-Quality Visual** – Course preview videos, book cover images, and sample pages to provide students with a clear representation of the content.
- ✓ **Content Details** – For courses: syllabus outline, lesson formats (video, exercises, mock tests). For books: number of pages, edition, and key topics covered.
- ✓ **Access or Format Options** – Courses available in online/on-demand format; books available in physical and/or digital (PDF/eBook) versions.
- ✓ **Pricing Information** – Transparent pricing details, along with any available discounts, bundled course–book packages, or promotional offers.

To improve accessibility, a smart search feature will be implemented, allowing users to:

- ❖ Search by Course/Book Title, Subject, or Keyword – Enabling quick navigation to desired courses or study materials.
- ❖ Apply Advanced Filters – Students and parents can refine search results by subject, level (middle school, high school, exam preparation), course type (video, practice test, bundle) and price range.
- ❖ Sort by Popularity, New Releases, or Price – Helping users easily find the most relevant and suitable courses or books.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 20 of 116

By offering structured, visually appealing, and detailed course and book information, the platform will significantly enhance the learning experience, reduce support inquiries, and streamline the enrollment and purchasing process.

3. Integration of Communication and Feedback Features:

To enhance student–teacher interaction and improve service efficiency, the platform will integrate communication and feedback features in the following ways:

- **Course-Based Comment Section** – Each course will include a dedicated comment area, enabling students to ask questions, share feedback, and receive direct responses from teachers.
- **Threaded Discussions** – Replies will be organized in threads, allowing structured conversations between students and teachers, and fostering peer-to-peer learning.
- **Company Information in Footer** – Essential details such as contact email, hotline, and office address will be displayed in the website footer for easy access.
- **Feedback and Rating System** – Students can rate courses and provide feedback, helping teachers improve content quality and guiding future learners in their course selection.
- **Notification Integration** – Students will be notified when teachers or administrators respond to their comments or feedback, ensuring timely communication.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 21 of 116

This integrated communication and feedback system will provide a more interactive learning experience, strengthen teacher–student relationships, and continuously improve the quality of courses offered on the platform.

4. Incorporation of Interactive and Engaging Features:

A modern educational platform should not only provide learning resources but also offer an engaging, interactive experience that keeps students motivated and returning. To achieve this, the website will integrate several dynamic UI/UX features, including:

- ❖ **Scrolling Ticker** – A live ticker on the homepage displaying:
 - Current date and time.
 - Important academic announcements, such as upcoming exams, enrollment deadlines, or new course launches.

- ❖ **Hover Effects on Menus & Courses/Books** – Providing:
 - Smooth color transitions when hovering over navigation menus, creating a modern and aesthetic feel.
 - Zoom-in effect when hovering over course thumbnails or book covers, improving browsing clarity.
 - Subtle animation effects to guide user interactions and enhance usability.

By incorporating these interactive elements, MapLearn Edu will increase student engagement, reduce bounce rates, and establish a visually appealing and motivating digital learning environment.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 22 of 116

Implementing these proposed solutions will transform MapLearn Edu's online presence, ensuring a seamless, learner-centric, and feature-rich digital platform. The combination of a Single-Page Application, structured course & book catalog, enhanced communication features, and interactive design elements will enable the platform to:

- Improve brand visibility and credibility in the EdTech sector.
- Enhance user experience, motivation, and learning outcomes.
- Increase course enrollments, book purchases, and overall platform adoption.
- Provide a competitive advantage over other e-learning solutions.

This strategic digital transformation will position **MapLearn Edu** as a forward-thinking, student-oriented platform, ensuring sustainable growth and long-term success.

IV. Database System Requirements

1. Data Management & API Services

- Centralized database (e.g., MySQL, PostgreSQL, or MongoDB) to store user profiles, courses, lessons, test results, and transactions.
- RESTful APIs or GraphQL endpoints to deliver structured data efficiently to the frontend.
- File storage and content delivery for videos, PDFs, and multimedia resources.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 23 of 116

2. User Management & Role-Based Access Control

- **Students:** Register, log in, purchase courses, attempt quizzes, track progress.
- **Teachers:** Create and manage courses, upload content, review student performance.
- **Administrators:** Approve courses, manage users, oversee transactions, and generate system reports.
- Secure authentication (JWT tokens) and role-based permissions to ensure proper data access.

3. Payment Processing & Security

- Integration with popular Vietnamese payment gateways such as MoMo, ZaloPay, VNPay, and bank transfers.
- Secure transaction handling with encryption for sensitive data (e.g., passwords, payment information).
- Fraud detection and prevention mechanisms.

4. AI-Powered Learning Analytics

- Track students' progress and analyze performance data.
- Generate personalized study plans and automated quizzes from question banks.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 24 of 116

- Provide real-time feedback and recommendations to improve learning outcomes.

5. Scalability & Performance Optimization

- Support a high number of concurrent users with load balancing.
- Caching systems (e.g., Redis) for frequently accessed data such as course lists and leaderboards.
- Cloud-based storage and CDN for fast delivery of multimedia content.

6. System Monitoring & Maintenance

- Logging and monitoring tools to detect errors, downtime, or suspicious activity.
- Automated backups and disaster recovery strategies.
- Continuous deployment and version control to ensure stable updates.

V. Description of Functions

1. Browse Courses and Books

Main Categories (Menu):

The platform will feature a clear navigation menu with categories such as:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 25 of 116

- **Courses** – Provides access to a wide range of online courses, categorized by subject (Mathematics, Physics, Chemistry, Biology, English, etc.) and by level (middle school, high school, university entrance preparation). Each course includes videos, practice exercises, and mock exams.
- **Online Tests / Learning Arena** – A section dedicated to timed practice exams, mock tests, and competitive learning challenges. Students can test their knowledge, track scores, and compete with peers in real time.
- **Books & Study Materials** – Offers textbooks, reference books, workbooks, and exam preparation guides. Both print and eBook formats will be available.
- **Resources** – Provides free or supplementary materials such as sample lessons, practice worksheets, and downloadable guides to support self-learning.
- **News / Blog** – Updates students and parents on educational trends, exam schedules, learning tips, and platform announcements.
- **Schedule / Interactive Q&A** – Displays upcoming live classes, exam dates, and interactive Q&A sessions with teachers, ensuring students stay on track.
- **Payment / Login** – Registration – Provides a secure gateway for users to register an account, manage their profile, and purchase

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 26 of 116

courses or books. Includes multiple payment methods for convenience.

Category Display:

- ✓ Each category will be displayed in a dedicated section with **a clear title** and a “**View All**” button, allowing users to explore the full catalog.
- ✓ Example: “Courses for Grade 10”, “Courses for Grade 11”, “Exam Preparation Books”, highlighted with images, teacher names, and status updates (e.g., “Newly Launched”).

The user-friendly course and book catalog will enable learners to navigate effortlessly and find their desired courses or study materials quickly and efficiently.

Detailed Presentation:

Each course or book will have a dedicated card with:

- **Thumbnail or preview video** (course intro or book cover).
- **Concise title & teacher/author information.**
- **Supplementary details** such as course duration, book edition and pricing information.

By offering detailed course and book insights, MapLearn Edu aims to enhance learner confidence and engagement, ultimately driving enrollments and book purchases.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 27 of 116

Search Functionality:

To streamline the browsing experience, the platform will feature an advanced search system, allowing users to:

- **Search by Course/Book Title, Subject, or Keyword** – Ensuring quick discovery of relevant learning resources.
- **Apply Smart Filters** – Refine results by subject, level (middle school, high school, exam preparation), course type (video, practice test, bundle), book format (print/eBook), and price range.

These search enhancements will reduce browsing time, improve efficiency, and ensure a seamless learning and purchasing journey.

2. Notification Bar & Instant Consultation

To create an engaging and interactive digital experience, the website will integrate several dynamic features, enhancing user engagement and satisfaction.

Scrolling Ticker:

A real-time ticker on the homepage will display:

- **Current date and time.**
- **Important academic updates such as exam countdowns, registration deadlines, and new course releases.**

Hover Effects on Menus & Courses/Books:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 28 of 116

To improve navigation and user interaction, the website will include:

- **Color-changing hover effects** on menus for a modern and intuitive experience.
- **Zoom-in effect** on course thumbnails and book covers for clearer previews.
- **Smooth animation transitions** to guide user interaction and improve overall usability.

These interactive elements will make the platform more visually appealing, engaging, and user-friendly, ensuring a memorable and motivating learning journey.

3. Teacher Information & Team Introduction

- A section on the homepage will highlight **featured teachers** with profile images, teaching specialties, and achievements.
- Users can click “**View All**” to see the full teaching team, enabling transparency and building trust in the platform’s educational quality.

4. Footer

The footer will contain all essential information and quick links, including:

- Company details: office address, contact email, and hotline for consultation.
- Useful links: About Us, FAQ, Terms of Service, Privacy Policy, Payment Guide, Course Activation, Newsletter Subscription.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 29 of 116

5. Community Engagement & Learning Resources

- Sections such as News, Resources, and Schedule/Q&A will be prominently displayed on the homepage, making it easy for users to access educational content and engage with the learning community.

6. Easy Navigation

Navigation Menu:

To ensure seamless website navigation, the menu bar will be:

- Intuitively structured**, allowing learners to access key sections effortlessly.
- Fixed at the top**, ensuring easy accessibility while scrolling.
- Dropdown-enabled**, offering direct access to subcategories such as subjects, grade levels, or book types.

The primary sections accessible via the navigation menu include:

- ❖ **Home** – A dynamic landing page with featured courses, books, and academic announcements.
- ❖ **Register / Login** – Allows users to create an account or quickly log in to access their personal dashboard, manage courses, study materials, and track progress.
- ❖ **Courses** – Provides access to a wide range of online courses across multiple subjects (Mathematics, Physics, Chemistry, English, etc.) and levels (middle school, high school, exam preparation).

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 30 of 116

- ❖ **Online Tests** – Includes mock exams, timed quizzes, and practice tests, enabling students to self-assess and improve their performance.
- ❖ **Learning Arena** – A competitive online space where students can participate in live challenges, fostering interaction and motivation.
- ❖ **Books & Resources** – Links to the library of textbooks, reference books, exam preparation guides (both print and eBook), and additional study materials.
- ❖ **News / Blog** – Updates on educational trends, exam schedules, study tips, and platform announcements.
- ❖ **Consultation & Interactive Q&A** – Provides access to study schedules, consultation sessions, and live Q&A with teachers for academic support.

Site Map:

For improved user experience and search engine optimization (SEO), the website will include a Site Map, which will:

- ❖ **Display a comprehensive overview** of all website sections.
- ❖ **Help learners and parents** quickly locate information without excessive navigation.
- ❖ **Improve search engine indexing**, ensuring better online visibility.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 31 of 116

By implementing an intuitive menu system and structured site map, **MapLearn Edu** will enhance usability, accessibility, and overall learner satisfaction.

The proposed functional enhancements will ensure that MapLearn Edu delivers a highly engaging, learner-centric, and efficient digital experience. By integrating structured course & book browsing, dynamic features, seamless communication tools, and intuitive navigation, the platform will:

- ✓ Enhance student engagement and satisfaction.
- ✓ Improve accessibility and searchability of courses and study materials.
- ✓ Increase enrollments and book purchases through an optimized browsing experience.
- ✓ Establish MapLearn Edu as a modern, student-focused educational platform.

This feature-rich digital transformation will ultimately drive platform growth and strengthen MapLearn Edu's competitive position in the EdTech industry.

VI. Additional Features Implemented by Our Team

1. Frontend Development (Next.js 15 with React 19)

The **frontend** was developed as a standalone web application using **Next.js (version 15.4.7)** on top of **React (version 19.1.1)**. This combination allows us to build a **Single-Page Application (SPA)** architecture that provides smooth navigation, minimal reloads, and an overall responsive user experience across devices (desktop, tablet, mobile)

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 32 of 116

i. User Interface and Styling

- **TailwindCSS v4** serves as the primary styling framework, ensuring a responsive design system with utility-first classes and faster development.
- The codebase is standardized using the **Prettier Tailwind plugin**, which automatically formats class order and enforces consistency in design.
- **Radix UI components** (AlertDialog, Dialog, DropdownMenu, Select, Slider, etc.) provide accessible, production-ready interface elements that can be customized according to our platform's branding.
- **Framer Motion v12.23.12** introduces dynamic animations and smooth transitions, making the learning process more interactive and visually engaging.
- **Lucide React** contributes a scalable vector icon set to ensure modern and clean visual representation.
- **Sass v1.90.0** is used in specific cases to extend styling capabilities beyond utility classes when complex UI layouts are required.

ii. Form Handling and Validation

- **React Hook Form (v7.62.0)** manages all form states and input handling with minimal re-rendering.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 33 of 116

- **Zod (v4.0.17)** combined with `@hookform/resolvers` enables schema-based input validation, ensuring secure and error-free form submissions (e.g., registration, login, payments).

iii. State Management and Data Fetching

- **Redux Toolkit (v2.8.2)** together with **React Redux (v9.2.0)** provides centralized and predictable state management across the application.
- **React Query (TanStack, v5.85.3)** manages asynchronous API calls, automatic caching, background updates, and real-time data synchronization, thereby improving performance and reducing unnecessary network requests.

iv. Media and Interactive Content

- **Plyr** handles multimedia playback (course videos).
- **Howler** provides advanced audio control for lessons and listening tests.
- **Swiper** and **React Slick** are used to implement responsive carousels and sliders.
- **react-katex** ensure accurate rendering of complex mathematical formulas.
- **react-markdown** integrated with **remark-math** and **rehype-katex** allows Markdown-based course content enriched with math symbols and equations

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 34 of 116

v. Utilities and Performance Enhancements

- **Axios** is the primary HTTP client for API communication.
- **date-fns**, **lodash**, and **xlsx** are used for time formatting, utility operations, and generating Excel reports.
- **Cloudinary** enables secure image/video uploads and optimized media delivery.
- **Pusher-js** integrates real-time features such as notifications and chat systems.
- **Nprogress** provides visual feedback during navigation or data loading.
- **Sonner** implement non-intrusive notification systems.
- **React Paginate** manages pagination of large datasets, while **React Tooltip** enhances the overall usability of interactive elements.

2. Server-Side Development

The server-side application was implemented using **Laravel** (version 12.0) running on **PHP 8.2**. It is responsible for handling authentication, business logic, database interactions, and API services that power the Next.js frontend.

i. Core Framework and Authentication

- **tymon/jwt-auth (v2.2)** is used to implement **JSON Web Token authentication**, ensuring secure login sessions for students, teachers, and administrators

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 35 of 116

- **Laravel Socialite with SocialiteProviders (Discord, GitHub)** extends authentication to third-party platforms, enabling users to log in through popular social accounts.
- **pragmarx/google2fa (v8.0)** introduces **two-factor authentication (2FA)**, which strengthens account security by requiring an additional verification code

ii. Database Management and Query Handling

- **spatie/laravel-query-builder (v6.3)** allows flexible filtering, sorting, and relationship inclusion in API endpoints, which is crucial for building adaptive dashboards and reports.
- **nesbot/carbon (v3.10)** simplifies date and time handling, widely used in scheduling lessons, managing quiz deadlines, and generating statistical reports

iii. Real-Time Communication and Utility Services

- **pusher/pusher-php-server (v7.2)**
Enables real-time event broadcasting, instantly delivering updates such as notifications, chat messages, and learning progress changes to connected clients.. It allows the system to instantly deliver updates such as notifications, chat messages, and learning progress changes to connected clients. By leveraging WebSocket technology, students and teachers receive immediate feedback without requiring manual page refresh, thereby improving interaction and engagement across the platform.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 36 of 116

- **endroid/qr-code (v6.0)**

This library provides powerful functionality for **QR code generation**.

In the MapLearn Edu platform, it is primarily applied in two contexts:

- a) **Two-Factor Authentication (2FA):** generating scannable QR codes that contain the user's secret key in otpauth URI format, enabling integration with Google Authenticator and similar apps.
 - b) **Transaction and Access Verification:** generating QR codes for secure payment processing, enrollment confirmation, and quick access to courses or events.
- Through these features, the system enhances both security and convenience for end users.

