

Edupro Intelligent Assistant: Product Requirements Document

Executive Summary

This Product Requirements Document (PRD) outlines the evolution of edupro.ps, an AI-powered educational assistant designed to enhance the learning experience for both students and educators. Currently, Edupro operates as a basic chatbot, providing students with AI-generated answers to subject-related questions upon registration. Students provide their name, email, and class details to access relevant subject materials.

The strategic vision detailed in this document transforms Edupro into a comprehensive, intelligent assistant. Key enhancements include AI-driven student level assessment, personalized reports highlighting strengths and weaknesses for both students and professors, and AI-assisted content creation tools for professors, such as question generation and study plan development.

The technology stack supporting this evolution includes Laravel, Filament, MySQL, Blade, HTML/CSS/JS, and the ChatGPT API, hosted on Injazat servers with the edupro.ps domain. Future development will incorporate RAG (Retrieval Augmented Generation) agent AI, microlearning modules, and a multi-tenant database architecture to facilitate scalability and support advanced AI functionalities. The ultimate goal is to create a more personalized and effective learning environment for all users.

1. Introduction

This Product Requirements Document (PRD) defines the requirements for the evolution of edupro.ps, an online educational platform. Currently, edupro.ps offers a basic AI-powered chatbot system. This document details the necessary enhancements to transform it into an advanced, intelligent assistant, providing personalized support for students and valuable tools for professors.

The scope of this PRD encompasses both the immediate development phase and future strategic improvements. It ensures that development teams and stakeholders have a clear understanding of the project's goals. The primary aim is to leverage artificial intelligence to personalize the learning experience for students by assessing their levels and providing detailed reports on their strengths and weaknesses.

Furthermore, the enhanced platform will offer professors tools to streamline their teaching processes. These tools include AI-assisted question generation and study plan development. Future iterations will explore microlearning integration and more sophisticated AI applications to further enrich the educational experience on edupro.ps.

2. Problem Statement

The current Edupro platform, while functional as a basic AI-powered Q&A chatbot, possesses several limitations that hinder its potential to deliver a truly personalized and effective learning experience. The existing system primarily serves as a reactive tool, answering student queries based on registered subject matter. However, it lacks the proactive and adaptive capabilities necessary to cater to individual student needs and provide comprehensive support for educators.

- **Limited Student Insight:** Students lack the ability to ascertain their current academic level within a subject. Furthermore, the system does not provide personalized reports identifying specific strengths and weaknesses, which are crucial for targeted improvement.
- **Lack of Educator Support:** Professors currently lack integrated tools to automate content creation, such as AI-assisted question generation for assessments or the development of comprehensive study plans. This increases workload and potentially limits the variety and effectiveness of teaching materials.
- **Absence of Holistic Performance View:** The existing chatbot functionality offers only a fragmented view of student performance, limited to individual queries and responses. A holistic overview of student progress and areas requiring attention is currently unavailable.

Addressing these limitations presents significant opportunities to transform Edupro into a proactive and intelligent learning assistant. By implementing the enhancements outlined in this document, Edupro can significantly improve educational outcomes for both students and professors.

3. Goals and Objectives

The overarching goals of the edupro.ps enhancement project are threefold: to significantly improve student learning outcomes through personalized AI support, to empower professors with AI-driven tools for efficient content creation, and to establish edupro.ps as a leading intelligent educational platform in the region.

3.1 Specific Objectives

- **Student Level Assessment:** By Q3 2024, implement AI-driven student level assessment capabilities with a target accuracy of 85% across core subjects.
- **Personalized Reporting:** Enable AI-generated student progress reports for professors, including strengths and weaknesses analysis, by Q4 2024.
- **AI-Assisted Question Generation:** Develop a feature that allows professors to generate practice questions based on specific topics and difficulty levels, available by Q2 2025.
- **Study Plan Assistance:** Provide professors with AI-assisted tools to create and customize study plans, incorporating adaptive learning principles, by Q3 2025.

- **Microlearning Foundation:** Lay the foundation for future microlearning integration, including content tagging and delivery mechanisms, by Q4 2025.

4. Target Audience

The enhanced edupro.ps platform is designed to serve two primary target audiences: students and professors. Secondary audiences include educational institutions and administrators who benefit from improved educational outcomes and streamlined processes.

4.1 Primary Audiences

- **Students:** Primarily university and secondary school students who seek personalized learning support. Their needs include:
 - Accurate self-assessment of their knowledge level.
 - Identification of strengths and weaknesses in specific subjects.
 - Tailored learning paths that address their individual needs.
 - Progress tracking and performance monitoring.
- **Professors:** Educators at the university and secondary school levels who require tools to enhance their teaching effectiveness. Their needs include:
 - Efficient generation of assessment questions.
 - Assistance in developing comprehensive and adaptive study plans.
 - Insights into student performance and areas requiring intervention.
 - Tools to streamline administrative tasks related to course management.