- **laravel-lang/common (v6.7)**

This package is used to provide **comprehensive multilingual support**. It supplies community-maintained translation files for Laravel's built-in validation, authentication, and system messages. By integrating this package, MapLearn Edu can easily adapt its interface for different groups of users across Vietnam, ensuring accessibility for students, teachers, and parents from diverse regions

3. Enhancing User Experience (UX/UI)

a. Dynamic Effects & User Interaction

- **Hover and transition effects** on the navigation menu and course/book categories, ensuring smoother and more intuitive browsing.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 37 of 116

- **Active menu state:** When users click on a sub-menu (e.g., Grade 10, Mathematics, Reference Books), it will be highlighted with an underline and color change to indicate their current location.
- **Zoom-in feature** for course thumbnails, book covers, or teacher profile images, allowing learners to preview course visuals and book details more clearly.

b. Improved Layout & Navigation

- **Fixed navigation bar** at the top of the page, ensuring continuous access to main categories such as Courses, Online Tests, Learning Arena, Books, News, and Consultation.
- **Floating “Scroll to Top” button** for quick movement across long pages, improving accessibility on both desktop and mobile.
- **Lazy Loading for Images:**
 - Applied to images that appear further down the page (e.g., additional course thumbnails, book previews, or news images), optimizing page performance.
 - Ensures essential visuals such as homepage banners, featured courses, and highlighted books load instantly, while non-essential media loads on demand.
- **Optimized Image Format (.webp):**

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 38 of 116

- Most course images, teacher portraits, and book covers are delivered in .webp format for better compression while preserving high quality.
- This significantly improves loading speed and reduces bandwidth consumption, enhancing the learning experience on all devices.

c. Dynamic Notification Bar (Marquee)

To create a dynamic and engaging homepage experience, the **MapLearn Edu** website will feature a **scrolling text banner (marquee)** positioned prominently on the homepage.

❖ Key Features of the Notification Bar:

- **Real-Time Announcements:** Displays the latest updates such as exam schedules, enrollment deadlines, new course launches, and platform notifications in a continuously scrolling format.
- **Smooth Scrolling Effect:** Uses a seamless, fluid animation to enhance readability and ensure a professional look.
- **Responsive & Adaptive:**
 - Adjusts speed and visibility based on screen size for optimal readability on desktop, tablet, and mobile devices.
 - Automatically pauses on hover, allowing learners to interact with the message without distractions.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No.01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 39 of 116

- **Customizable Messages:** The admin can easily update the marquee text to highlight:
 - Upcoming exam dates and countdowns
 - New courses or books released on the platform
 - Important study-related notifications
 - Educational events, webinars, or workshops

This scrolling notification bar enhances **student engagement**, keeps learners and parents informed about important academic updates, and adds a **dynamic, interactive element** to the homepage.

4. Enhancing Learning & Purchase Functionality

a. Enrollment & Payment Management

- The enrollment cart retains selected courses and books even if users leave the website.
- Automatic application of promotions or discount codes (e.g., seasonal offers, bundle discounts).
- Supports multiple secure payment methods: online banking, e-wallets (Momo, ZaloPay), credit/debit cards, and direct bank transfer.
- Security Enhancement:
 - Access to the checkout/enrollment page is restricted to logged-in users to prevent unauthorized transactions.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 40 of 116

- If a user attempts to access checkout without adding any course or book, they are redirected to the catalog page.

b. Wishlist & Recently Viewed Items

- Wishlist: Students can save favorite courses or books for future enrollment or purchase.
- Recently Viewed: Displays a list of products previously viewed, making it easier for customers to return to them.

c. Enrollment History & Learning Progress Tracking

- Order/Enrollment Tracking: Students can check the status of their course registration or book delivery using their enrollment/order ID.
- Downloadable Invoice & Certificate.
 - Users can download invoices for their purchases directly from the system.
 - Upon course completion, students may download certificates (if applicable)

5. Enhancing Customer Interaction

a. Feedback & Support System

- Multiple support channels: Students and parents can send inquiries about courses, books, enrollment, or technical support.
- Feedback forms integrated within each course allow learners to rate the content, suggest improvements, and report issues.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 41 of 116

b. Integrated Communication Features

Since MapLearn Edu does not use a dedicated “Contact Us” page, essential contact details (email, phone, social media) are displayed in the footer for quick access:

- **Clicking on the phone number:**

- On mobile: Opens the calling app with the number pre-filled.
- On desktop: Redirects to Skype, Zoom, or other VoIP apps if available.

- **Clicking on the email address:**

- On mobile: Opens Gmail, Outlook, or another default mail app with the address pre-filled.
- On desktop: Opens the default email client or browser-based Gmail.

These enhancements ensure faster communication, improved accessibility, and a user-friendly contact process for all device types.

c. Course & News Commenting System

- Students can **comment, reply, and discuss directly under each course lesson or book resource**, enabling interaction with teachers and peers.
- In the **News/Blog section**, users can comment and share articles related to exams, study tips, and announcements.
- Comments and replies remain persistent, stored in the database to ensure

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 42 of 116

seamless engagement..

- Social sharing buttons allow articles to be shared on **Facebook, Zalo, Twitter, or via direct link copy**, with auto-generated previews (title, image, description).
- **Future Enhancements (Planned Version 2):**
 - **AI-powered comment filtering** to remove inappropriate or spam content.
 - **Moderation tools** requiring admin approval for sensitive comments before publishing.

6. Expanding Marketing & Promotion Strategies

a. SEO Optimization for Educational Platform

- SEO-friendly implementation:
 - Meta tags optimized for search engines, focusing on keywords related to online learning, exam preparation, and educational resources.
 - Structured data to improve Google indexing and ranking of courses, books, and blog posts.
 - Course descriptions, book summaries, and blog articles are written with SEO best practices to enhance discoverability.
- Auto-Updating Page Titles:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 43 of 116

- Browser tab titles dynamically update when users switch between sections (e.g., Courses, Online Tests, Books, Blog).
- Improves SEO performance and helps users track their navigation clearly.

b. Social Media Integration & Sharing Enhancements

- Sharing buttons for Facebook, Zalo, Twitter, and Instagram are integrated into each course, book detail page, and blog article.
- When sharing content, the system automatically generates a preview including:
 - Course thumbnail, book cover, or article image.
 - Title and short description.
 - Direct link to the full content.
- This ensures higher click-through rates, boosts student engagement, and makes shared learning resources more attractive and trustworthy.

7. Social Engagement & Trust Building

- Fanpage Integration:
 - The footer includes an embedded **Facebook fanpage**, allowing learners and parents to:
 - View recent educational updates and announcements.
 - Follow MapLearn Edu directly from the site.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Problem Definition	SWD/Form No. 01/PD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 44 of 116

- Engage with platform news, events, and community activities without leaving the page.
- Community Interaction:
 - Links to other official social media channels (e.g., Zalo, YouTube) to strengthen student-teacher-parent engagement.
 - Encourages knowledge sharing, live-stream sessions, and interactive Q&A through social platforms.

8. Conclusion

These additional features help **MapLearn Edu**:

- Leverage modern technologies for UI/UX, API handling, and performance.
- Improve SEO and social media integration, ensuring better discoverability and learner engagement.
- Ensure security and reliability in the enrollment & payment process.
- Enhance the learning experience with dynamic interactions, smooth navigation, and optimized content delivery.

This combination of advanced technologies, performance enhancements, and strong security measures positions **MapLearn Edu** as a **future-proof, scalable, and competitive EdTech platform**, ensuring long-term growth and sustained learner satisfaction.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 45 of 116

Customer Requirements Specifications

II. Customer Requirements Specifications

1. Student

Course Browsing & Search

Description: Students can browse courses by subject, grade, or keyword search to find suitable learning content.

Input:

- Student selects category (Math, Physics, Literature, etc.).
- Enters keywords in search bar.
- Apply filters (subject, grade, price).

Process:

- System retrieves courses from database.
- Filters and sorts based on input.

Output:

- Display matching course list with title, teacher info, price, preview.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 46 of 116

- If no match, show “No courses found” with suggestions.

Course Enrollment & Payment

Description: Students can purchase courses through integrated payment gateways.

Input:

- Student selects a course and clicks “Enroll / Buy.”
- Chooses payment method (MoMo, ZaloPay, VNPay, bank transfer).
- Confirms transaction.

Process:

- System redirects to payment gateway.
- Validates transaction.
- If successful, system records order and auto-adds course to dashboard.

Output:

- Success: “Enrollment successful. Course added to your dashboard.”
- Failure: “Payment failed, please try again.”

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 47 of 116

- Invoice generated (downloadable PDF).

Course Access & Learning

Description: Enrolled students can access course materials (videos, documents, exercises).

Input:

- Student selects a purchased course from dashboard
- Chooses lesson or resource.

Process:

- System retrieves learning content from storage.
- Loads video, PDF, or exercise to interface.

Output:

- Course content displayed (video player, PDF viewer, exercise panel)
- Lesson completion status updated in database.

Practice Tests & Exam

Description: Students can attempt practice quizzes or full exam simulations.

Input:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 48 of 116

- Student chooses test (chapter quiz, full exam).
- Answers questions and submits.

Process:

- System records responses:
- Compares answers with keys.
- AI/logic engine evaluates score, time, weak areas.

Output:

- Score report displayed
- Correct/incorrect answers shown.
- Personalized recommendations for improvement.

Progress Tracking

Description: Students can view their overall progress in enrolled courses.

Input:

- Student opens “Progress” or “Dashboard.”

Process:

- System calculates completed lessons, attempted tests, and scores.
- Aggregates performance data.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 49 of 116

Output:

- Progress chart (percentage completed, average score).
- List of completed/incomplete modules.

Feedback & Commenting

Description: Students can post feedback or ask questions on course pages.

Input:

- Enter text comment or question.
- Click “Post.”

Process:

- System validates input (not empty, no profanity if moderation enabled).
- Stores comment in database.
- Sends notification to teacher.

Output:

- Comment displayed instantly under course.
- Notification sent to relevant teacher.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 50 of 116

Profile & Account Management

Description: Students manage personal information and login credentials.

Input:

- Student opens profile page.
- Edits name, email, password, avatar.
- Clicks “Save.”

Process:

- System validates new data.
- Updates records in database.

Output:

- Confirmation: “Profile updated successfully.”
- Updated data reflected in system.

News & Notifications Access

Description: Students can read educational news and system notifications.

Input:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 51 of 116

- Click “News” or notification icon.

Process:

- System retrieves latest news and notifications.
- Marks read/unread status

Output:

- Display news list with details.
- Notifications (exam dates, new courses, promotions).

Support & FAQ Access

Description: Students can seek support through hotline, FAQ, or chat.

Input:

Users select the store location from a dropdown menu.

- Student clicks “Support / FAQ.”
- Optionally enters query.

Process:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 52 of 116

- System displays FAQ or routes request to support channel.

Output:

- Display FAQ answers.
- Show hotline number and chat options.

2. Teacher

Course Creation & Management

Description: Teachers can create new courses, upload lessons, and manage existing courses.

Input:

- Teacher logs in..
- Clicks “Create Course.”
- Fills course info: title, subject, grade, description, price.
- Uploads content (videos, PDFs, quizzes).

Process:

- System validates all fields.
- Stores course content in database & cloud storage
- Course marked as “Pending” for admin review.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 53 of 116

Output:

- Confirmation: “Your course has been submitted for review.”
- Course status shown in teacher dashboard (Pending / Approved / Rejected).

Lesson & Content Management

Description: Teachers can edit, update, or remove lessons from their courses.

Input:

- Teacher selects a course.
- Clicks “Edit Lesson.”
- Updates video, document, or quiz.

Process:

- System checks file format & size.
- Updates lesson record in database.
- Replaces old content with new one.

Output:

- Success: “Lesson updated successfully.”.

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 54 of 116

- Updated content displayed for enrolled students.

Student Interaction & Feedback

Description: Teachers can respond to student comments/questions on course pages.

Input:

- Student posts a comment.
- Teacher types reply and submits.

Process:

- System stores reply in database.
- Links it to the original comment thread.
- Sends notification to student.

Output:

- Comment + reply displayed under lesson.
- Notification: “Teacher has replied to your question.”

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 55 of 116

Student Progress Monitoring

Description: Teachers can view the progress of students enrolled in their courses.

Input:

- Teacher selects a course.
- Clicks “View Student Progress.”

Process:

- System retrieves learning data (lesson completion, quiz scores, time spent).
- Aggregates into charts/tables.

Output:

- Display student performance dashboard.
- Option to export reports (CSV/PDF).

Profile & Account Management

Description: Teachers can update their personal profile and teaching credentials.

Input:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 56 of 116

- Teacher edits name, bio, avatar, subject expertise.
- Clicks “Save.”

Process:

- System validates fields.
- Updates database record.

Output:

- Confirmation: “Profile updated successfully.”
- Updated info shown on teacher’s public profile.

3. Admin

User & Role Management

Description: Admin manages all users and assigns roles (Student / Teacher / Admin).

Input:

- Admin logs in.
- Searches for user.
- Selects “Edit Role,” “Suspend,” or “Delete.”

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 57 of 116

Process:

- System retrieves user info.
- Updates user data in database.

Output:

- Confirmation: “User updated successfully.”
- Updated user list displayed.

Course Approval & Moderation

Description: Admin reviews courses submitted by teachers before publishing.

Input:

- Admin opens “Pending Courses.”
- Clicks “Approve” or “Reject.”

Process:

- System loads course details.
- Admin decision stored in database.

Output:

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 58 of 116

- If approved → course published to students.
- If rejected → teacher notified with reason.

Content & Comment Moderation

Description: Admin moderates inappropriate comments, content, or feedback.

Input:

- Admin views reported comments/content.
- Selects “Delete” or “Approve.”

Process:

- System removes inappropriate content from database.
- Updates visibility for all users.

Output:

- Content removed instantly.
- Notification sent to user if their comment was deleted.

Payment & Transaction Management

Description: Admin monitors all student payments and course

	Prepared by (Student) Project Group No: 01	Approved by (Faculty) LE THANH NHAN
Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 59 of 116

sales.

Input:

- Admin opens “Transactions.”
- Filters by date, course, or user.

Process:

- System retrieves payment records.
- Generates revenue statistics.

Output:

- Display detailed transaction list.
- Exportable financial report (CSV/PDF).

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Signature		
Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 60 of 116

Hardware / Software requirement

Software:

- **Frontend:** HTML5, CSS3, TypeScript, Next.js 15+ (React Framework), Tailwind CSS.
- **Base:** Laravel (PHP Framework) for API services and business logic.
- **Database:** MySQL (Relational Database Management System).
- **APIs & Services:** RESTful API.
- **Operating System (Development & Deployment):** Windows.
- **Browsers (Supported):** Microsoft Edge, Google Chrome, Mozilla Firefox, Safari.

Hardware:

- **Processor:** Intel Core i3/i5 or higher.
- **RAM:** 8 GB or above.
- **Graphics:** Color SVGA.
- **Storage:** 500 GB Hard Disk space or higher.
- **Input Devices:** Mouse and Keyboard.

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Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 61 of 116

I. CRS/Customer Acceptance Criteria

Student

S.No	Customer's Acceptance Criteria
1	Given the student is on the homepage, when they search for a course by keyword, then the system must display a list of matching courses.
2	Given the student is browsing by subject/grade, when they apply filters (e.g., grade 12, Physics), then the system must show only the relevant courses.
3	Given the student has selected a course, when they click “Enroll/Buy” and complete the payment, then the course must automatically appear in their dashboard.
4	Given the student has purchased a course, when they access the course from dashboard, then the system must load the lessons (videos, documents, quizzes).
5	Given the student is inside a course, when they complete a lesson, then the system must mark the lesson as completed in their progress tracker.
6	Given the student starts a quiz or exam simulation, when they submit their answers, then the system must calculate the score and display correct/incorrect responses.
7	Given the student has completed multiple lessons/tests, when they view their dashboard, then the system must display overall progress (percentage completed, average score).
8	Given the student has a question about a lesson, when they post a comment, then the system must save it and notify the teacher.
9	Given the student edits their profile (name, email, password), when they click “Save,” then the system must update their profile successfully.
10	Given the student clicks on “Support/FAQ,” when they access this section, then the system must show support options (hotline, chat, FAQ list).

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Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 62 of 116

Teacher

S.No	Customer's Acceptance Criteria
1	Given the teacher is logged in, when they click “Create Course,” then the system must display the course creation form.
2	Given the teacher has filled in all required fields, when they submit the course, then the system must save it and mark the status as “Pending Approval.”
3	Given the teacher is editing a course, when they update lessons or materials, then the system must save changes and display updated content.
4	Given the teacher uploads a file (video, PDF, quiz), when the file meets format/size requirements, then the system must accept and store it successfully.
5	Given the teacher has submitted a course, when the admin approves it, then the course must be visible to students in the catalog.
6	Given a student posts a question under a lesson, when the teacher replies, then the system must save the reply and notify the student.
7	Given the teacher is on their dashboard, when they view student progress, then the system must show completion rate and quiz scores.
8	Given the teacher requests to export reports, when they choose CSV or PDF, then the system must generate and allow download of the file.
9	Given the teacher edits their profile (bio, avatar, expertise), when they save changes, then the system must update their profile successfully.
10	Given the teacher navigates to their course list, when they deactivate a course, then the system must hide it from student catalog.

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Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 63 of 116

Admin

S.No	Customer's Acceptance Criteria
1	Given the admin is logged in, when they open the user management page, then the system must display all users with roles (Student/Teacher/Admin).
2	Given the admin searches for a user, when they enter a keyword, then the system must display matching user accounts.
3	Given the admin selects a user, when they change the role or deactivate the account, then the system must update the record accordingly.
4	Given a course is pending approval, when the admin reviews it and clicks "Approve," then the course must become visible in the catalog.
5	Given the admin rejects a course, when they enter the reason and submit, then the teacher must receive a notification.
6	Given a comment is reported as inappropriate, when the admin deletes it, then it must be removed from the course page.
7	Given the admin accesses the transaction dashboard, when they select a timeframe, then the system must display all payments within that period.
8	Given the admin generates a financial report, when they select export format (CSV/PDF), then the system must provide the file for download.
9	Given the admin opens the analytics page, when they filter by course or subject, then the system must display relevant statistics.
10	Given the admin manages system settings, when they update configurations, then the changes must take effect immediately across the platform.

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Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 64 of 116

II. Project Plan

1. Project Details	
+ Name of the Client:	FPT Aptech Academic Project (Education Platform – MapLearn Edu)
+ Date of Project Plan:	20/08/2025
+ Project Vision/Objectives:	To develop a full-stack e-learning platform that allows students to enroll in courses, access digital learning materials, take quizzes/exams, and track their progress. The system also enables teachers to create and manage courses, and administrators to control user management, course approval, and financial reporting.
+ Scope:	
- In Scope:	<ul style="list-style-type: none"> - Student: course browsing, enrollment, payment, learning access, progress tracking, feedback. - Teacher: course creation, lesson management, student monitoring, reporting. - Admin: user management, course approval, payment reporting, analytics.
- Out of Scope:	<ul style="list-style-type: none"> - Mobile app (not included in initial phase). - Third-party integrations beyond payment gateway and Google Maps API.
+ Our understanding of the client organization:	The platform is designed for high school and university students preparing for exams, teachers providing online courses, and an admin team managing operations.
+ Project Organization with Responsibilities and Authorities:	

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Date		

Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 65 of 116

Project Manager (PM): Overall coordination, scheduling, client communication.
Frontend Developer(s): Build user interface with Next.js, ensure responsive UI.
Backend Developer(s): Develop APIs with Laravel, handle business logic and database with MySQL.
Database Engineer: Database schema design, optimization, backup and restore.
QA/Test Engineer: Write test cases, perform functional & user acceptance testing.
UI/UX Designer: Design mockups in Figma, ensure good user experience.
2. Project Initiation/Requirement Documents
Problem Definition Document.
CRS (Customer Requirements Specifications).
Customer Acceptance Criteria.
Use Case Diagram & System Architecture Diagram.
3. Deliverables
Functional web application (Next.js frontend + Laravel).
MySQL database with initial seed data.
Documentation: Requirement specification, Design documents, User manual.
Final report and presentation slides.
Source code hosted on GitHub.
4. Project Dependencies
Payment gateway API (MoMo / ZaloPay / VNPay).
Google Maps API (if location features are included).
Hosting environment (Cloud VPS or School server).
Internet connectivity for all team members.
5. Major Project Milestones
Week 1: Requirement gathering & system design.
Week 2: UI/UX design with Figma, frontend setup with Next.js.
Week 3: Setup with Laravel, database schema with MySQL.

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Design Plan: MapLearn Edu	Document Name: Customer Requirements Specifications	SWD/Form No.02/CRSVer1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 66 of 116

	Week 4: Integration (frontend + backend + payment).
	Week 5: Testing (unit test, integration test, acceptance test).
	Week 6: Final demo & project report submission.
6. Quality Plan	
+ Review Activities:	
	Weekly team meetings to review progress.
	Code review using GitHub pull requests.
	Supervisor review on documentation drafts.
+ Testing Activities:	
	Unit testing for API endpoints and frontend components.
	Integration testing for payment and course enrollment.
	UAT (User Acceptance Testing) with sample students and teachers.
+ Backup and recovery strategies:	
	Daily database backup using MySQL dump.
	Source code stored in GitHub repository with version control.
	Server snapshots created weekly.

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Review 02

Design Plan: MapLearn Edu	Document Name: Architecture and design of the Application	SWD/Form No.03/ARD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 68 of 116

Architecture and design of the Application

I. Architecture and design of the Application

1. Application Architecture

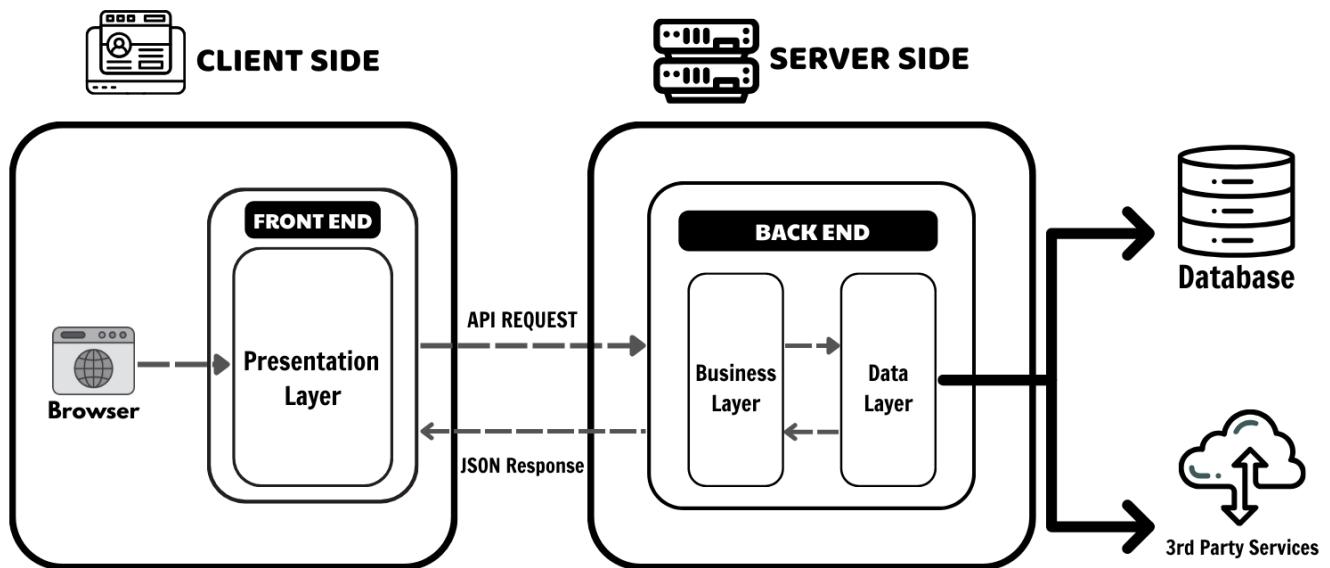


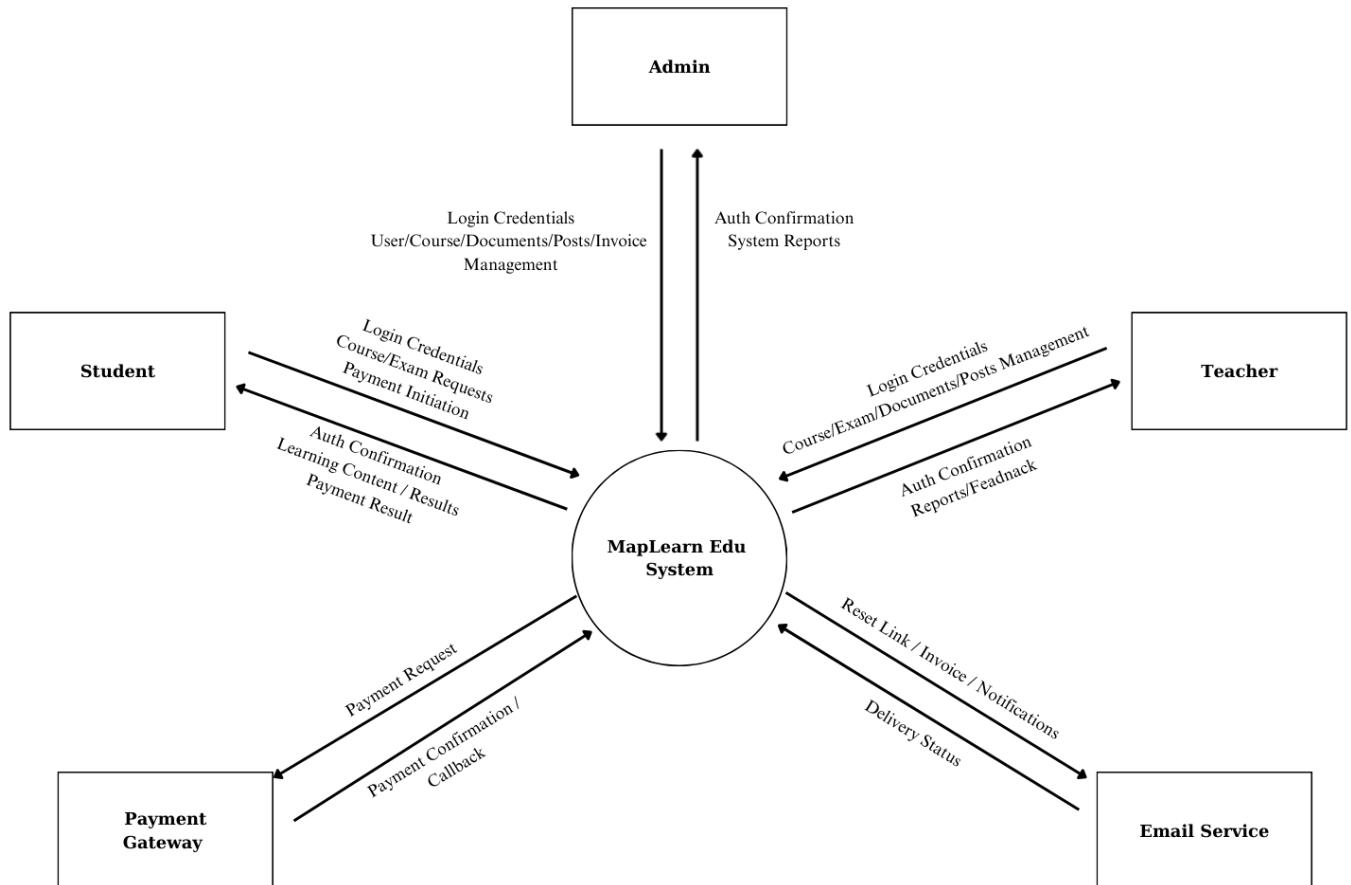
Figure F1: Application Architecture

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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 69 of 116

2. Data Flow Diagram

1. DFD Level 0

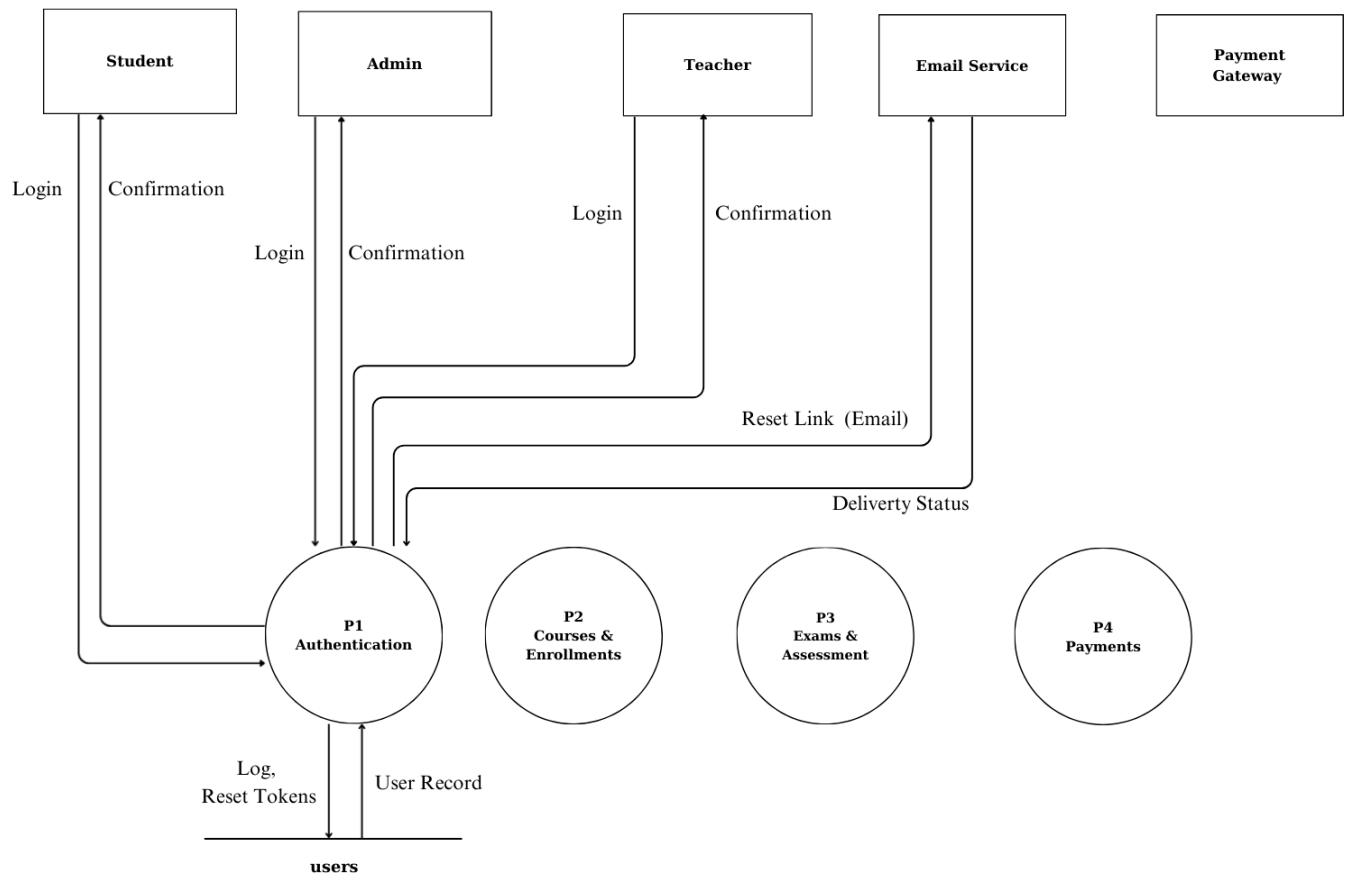


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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 70 of 116