4.2 Secondary Audiences

- **Educational Institutions and Administrators:** These stakeholders benefit from the platform's ability to improve student outcomes, enhance teaching quality, and provide data-driven insights into educational performance.

5. Current System Overview

The current edupro.ps platform functions as an AI-powered question and answer system, providing students with immediate assistance within their registered subjects. The system operates primarily through a chatbot interface, enabling students to pose questions and receive AI-generated responses.

The user journey begins with student registration, where users provide their name, email address, and class details. Upon successful registration, the system displays a list of subjects relevant to the student's selected class. Students can then select a subject and interact with the chatbot, posing questions related to the subject matter. The AI processes the query and provides a relevant answer.

The technological foundation of the current system relies on web technologies including Laravel, Blade, HTML, CSS, and JavaScript. The chatbot functionality is enabled through integration with the ChatGPT API. The platform is currently hosted on Injazat

servers, accessible through the edupro.ps domain. This initial architecture provides a solid base for the planned enhancements and future scalability.

6. Proposed System Features: AI-Powered Student Support

The enhanced Edupro platform will incorporate advanced AI functionalities designed to provide comprehensive and personalized support for students. These features go beyond basic question answering, offering proactive assessment, personalized insights, and adaptive learning recommendations. The AI will act as a personalized tutor and analytical tool, empowering students to take ownership of their learning journey and enabling professors to deliver more effective instruction.

6.1 AI-Driven Student Level Assessment

The system will leverage AI to continuously assess student academic levels across various subjects. This assessment will be based on a variety of factors, including:

- **Performance on quizzes and assignments:** Analyzing student responses to identify areas of strength and weakness.
- **Interaction with the chatbot:** Monitoring the types of questions asked and the level of assistance required.
- **Engagement with learning materials:** Tracking the amount of time spent on different topics and resources.

The AI will use this data to generate a dynamic assessment of each student's proficiency in different areas, providing a more accurate and nuanced understanding of their academic standing than traditional grading methods.

6.2 Identification of Strengths and Weaknesses

Based on the continuous assessment data, the AI will identify individual student strengths and weaknesses. This analysis will provide students with personalized insights into their learning profile, highlighting areas where they excel and areas where they need additional support. The system will present this information in an accessible and actionable format, enabling students to focus their efforts on areas where they can make the most significant improvements.

For example, if a student consistently struggles with questions related to a specific concept, the AI will identify this as a weakness and recommend additional resources or practice exercises to address the gap in knowledge. Conversely, if a student consistently performs well in a particular area, the AI will recognize this as a strength and suggest more challenging activities to further enhance their skills.

6.3 Personalized Academic Reports for Professors

The AI will generate personalized academic reports for professors, summarizing student progress, engagement, and areas needing improvement. These reports will provide professors with valuable insights into the learning needs of their students, enabling them to tailor their instruction to better meet those needs. The reports will include:

- **Overall student performance:** A summary of the student's academic level and progress across different subjects.
- **Strengths and weaknesses analysis:** A detailed breakdown of the student's strengths and weaknesses in specific areas.
- **Engagement metrics:** Data on the student's interaction with the platform, including the amount of time spent on different activities and the frequency of chatbot usage.
- **Recommendations for intervention:** Suggestions for how professors can provide targeted support to students who are struggling.

6.4 Adaptive Learning Paths and Recommendations

Based on the identified needs of each student, the AI will offer adaptive learning paths and recommendations. This means that the system will automatically adjust the difficulty level and content of the learning materials to match the student's individual skill level. Students who are struggling with a particular topic will be provided with more basic materials and practice exercises, while students who are excelling will be challenged with more advanced content.

The AI will also recommend specific resources and activities that are tailored to each student's learning style and preferences. For example, students who learn best through visual aids may be recommended to watch videos or view infographics, while students who prefer hands-on learning may be encouraged to complete interactive simulations or experiments.

7. Proposed System Features: AI-Powered Professor Tools

The enhanced Edupro platform will provide professors with AI-powered tools to streamline their workflows and enhance the quality of educational materials. These tools focus on automating content creation and providing data-driven insights to personalize instruction.

7.1 AI-Driven Question Generation

Professors can leverage AI to generate varied and relevant questions for assessments. This feature will allow professors to input specific topics or learning objectives, and the AI will generate a range of question types, including multiple-choice, short answer, and essay questions.

The AI will consider the difficulty level specified by the professor and ensure that the generated questions align with the intended learning outcomes. This feature aims to reduce the time and effort required to create high-quality assessments, while also ensuring that the questions are relevant and challenging for students.