2. DFD Level 1

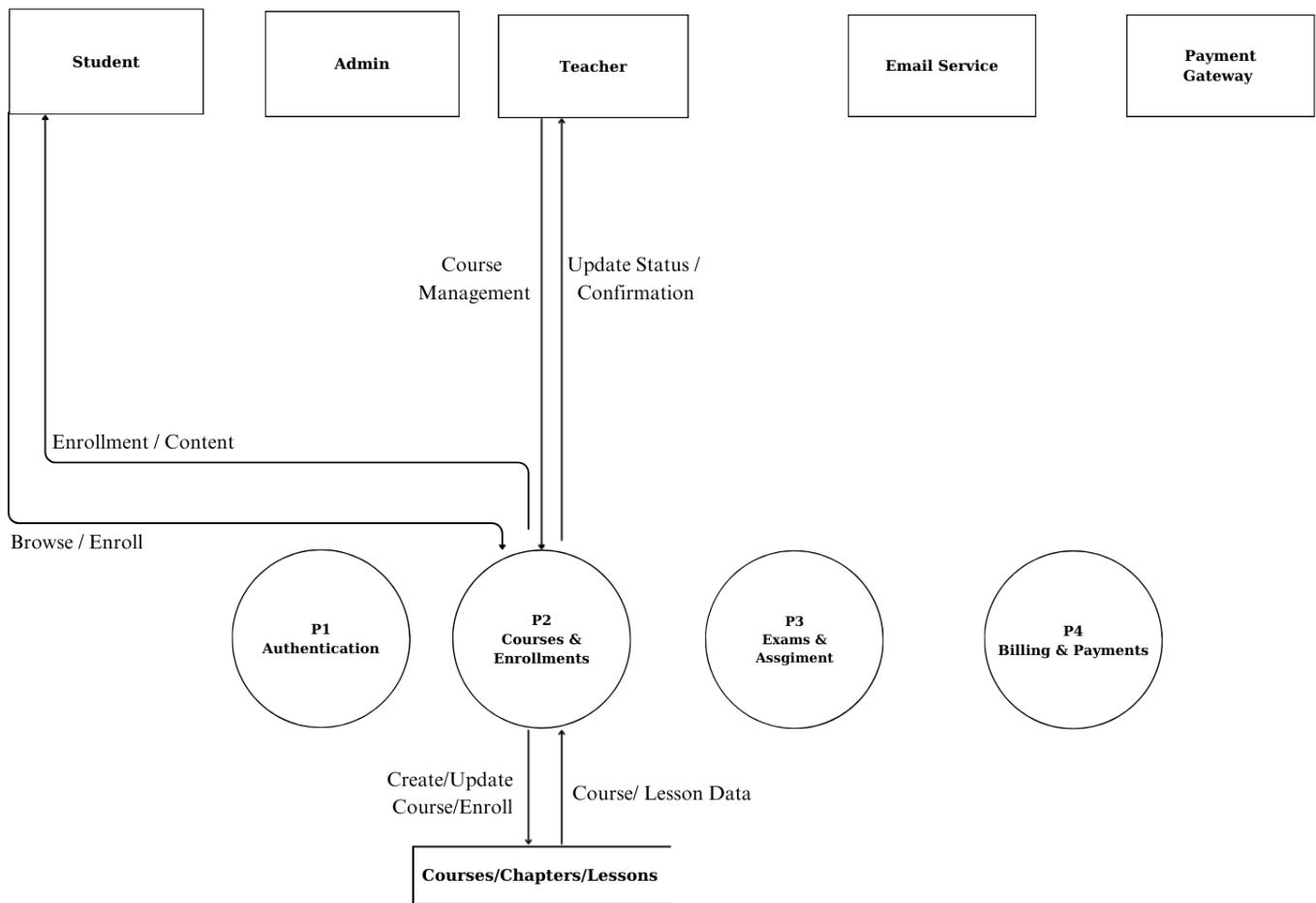
1.1. Process Authentication



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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 71 of 116

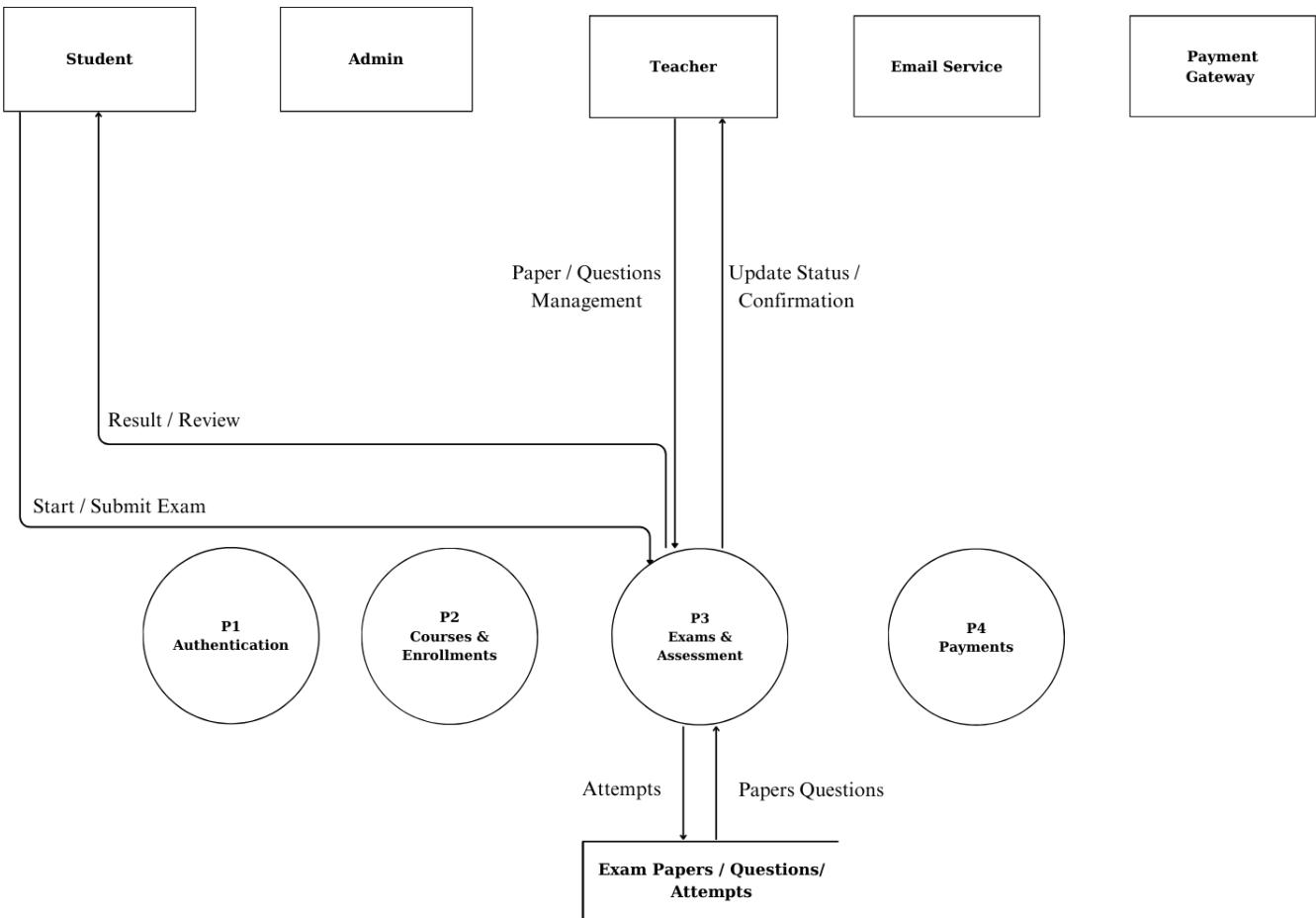
1.2. Process Course & Enrollments



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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 72 of 116

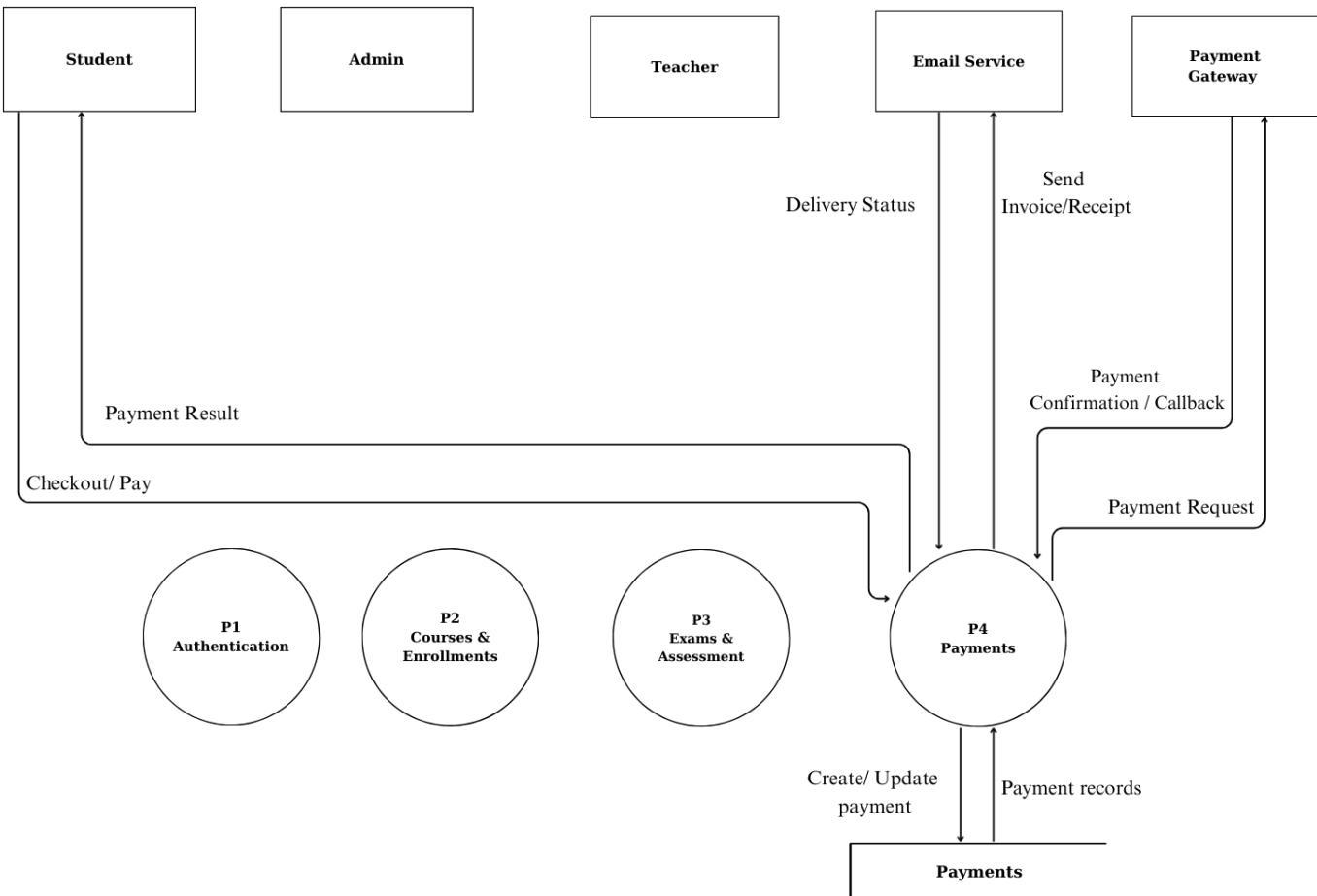
1.3. Process Exams & Assessment



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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 73 of 116

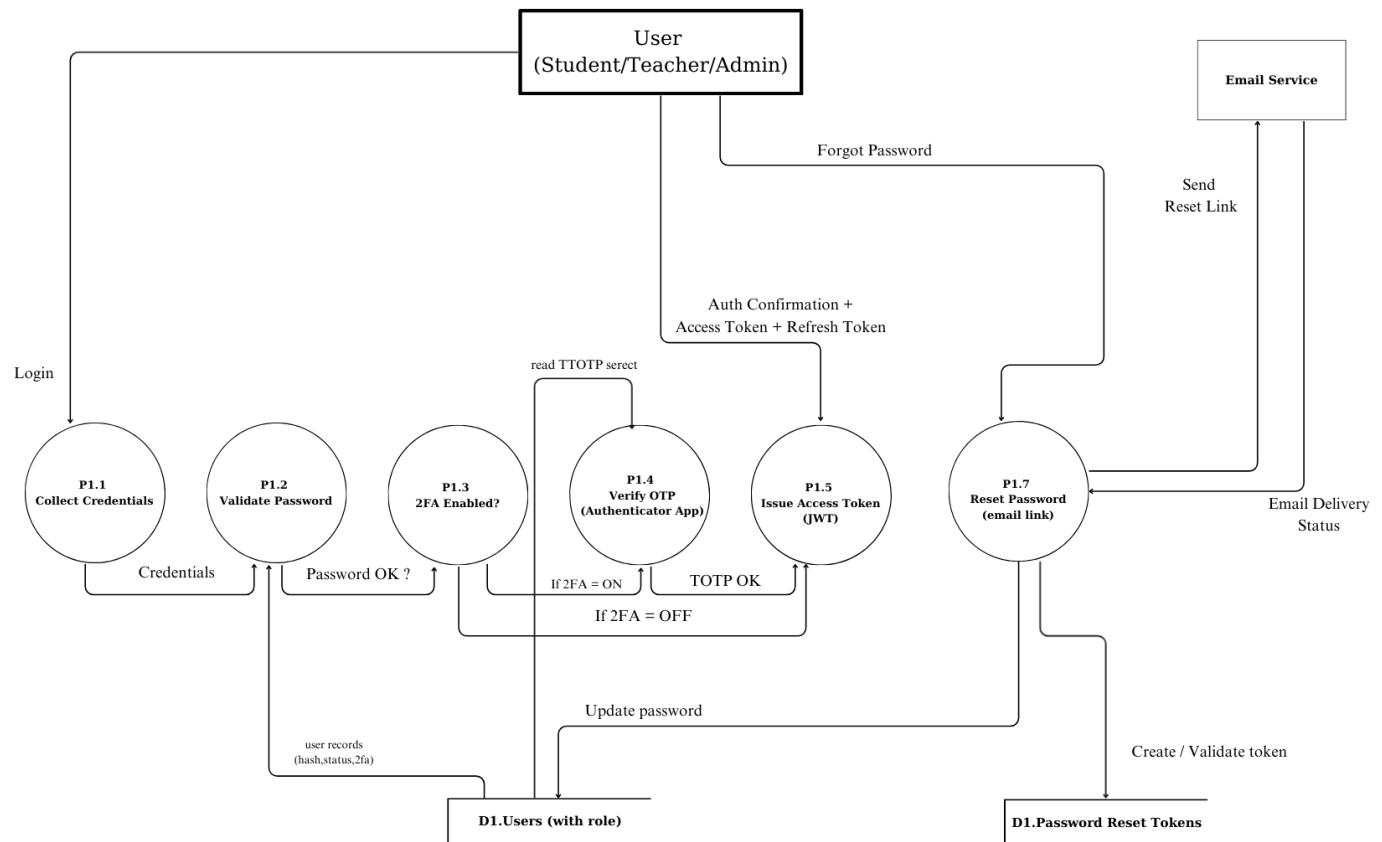
1.4. Process Billing & Payments



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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 74 of 116

3. DFD Level 1.1.1: Process Authentication



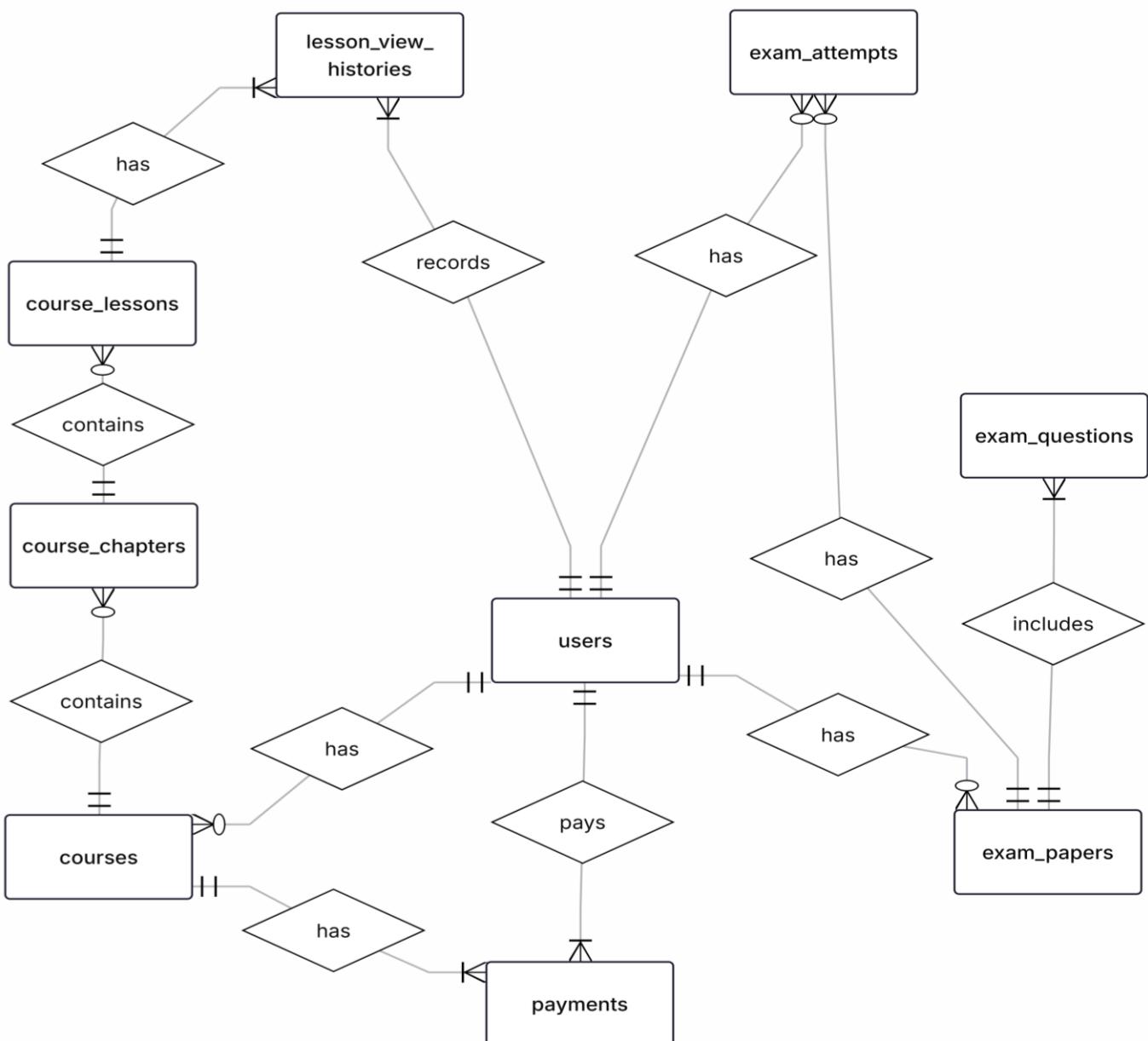
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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 75 of 116

Entity Relationship Diagram

II. Entity Relationship Diagram

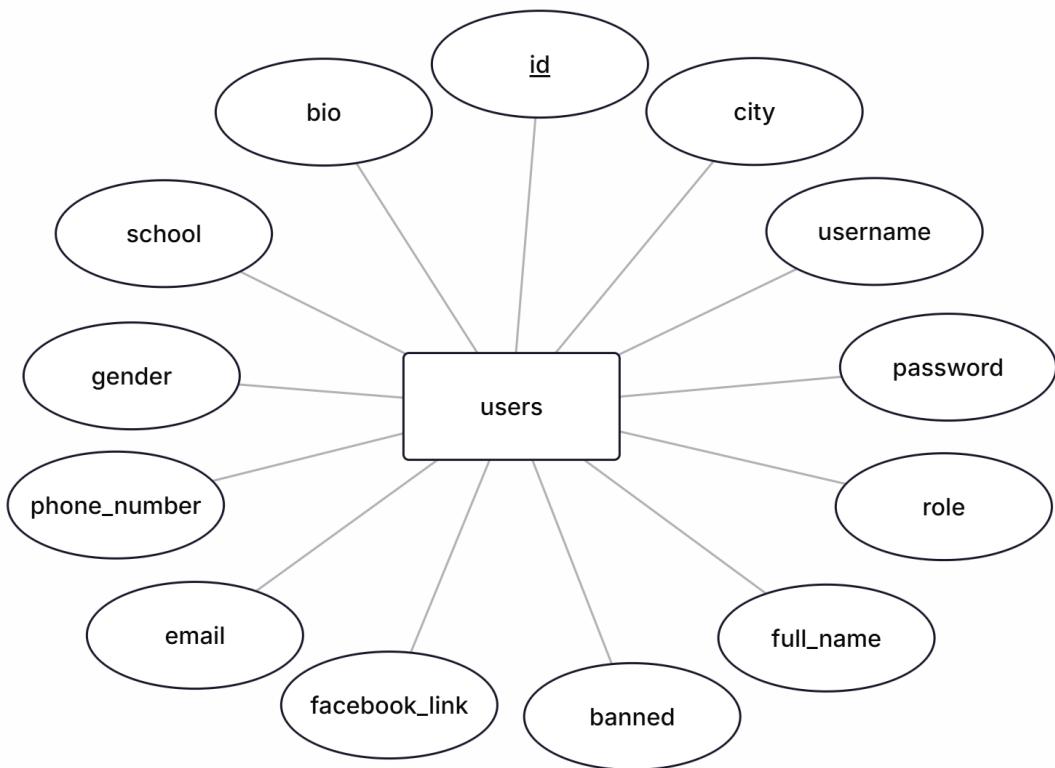
1. ERD



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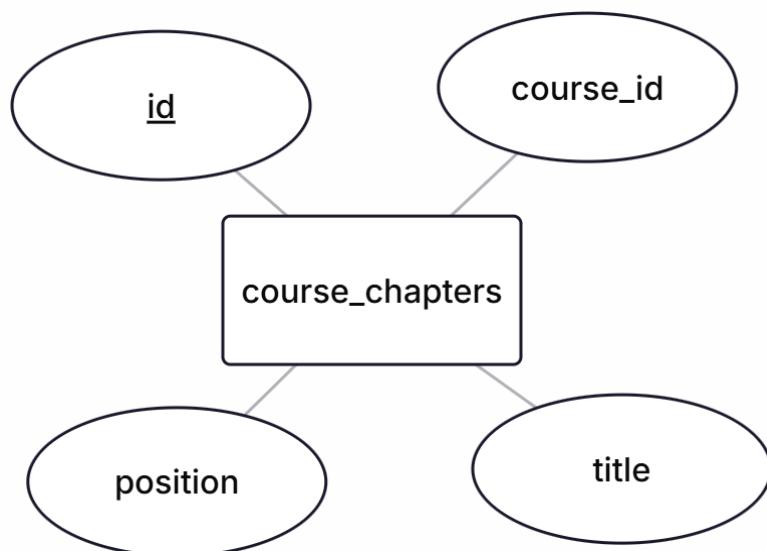
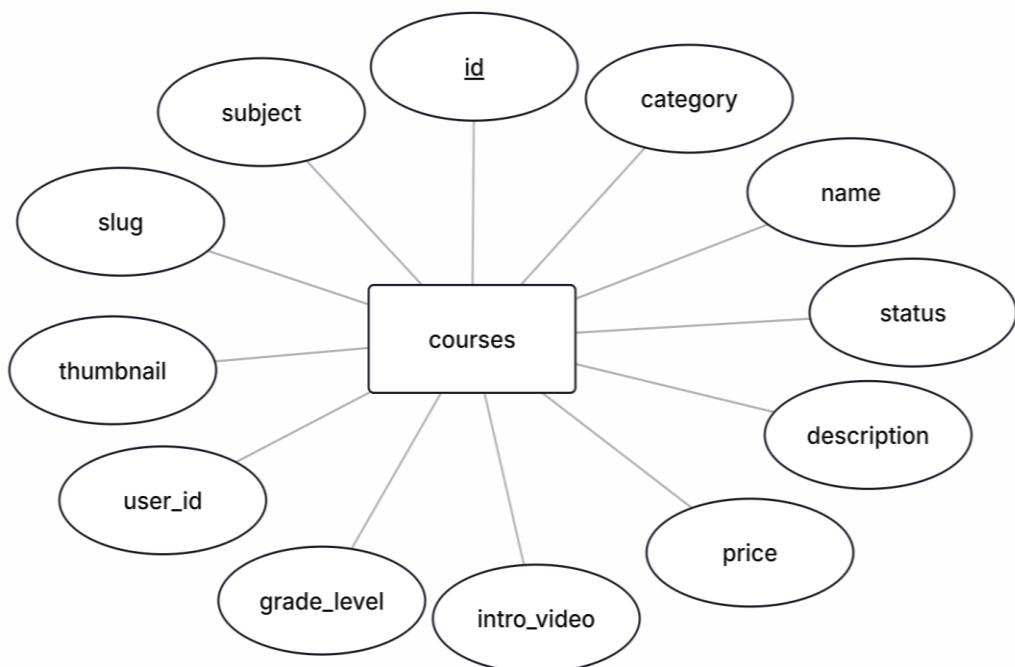
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Effective Date: 20-08-2025	Version 1.0	Page No: 76 of 116

2. ERD Properties



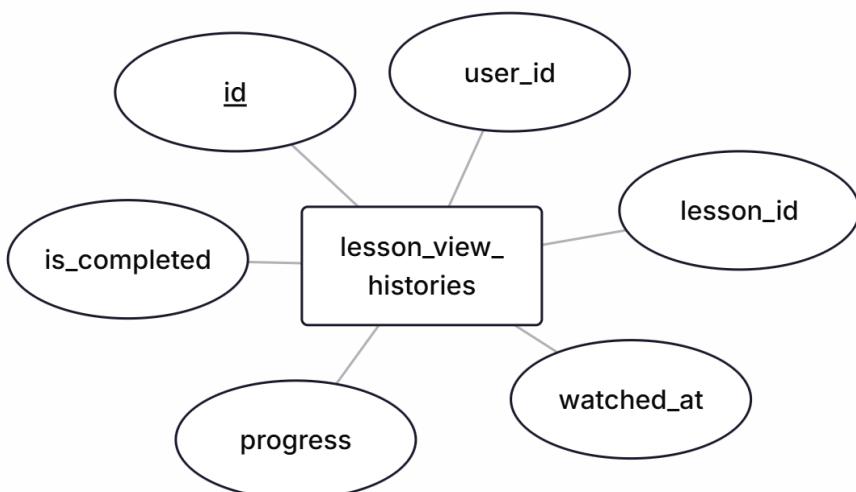
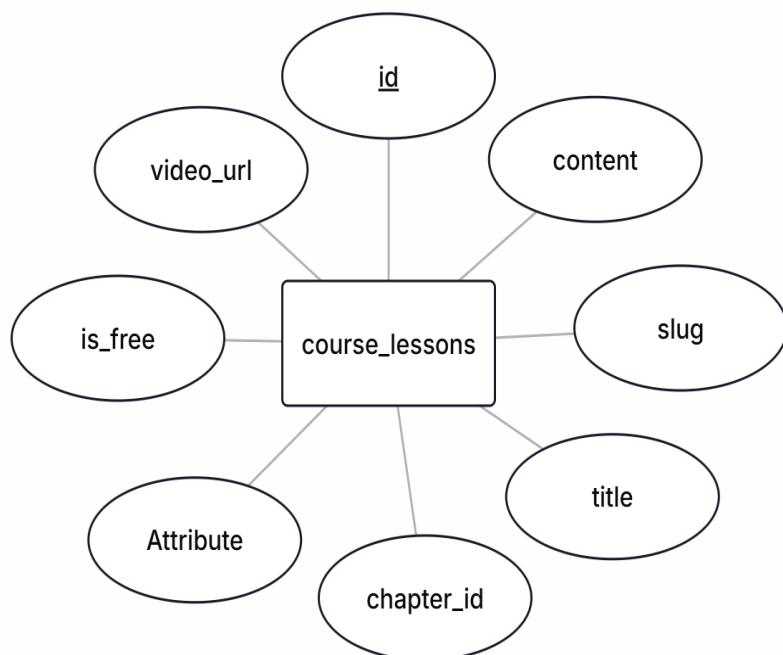
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Effective Date: 20-08-2025	Version 1.0	Page No: 77 of 116



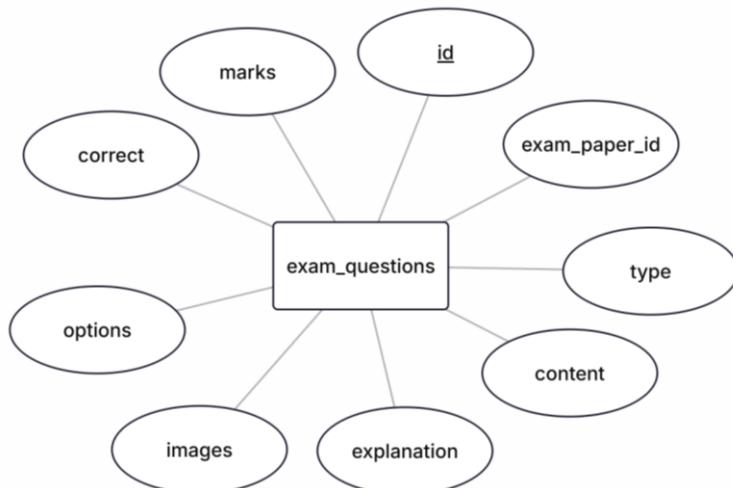
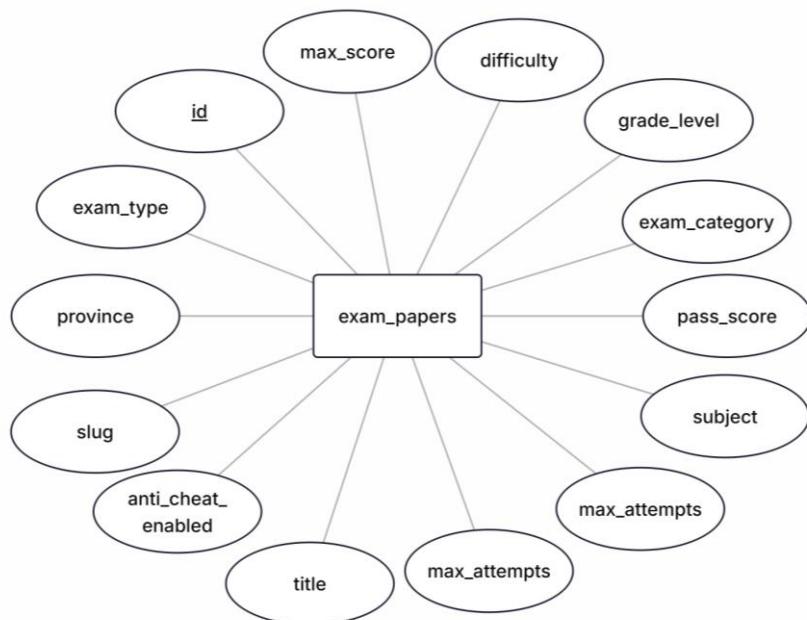
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Effective Date: 20-08-2025	Version 1.0	Page No: 78 of 116



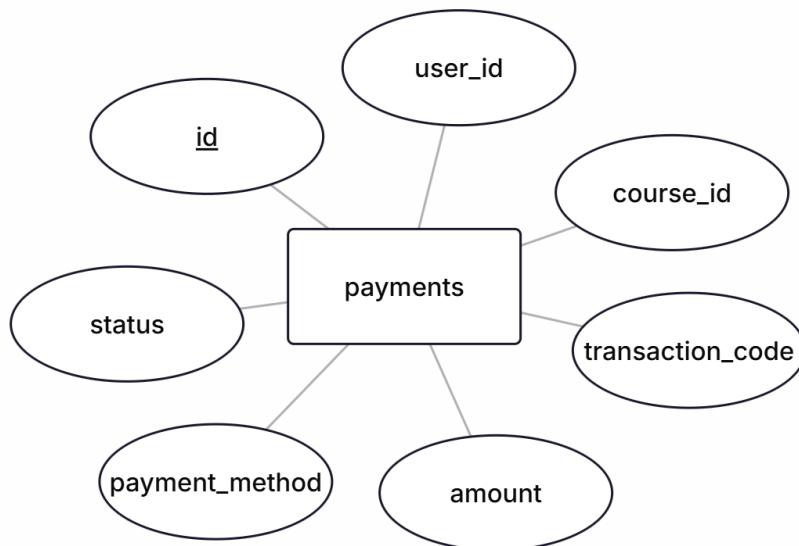
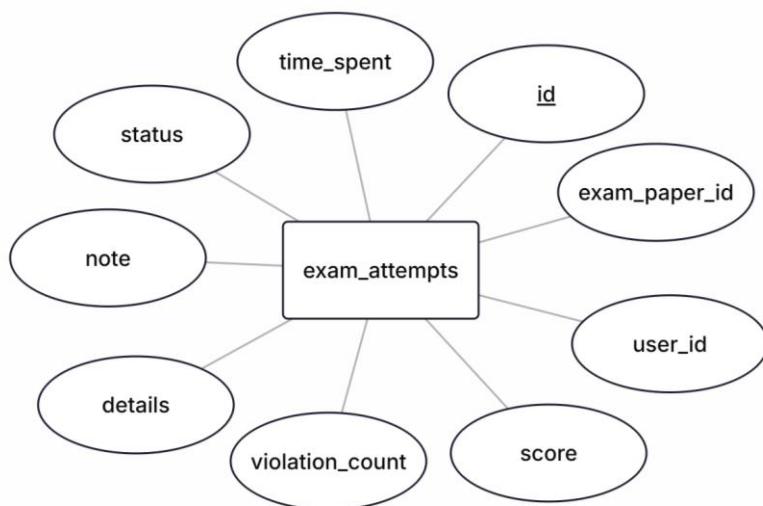
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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 79 of 116



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Design Plan: MapLearn Edu	Document Name: Entity Relationship Diagram	SWD/Form No.04/ERD/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 80 of 116



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Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 81 of 116

Table Design

III. Table Design

1. Table Design

users					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique identifier
2	username	varchar(255)	Unique	Not null	Login username
3	password	varchar(255)		Not null	Hashed password
4	full_name	varchar(255)		Not null	Full name
5	email	varchar(255)	Unique	Not null	Email address
6	phone_number	varchar(15)		Null	Phone number
7	gender	enum		Not null, Default 'other'	Gender
8	avatar	varchar(255)		Null	Profile picture URL
9	birth_year	int		Null	Year of birth
10	facebook_link	varchar(255)		Null	Facebook profile link
11	school	varchar(255)		Null	School name
12	bio	varchar(255)		Null	Short bio
13	degree	varchar(255)		Null	Degree/qualification
14	city	varchar(255)		Null	City
15	role	enum		Not null, Default	User role

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Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 82 of 116

				'student'	
16	banned	tinyint(1)		Not null, Default 0	Ban status
17	google2fa_secret	varchar(255)		Null	2FA secret
18	google2fa_enabled	tinyint(1)		Not null, Default 0	2FA enabled
19	google_id	varchar(255)		Null	Google account ID
20	facebook_id	varchar(255)		Null	Facebook account ID
21	discord_id	varchar(255)		Null	Discord account ID
22	email_verified_at	timestamp		Null	Email verification time
23	verification_token	varchar(255)	Unique	Null	Email verification token
24	remember_token	varchar(100)		Null	Remember me token
25	created_at	timestamp		Null	Record creation time
26	updated_at	timestamp		Null	Record last update time

courses					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique identifier
2	name	varchar(255)		Not null	Course name
3	slug	varchar(255)	Unique	Not null	URL-friendly slug
4	description	text		Null	Course description
5	thumbnail	varchar(255)		Null	Thumbnail image
6	intro_video	varchar(255)		Null	Introductory video URL

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Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 83 of 116

7	price	decimal(10,2)		Not null, Default 0.00	Course price
8	is_sequential	tinyint(1)		Not null, Default 0	Sequential enrollment required
9	user_id	int unsigned	FK	Not null, References users(id)	Instructor reference
10	grade_level	enum		Not null,	Grade level
11	subject	enum		Not nul	Subject
12	category	enum		Not null	Course category
13	start_date	datetime		Null	Course start date
14	end_date	datetime		Null	Course end date
15	status	tinyint(1)		Not null, Default 1	Status flag
16	created_at	timestamp		Null	Record creation time
17	updated_at	timestamp		Null	Record last update time

course_chapters					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique identifier
2	course_id	int unsigned	FK	Not null, References courses(id)	Reference to course
3	title	varchar(255)		Not null	Chapter title
4	position	int		Not null, Default 0	Order of chapter
5	created_at	timestamp		Null	Record creation time
6	updated_at	timestamp		Null	Record last update time

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Date		

Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 84 of 116

course_lessons					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique identifier
2	chapter_id	int unsigned	FK	Not null, References course_chapters(id)	Reference to chapter
3	title	varchar(255)		Not null	Lesson title
4	slug	varchar(255)	Unique	Not null	URL-friendly slug
5	content	text		Null	Lesson content/body
6	video_url	varchar(255)		Null	Video URL
7	position	int		Not null, Default 0	Order within chapter
8	duration	int		Not null, Default 0	Duration (seconds)
9	is_free	tinyint(1)		Not null, Default 0	Free preview flag
10	created_at	timestamp		Null	Record creation time
11	updated_at	timestamp		Null	Record last update time

lesson_view_histories					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique lesson view history identifier
2	user_id	int unsigned	FK	Not null, References users(id)	Reference to user
3	lesson_id	int unsigned	FK	Not null, References course_lessons(id)	Reference to course lesson
4	watched_at	timestamp		Null	Last viewed timestamp

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Date		

Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 85 of 116

5	progress	int		Not null, Default 0	Progress percentage
6	is_completed	tinyint(1)		Not null, Default 0	Completion flag
7	created_at	timestamp		Null	Record creation time
8	updated_at	timestamp		Null	Record last update time

exam_papers					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique identifier
2	exam_category	enum		Not null	Exam category
3	subject	enum		Not null	Subject
4	grade_level	enum		Not null	Grade level
5	user_id	int unsigned	FK	Not null, References users(id)	Creator/teacher reference
6	title	varchar(255)		Not null	Exam title
7	slug	varchar(255)	Unique	Not null	URL-friendly slug
8	province	varchar(255)		Null	Province/region (optional)
9	difficulty	enum		Not null	Difficulty level
10	exam_type	enum		Not null,	Exam type
11	max_score	decimal(5,2)		Not null, Default 10.00	Maximum score
12	pass_score	decimal(5,2)		Not null, Default 5.00	Passing score
13	duration_minutes	int		Not null	Time limit (minutes)
14	anti_cheat_enabled	tinyint(1)		Not null, Default 0	Anti-cheat enabled flag
15	maxViolationAttempts	int		Not null,	Max detected

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Date		

Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 86 of 116

				Default 3	violations allowed
16	max_attempts	int		Null	Max attempts per user (null = unlimited)
17	status	tinyint(1)		Not null, Default 1	Publication status
18	start_time	timestamp		Not null	Start time
19	end_time	timestamp		Null	End time
20	created_at	timestamp		Null	Record creation time
21	updated_at	timestamp		Null	Record last update time

exam_questions					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique question identifier
2	exam_paper_id	int unsigned	FK	Not null, References exam_papers(id)	Reference to exam paper
3	type	enum		Not null	Question type
4	content	text		Not null	Question text/content
5	explanation	longtext		Null	Explanation/solution
6	images	json		Null	Associated images
7	options	json		Not null	Answer options

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Date		

Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 87 of 116

8	correct	json		Not null	Correct answer(s)
9	marks	decimal(5,2)		Not null, Default 1.00	Marks awarded
10	created_at	timestamp		Null	Record creation time
11	updated_at	timestamp		Null	Record last update time

exam_attempts					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique exam attempt identifier
2	exam_paper_id	int unsigned	FK	Not null	Reference to exam paper
3	user_id	int unsigned	FK	Not null	Reference to user
4	score	decimal(5,2)		Default 0.00	Score achieved
5	violation_count	int		Default 0	Number of violations
6	time_spent	int		Default 0	Time spent in seconds
7	details	json		Null	Detailed attempt data
8	started_at	timestamp		Null	Start time
9	submitted_at	timestamp		Null	Submission time
10	note	text		Null	Extra notes
11	status	enum		Default 'in_progress'	Attempt status
12	created_at	timestamp		Null	Record creation time
13	updated_at	timestamp		Null	Record last update time

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Effective Date: 20-08-2025	Version 1.0	Page No: 88 of 116

payments					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique payment identifier
2	user_id	int unsigned	FK	Not null, References users(id)	Reference to user
3	course_id	int unsigned	FK	Not null, References courses(id)	Reference to course
4	transaction_code	varchar(255)	Unique	Not null	Transaction code
5	amount	decimal(10,2)		Not null	Payment amount
6	payment_method	enum		Not null	Payment method
7	status	enum		Not null	Payment status
8	paid_at	timestamp		Null	Paid timestamp

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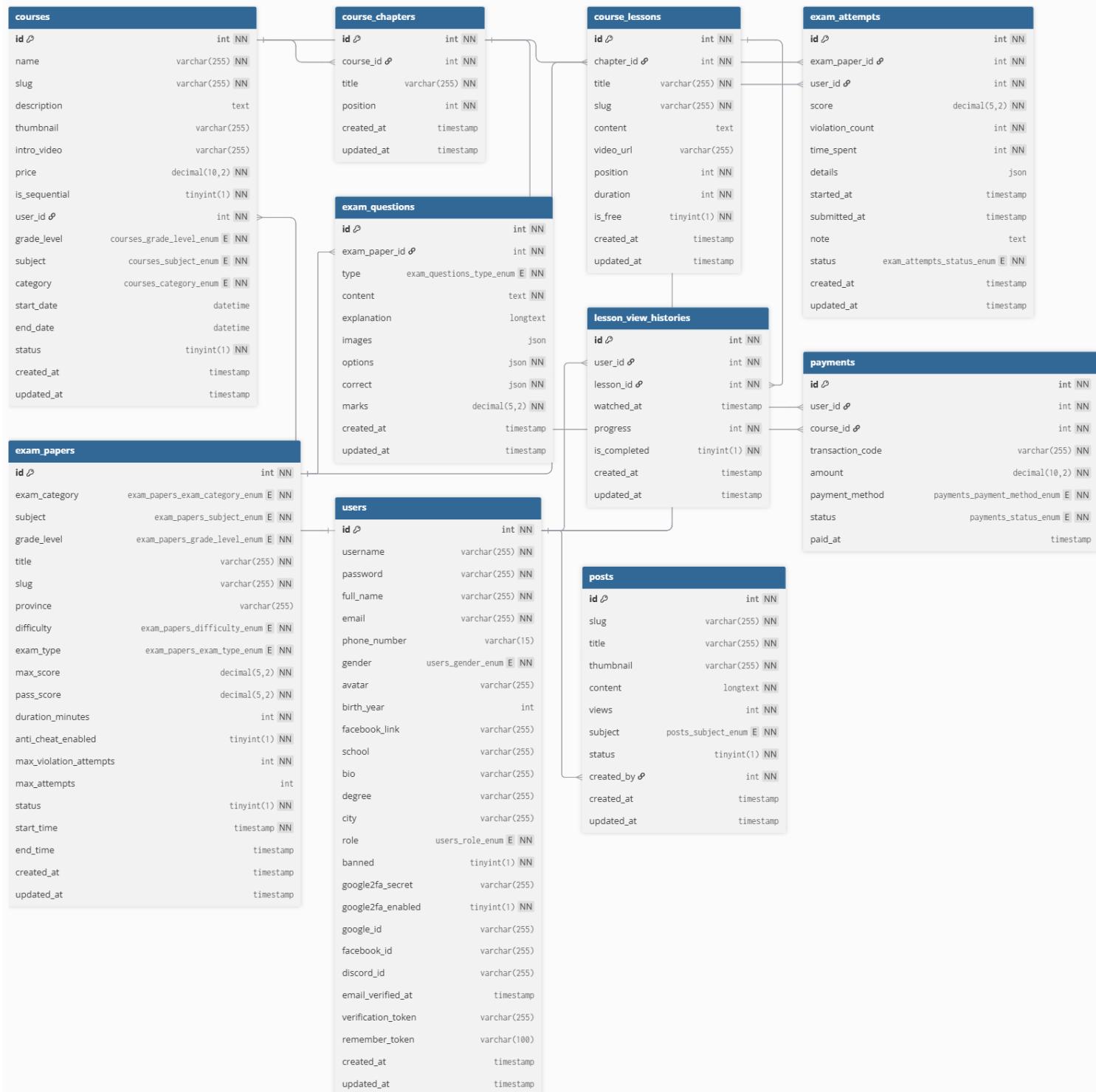
Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 89 of 116

posts					
Serial	Fields	Data Type	Keys	Constraints	Description
1	id	int unsigned	PK	Not null, auto_increment	Unique post identifier
2	user_id	int unsigned	FK	Not null	Reference to user who created the post
3	title	varchar(255)		Not null	Post title
4	slug	varchar(255)	Unique	Not null	SEO-friendly slug
5	content	longtext		Not null	Post content
6	status	enum		Default 'draft'	Post status
7	created_at	timestamp		Null	Record creation time

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Effective Date: 20-08-2025	Version 1.0	Page No: 90 of 116

2. Relationship Diagram

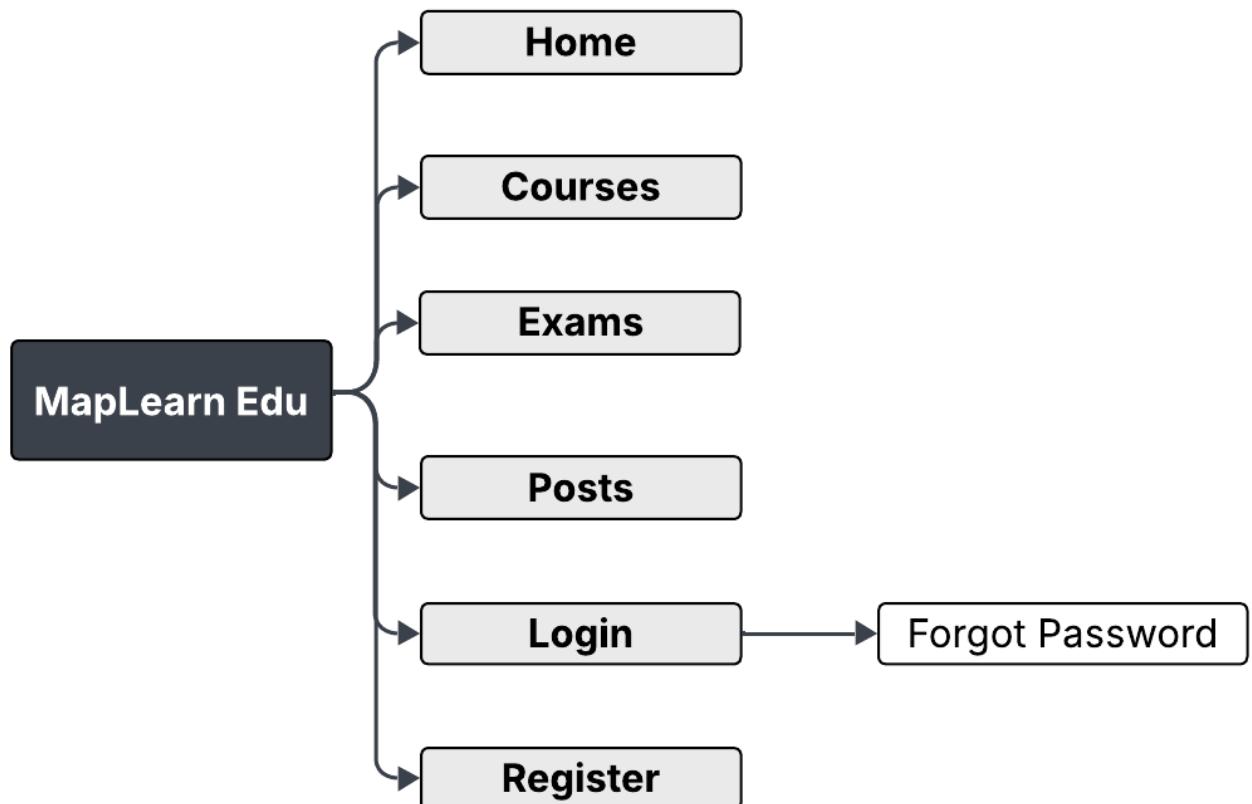


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Effective Date: 20-08-2025	Version 1.0	Page No: 91 of 116

Site Map

IV. Site Map



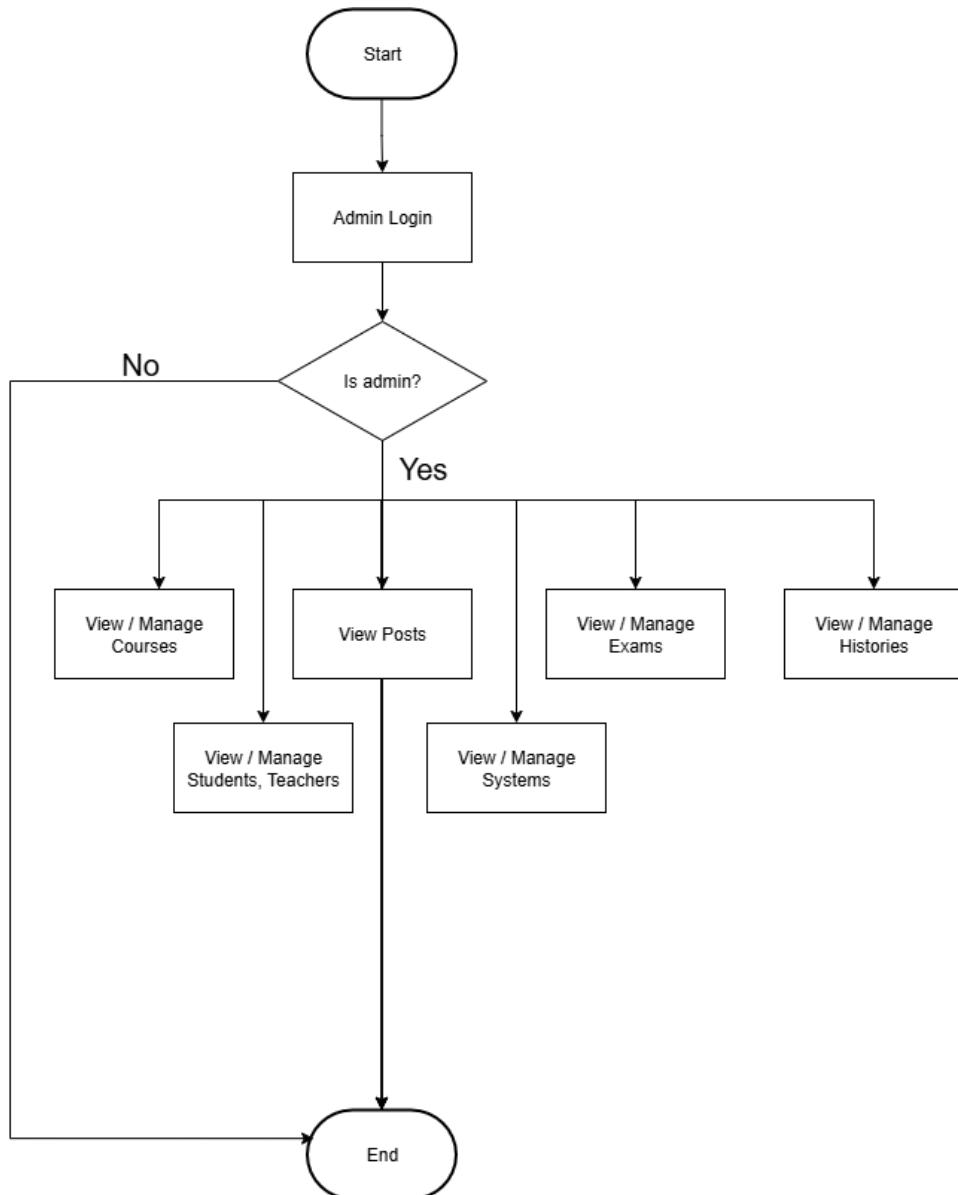
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Effective Date: 20-08-2025	Version 1.0	Page No: 92 of 116

Algorithm

V. Algorithm

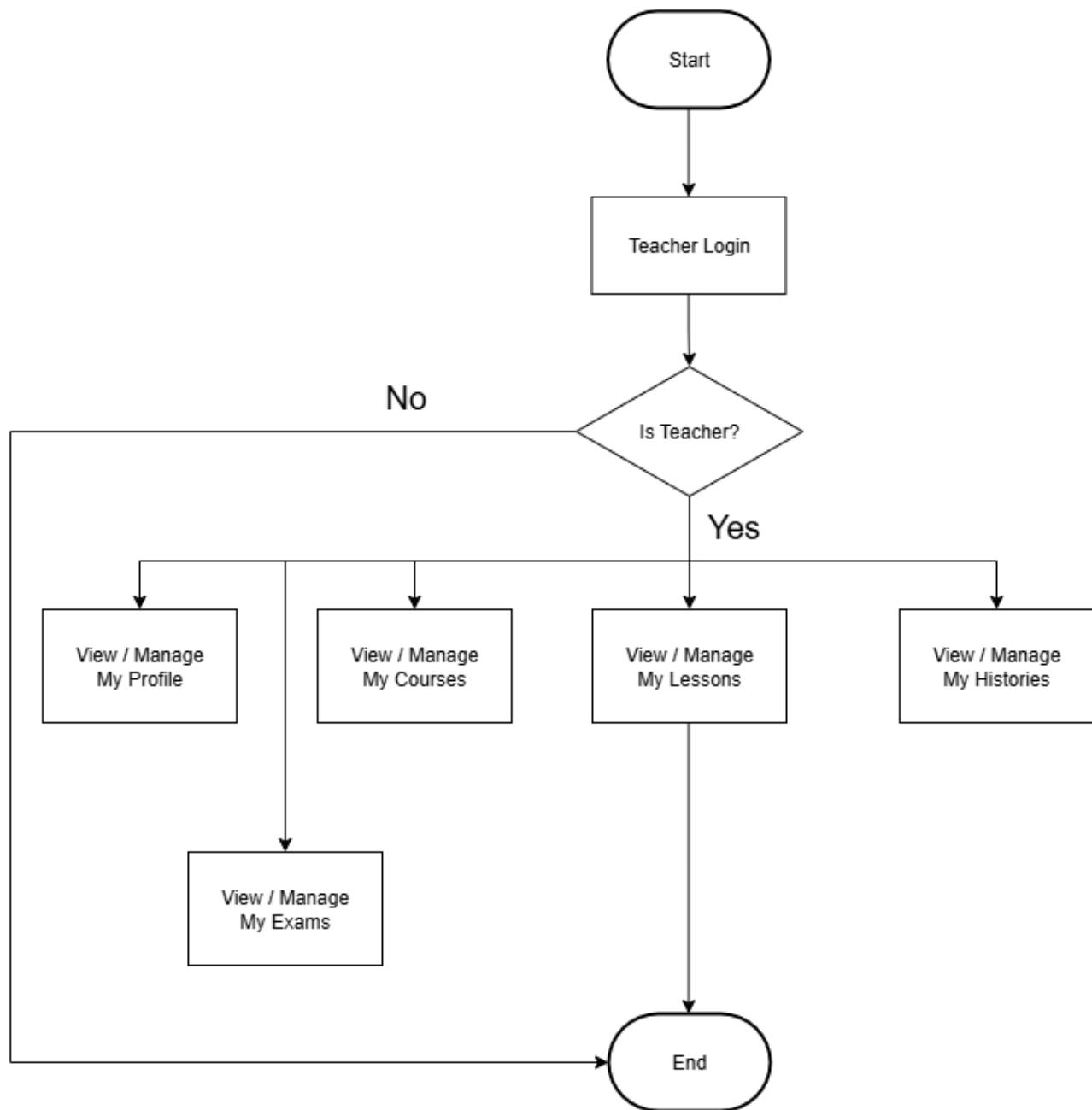
1. Algorithm Administrator



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Date		

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Effective Date: 20-08-2025	Version 1.0	Page No: 93 of 116

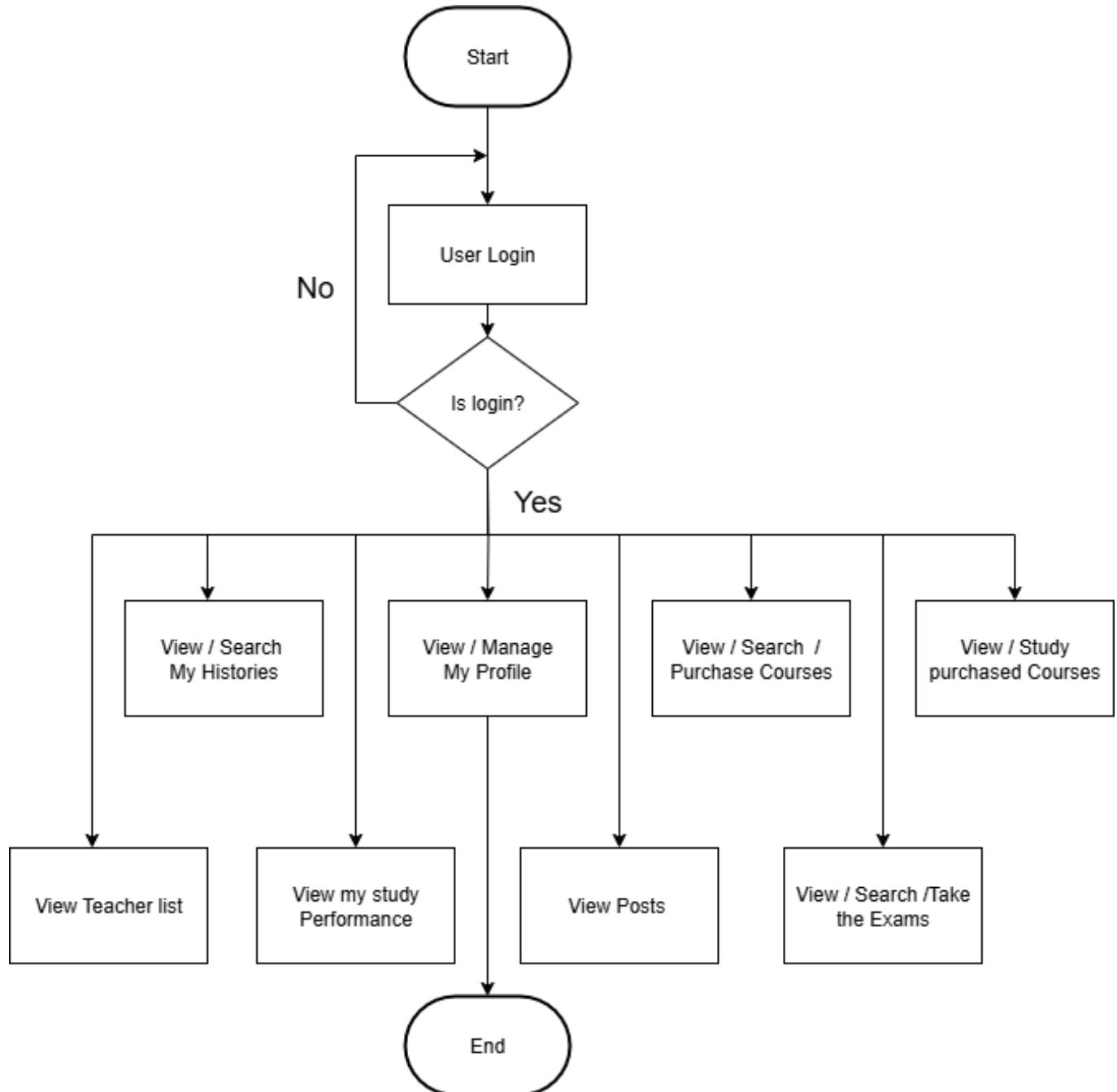
2. Algorithm Teacher



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Date		

Design Plan: MapLearn Edu	Document Name: Algorithm	SWD/Form No.07/ALG/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 94 of 116

3. Algorithm Student



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Date		

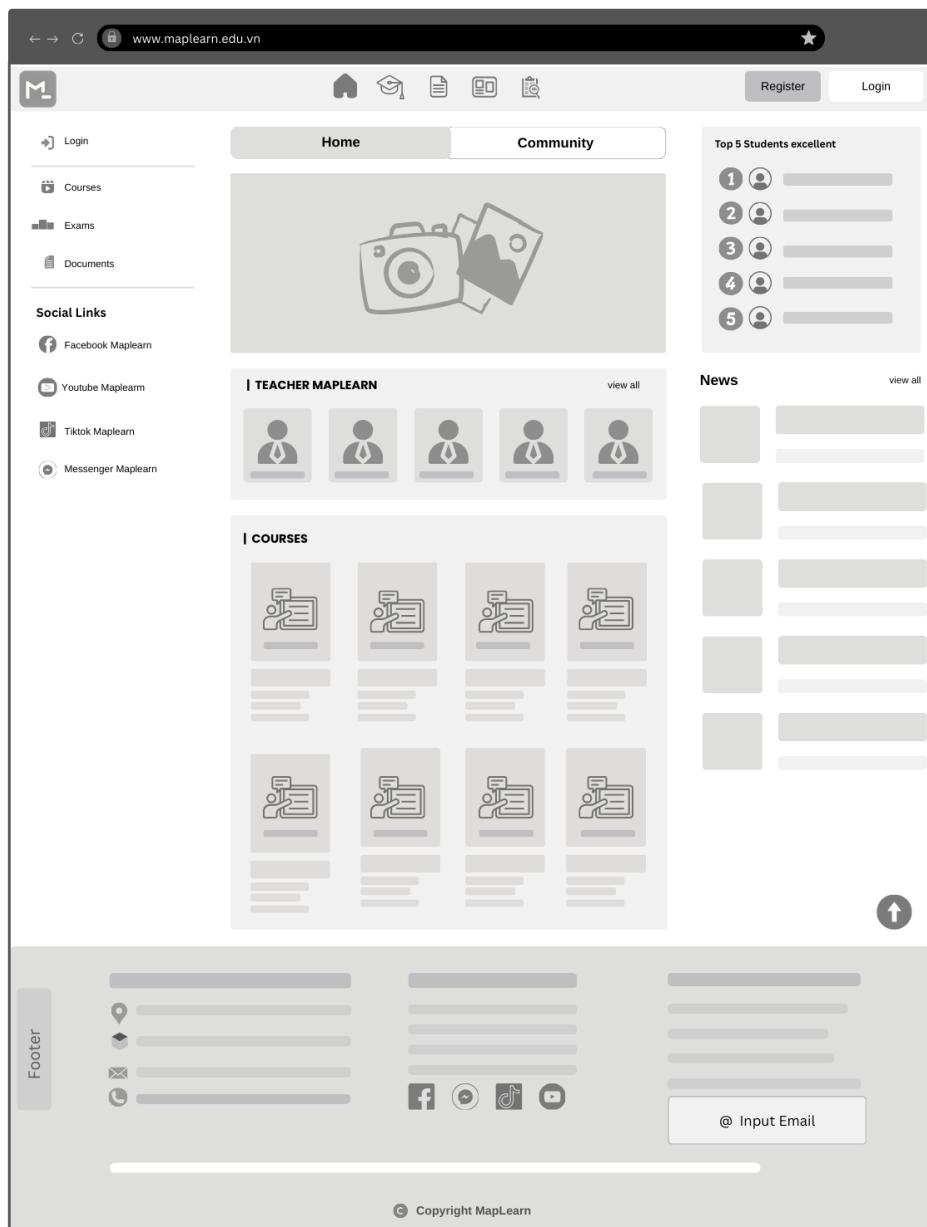
Review 03

Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.08/SS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 96 of 116

Screen Shoots

I . Screen Shoots

1. Homepage



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Date		

Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.08/SS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 97 of 116

Description:

The Home Page serves as the main entry point of the MapLearn Edu platform. It provides an overview of the platform's offerings, including featured courses, subject categories, top-performing students, and highlighted teachers. The design aims to give users quick access to essential features and to promote engagement with the platform. This screen is primarily used for navigation and exploration. Users can discover new courses, exams, and resources directly from here.

From:

This page is displayed by default when users access the platform's root URL. It can also be returned to at any time via the **Home** option in the navigation menu.

To:

From the Home Page, users can navigate to multiple destinations, such as:

- **Login / Register:** Access the authentication pages.
- **Courses:** View the list of available courses.
- **Exams:** Explore the online exam repository.
- **Posts:** Access shared educational posts or study documents.
- **My Account** (if logged in): Access personal dashboard and settings.
- **Teachers / Rankings:** View teacher profiles and student ranking lists.

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Effective Date: 20-08-2025	Version 1.0	Page No: 98 of 116

2. Courses

The screenshot shows the 'COURSES' section of the MapLearn Edu website. On the left, there is a sidebar labeled 'Category' containing five items, each with a 'M-' icon. The main area is titled 'COURSES' and displays a grid of course cards. Each card features a person icon and a document icon. A 'Keyword Search' bar is located at the top right of the course grid. At the bottom of the page, there is a 'Footer' section with links for location, address, email, and phone, along with social media icons for Facebook, Messenger, TikTok, and YouTube. A 'Copyright MapLearn' notice and an '@ Input Email' field are also present.

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Effective Date: 20-08-2025	Version 1.0	Page No: 99 of 116

Description:

The Courses page displays a complete list of all available online courses. Users can filter and sort by subject (e.g., Mathematics, Physics, Literature), by grade level (secondary or high school), or by exam preparation goals (National High School Exam, Competency Assessments, etc.). Each course entry includes the title, subject, teacher, and a brief description.

This screen is mainly used for course exploration and selection.

From:

This page is accessible via the **Courses** menu in the navigation bar, or through shortcut links displayed on the **Home Page**.

To:

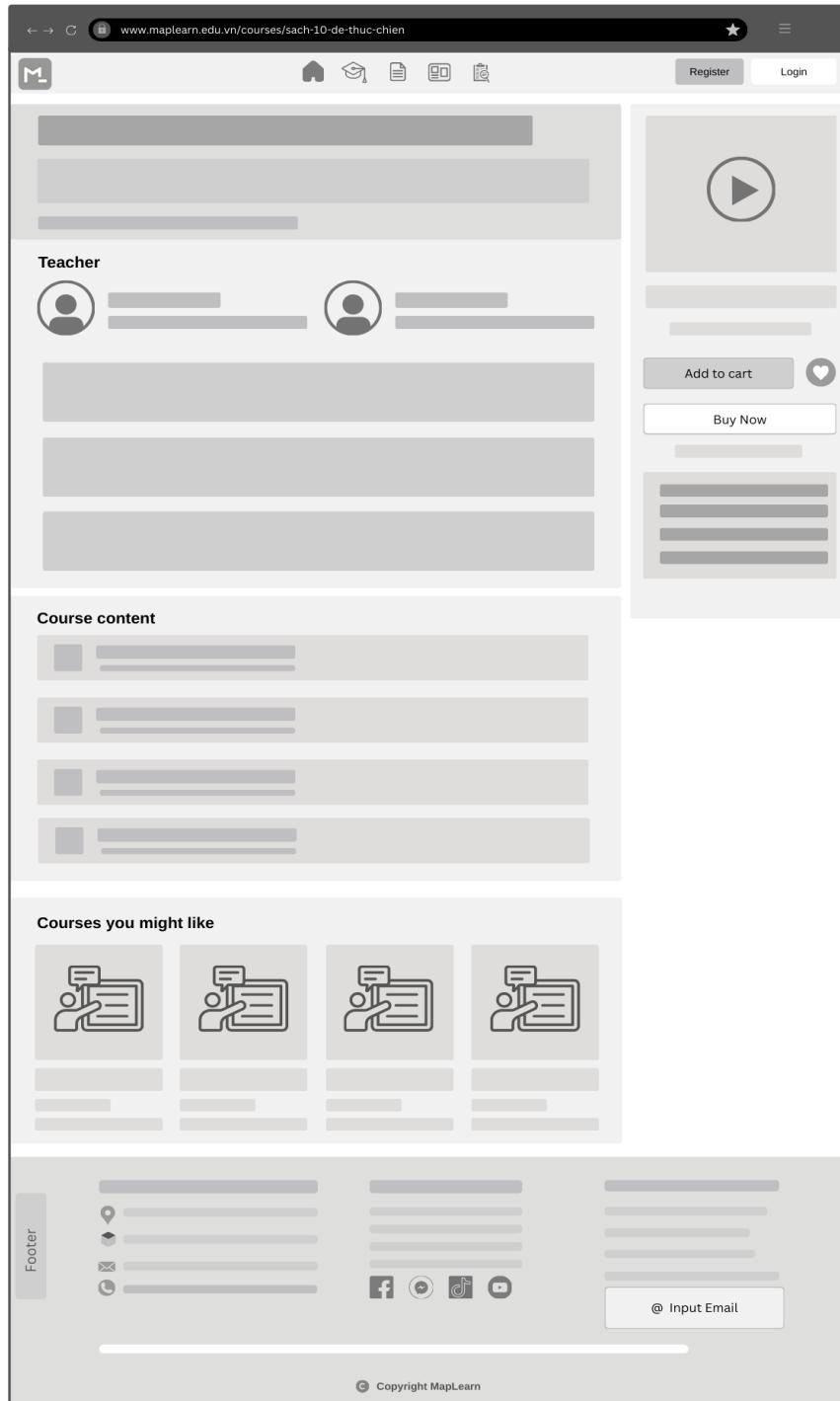
From the Courses page, users can proceed to:

- **Course Detail:** Open the detailed information of a specific course.

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Effective Date: 20-08-2025	Version 1.0	Page No: 100 of 116

3. Course Details



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Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.08/SS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 101 of 116

Description:

The Course Detail page provides comprehensive information about a selected course. It contains the course overview, objectives, curriculum (chapters and lessons), teacher introduction, and student reviews/ratings. If the user has enrolled, this page also provides access to lessons and study materials (video lectures, assignments, and practice exams).

The purpose of this screen is to allow students to evaluate the course in detail before enrollment, and for enrolled students to begin studying.

From:

This page is accessed when a user clicks on a course card in the **Courses** page or through a recommendation on the **Home Page**.

To:

From the Course Detail page, users can navigate to:

- **Lesson Player / Learning Screen:** Access course content if the course has been purchased or assigned.
- **Teacher Profile:** View more details about the course's instructor.
- **Reviews Section:** Read or write student feedback.

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Effective Date: 20-08-2025	Version 1.0	Page No: 102 of 116

4. Learn Course (Watch Video)

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Effective Date: 20-08-2025	Version 1.0	Page No: 103 of 116

Description:

The Lesson Player is the interactive study screen where students can watch video lectures, access downloadable materials (PDFs, slides, assignments), and participate in quizzes embedded in lessons.

It provides a structured learning flow, typically divided into chapters and lessons.

Students can track their progress (completed vs. remaining lessons), add notes, and re-watch content as needed. Some lessons may also include AI-powered features like auto-summaries, practice questions, or explanations of difficult concepts.

This page is the **core learning environment** of the platform, used after successful course enrollment.

From:

Accessed from the **Course Detail** page (after purchasing/enrolling in the course), or from the **My Courses** section inside **My Account**.

To:

From the Lesson Player, students can navigate to:

- **Next / Previous Lesson** within the same course.
- **Course Overview** (back to the course detail page or curriculum list).
- **Quizzes / Practice Exams** linked to the lesson or course.
- **Discussion / Q&A Section** (if enabled, for interaction with teachers or other students).
- **Notes / Wrong Questions** (personalized tools for tracking mistakes and highlights).

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Effective Date: 20-08-2025	Version 1.0	Page No: 104 of 116

5. Exams

The screenshot displays the MapLearn Edu website's exam search feature. On the left, there is a sidebar with a search bar labeled "Search" containing placeholder text "Search for exam questions...". Below it are four sections for filtering results: "Subject", "Taxonomy", "Difficulty level", and "Province/City". Each section contains two sets of checkboxes. At the bottom of the sidebar are "Reset" and "Confirm filtering" buttons. The main area features a grid of 12 exam question cards, each represented by a gray box with a small icon at the top. The footer contains social media icons for Facebook, Twitter, TikTok, and YouTube, along with an "Input Email" field and a copyright notice "Copyright MapLearn".

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Effective Date: 20-08-2025	Version 1.0	Page No: 105 of 116

Description:

The Exams page presents the list of available practice exams and test papers, including National High School Exam simulations, Competency Assessments, and subject-specific tests. Each exam item shows the exam title, subject, duration, and difficulty level.

This screen is mainly used by students who want to practice under exam conditions and track their performance.

From:

This page is accessible via the **Exams** option in the navigation bar, or from highlighted links on the **Home Page**.

To:

From the Exams page, users can proceed to:

- **Exam Detail / Attempt Exam:** Start taking a specific exam online.
- **Exam History:** Review past attempts and results.

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Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.08/SS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 106 of 116

6. Login

Login

Username

Password

Login

or continue with

G+ F T Y

Don't have an account yet? [Register](#)

Footer

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Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.08/SS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 107 of 116

Description:

The Login page allows existing users (students, teachers, or admins) to securely access the system by entering their email/username and password. It also provides options for password recovery (Forgot Password) and may support social logins (Google, Facebook, etc.).

This screen is used to authenticate and grant access to personalized features of the platform.

From:

Accessed directly from the **Home Page** or via the **Login** option in the navigation bar.

To:

After successful login, users can be redirected to:

- **Home Page** (default).
- **My Account / Dashboard** (personalized study dashboard).
- Any page they were trying to access before being prompted to log in (e.g., Course Detail, Exam Attempt).

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Effective Date: 20-08-2025	Version 1.0	Page No: 108 of 116

7. Register

www.maplearn.edu.vn/login

Register Login

Learning system

CREATE AN ACCOUNT

Full name

Your email address

Username

Password

Confirm password

Create an account

— or continue with —

Already have an account? [Login](#)

Footer

@ Input Email

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Effective Date: 20-08-2025	Version 1.0	Page No: 109 of 116

Description:

The Register page is used for new users to create an account on MapLearn Edu. It typically includes fields for full name, email, password, grade level, and optionally a referral code. The purpose of this screen is to onboard new students or teachers into the system.

It ensures that users have verified access to the platform's services such as courses, exams, and personalized study tracking.

From:

Accessed from the **Home Page** or by clicking the **Register / Sign Up** link (often found near the Login button).

To:

After successful registration, users can be redirected to:

- **Login Page** (to sign in with their new account).
- **Home Page** (auto-login after registration, depending on system design).
- **My Account / Dashboard** (first-time setup of profile, subjects of interest, etc.).

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Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.09/SS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 110 of 116

Testing Document

II . Tesing Document

Sr.No	Features Tested	Remarks
1	Test case	Pass
2	Test plan	Pass
3	Test scenario	Pass
4	Test report	Pass
5	Requirements Specification	Pass
6	Functional Specification	Pass
7	Use-Case Reports	Pass
8	Project Plan	Pass
9	Design Specifications	Pass
10	Prototype	Pass
11	User's Manuals	Pass
12	Business Functions and Rules	Pass
13	Project or Business Risk Assessment	Pass
14	Responsibilities	Pass
15	Approvals	Pass

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Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.10/FC/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 111 of 116

Final Checklist

III . Final Checklist

Sr.No	Aspected Tested	Suggestion/ Remarks
1	Can users register / log in successfully via account or social login?	Pass
2	Does the homepage display course categories, exam papers, and teacher info clearly?	Pass
3	Is the Course → Chapter → Lesson structure displayed correctly and easy to use?	Pass
4	Do lesson videos and documents load properly across all browsers?	Pass
5	Does the progress tracking (lesson_view_histories) save and show user progress percentage?	Pass
6	Can users pay course using multiple methods (VNPay, MoMo, ZaloPay, Bank Transfer)?	Pass
7	Are invoices (payments) generated correctly and displayed in the user's profile?	Pass
8	Do exam papers show all details (subject, difficulty, duration) and allow users to start the test?	Pass
9	Are exam questions displayed clearly with correct answers and automatic scoring?	Pass
10	Are exam attempts saved and results shown to students immediately after submission?	Pass

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Design Plan: MapLearn Edu	Document Name: Screen shots	SWD/Form No.10/FC/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 112 of 116

11	Are all forms (registration, login, payment, course creation) validated with proper criteria?	Pass
12	Is navigation between page smooth without 404 errors?	Pass
13	Does the website work correctly on popular browsers (Chrome, Edge, Firefox, Safari)?	Pass
14	Is the page load time less than 3 seconds under normal network conditions?	Pass
15	Does the role system (admin, teacher, student) work correctly without privilege issues?	Pass
16	Is the language, spelling, labels, and notifications displayed correctly without errors?	Pass
17	Are security features (password hashing, 2FA if enabled, login tokens) functioning properly?	Pass
18	Is critical data (payments, exam results) stored accurately in the database and retrievable?	Pass
19	Does the system handle multiple concurrent users without crashing?	Pass
20	Is the website user-friendly for students, teachers, and admins?	Pass

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Design Plan: MapLearn Edu	Document Name: Task Sheet	SWD/Form No.11/TS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 113 of 116

No	Member	Contents		Table Name	Date of Preparation of Activity Plan				
					Planned Start Date	Actual Start Date	Actual Days		
1	Phạm Hoàng Tuấn	Admin	<i>Manage Courses (create, edit, delete courses; assign teacher)</i>		courses, course_chapters, course_lessons, lesson_view_histories	20/08/2025			
2			<i>Manage Courses (create, edit, delete courses; assign teachers; manage categories, subjects, grade levels, departments; apply/remove discounts)</i>			25/08/2025			
3		Teacher	<i>Manage Chapters (create, edit, delete). Manage Lessons (create, edit, delete; upload video/content; mark free lessons)</i>			08/09/2025			
4			<i>View learning progress; system records lesson progress automatically</i>			22/09/2025	DONE		
5		Student							

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Date		

Design Plan: MapLearn Edu	Document Name: Task Sheet	SWD/Form No.11/TS/Ver1.0
Effective Date: 20-08-2025	Version 1.0	Page No: 114 of 116

1	Lâm Hoàng An	Admin	<i>Manage Users (create, edit, reset password if no transactions recorded)</i>	users payment	20/08/2025			
2			<i>Manage Payments (approve, reject, track transactions)</i>		01/09/2025			
3		Teacher	<i>View enrolled students</i>		15/09/2025			
4		Student	<i>Make Payments (pay for courses, check status, download receipt)</i>					DONE
5								

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Effective Date: 20-08-2025	Version 1.0	Page No: 115 of 116

1	Trần Hoàng Anh	Admin	<i>Manage Exam Papers (create, edit, delete exam_papers; assign subjects, level, duration)</i>	exam_papers exam_questions exam_attempts	25/08/2025			
2		Teacher	<i>Manage Exam Questions (create, edit, delete questions; assign to exam_paper; set answers)</i>		28/08/2025			
3		Student	<i>Take Exam (exam_attempts: start, submit, review score & feedback)</i>		10/09/2025			DONE
4								

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Signature		
Date		

Acknowledgments and Declaration

Project Documentation for MapLearn Edu

Completed on September 10, 2025

The documentation for the **MapLearn Edu** project was completed on September 10, 2025. Our team would like to express our sincere gratitude to our supervisor, **Mr. LE THANH NHAN**, for his continuous guidance, valuable feedback, and encouragement throughout the development of this project.

We are also thankful to our classmates for their constructive input and collaboration, which contributed to the improvement and refinement of our work

In addition, we would like to thank **FPT Aptech** for providing us with the opportunity to carry out this project. This experience has allowed us to apply the knowledge and skills we have gained during our studies in a practical and meaningful context.

This document is the result of the collective efforts of our team, combining the knowledge acquired through our coursework and further independent research. We confirm that the content presented is original and accurate, with no unauthorized copying or plagiarism. Our team is committed to upholding academic integrity and ensuring the quality of this project.

This is a complete documentation that reflects the dedication, research, and learning process of our team as students who are still in the process of developing professional skills. We are deeply grateful to our teacher for his support and guidance during this journey. The content is based on reliable sources and the knowledge we have accumulated during our studies.