7.2 AI-Assisted Study Plan Development

The system will provide AI assistance in outlining course study plans. Professors can input curriculum requirements and student needs, and the AI will suggest topics, pacing, and resource allocation. The AI will also consider factors such as the length of the course, the prior knowledge of students, and the availability of resources when generating the study plan.

The generated study plans can be customized by the professor to meet their specific needs and preferences. This feature aims to help professors create comprehensive and effective study plans that maximize student learning outcomes, while also reducing the amount of time and effort required for plan development.

By automating these tasks, professors can dedicate more time to direct student interaction and personalized instruction.

8. Future Integration: Personalized Learning Paths & Microlearning

The long-term vision for edupro.ps includes advanced personalized learning paths and the integration of microlearning modules. While not part of the initial development phase, the platform's architecture will be designed with extensibility in mind to seamlessly support these features in the future.

Microlearning, in this context, refers to the delivery of learning content in small, focused modules. These modules will address specific student weaknesses identified by the AI assessment system. For example, if a student struggles with a particular grammatical concept in English, a microlearning module focusing specifically on that concept will be presented. These modules could include short videos, interactive quizzes, or concise textual explanations.

Ultimately, AI will be instrumental in tailoring learning paths with even greater granularity. Instead of broad subject areas, the system will deliver bite-sized content and assessments designed to reinforce understanding and address specific skill gaps. This approach ensures that students receive the most relevant and impactful learning experience possible, maximizing their engagement and knowledge retention. The system will adapt in real-time based on student performance within the microlearning modules, ensuring continuous improvement and personalized support.

9. Technical Architecture & Stack

The edupro.ps platform is built on a robust and scalable technical architecture, leveraging a combination of proven and cutting-edge technologies. This architecture is designed to support the current functionality and accommodate future growth and feature enhancements, including RAG agent AI and multi-tenant database capabilities.

- **Backend Framework:** Laravel, a PHP framework known for its elegance, security, and rich feature set, forms the backbone of the platform. Laravel provides a solid foundation for building complex web applications with clean and maintainable code.
- **Administrative Panel:** Filament, a Laravel package, is utilized for the administrative panel and backend interface. Filament provides a user-friendly and efficient way to manage data, users, and other administrative tasks.
- **Database System:** MySQL, a widely used open-source relational database management system, stores all platform data, including user information, subject content, and AI-generated reports.
- **Frontend Technologies:** The frontend is built using a combination of Blade templating engine (integrated with Laravel), HTML, CSS, and JavaScript. Blade enables dynamic content rendering, while HTML, CSS, and JavaScript provide the structure, styling, and interactivity of the user interface.
- **AI Integration:** A crucial component of the architecture is the integration of the ChatGPT API. This API is used to power various AI functionalities, including the chatbot, student level assessment, report generation, and AI-assisted content creation for professors.
- **Hosting Environment:** The platform is hosted on Injazat servers, ensuring reliable performance and security. The domain name for the platform is edupro.ps.

The integration of these technologies allows for seamless interaction between the frontend user interface, the backend logic, the database, and the AI engine. This ensures that the platform is able to deliver a personalized and effective learning experience for both students and professors. The architecture is also designed to be scalable, allowing the platform to handle increasing traffic and data volumes as the user base grows.

10. Future Technical Roadmap & AI Evolution

The future of edupro.ps hinges on continuous technological advancement, particularly in the realm of Artificial Intelligence. Two key initiatives are planned to significantly enhance the platform's capabilities: the integration of a RAG (Retrieval Augmented Generation) Agent AI model and the implementation of a multi-tenant database architecture.

10.1 RAG (Retrieval Augmented Generation) Agent AI

The integration of a RAG Agent AI model will revolutionize the accuracy and reliability of the platform's AI-driven responses. Unlike the current model that relies solely on pre-trained knowledge, RAG will augment its knowledge by retrieving relevant information from a curated knowledge base before generating a response. This knowledge base will consist of authoritative sources, such as subject-specific textbooks, university curricula, and peer-reviewed articles.

By grounding its responses in verifiable information, RAG significantly reduces the risk of "AI hallucinations"—instances where the AI generates incorrect or nonsensical information. The retrieval process ensures that the AI has access to the most up-to-date and contextually relevant information, leading to more accurate and reliable answers for students and more dependable assistance for professors.

10.2 Multi-Tenant Database Architecture

To support future scalability and potential partnerships with multiple educational institutions, edupro.ps will transition to a multi-tenant database architecture. This architecture allows multiple distinct tenants (e.g., universities, departments) to use the same core infrastructure while maintaining complete data isolation and security. Each tenant will have its own dedicated database schema, ensuring that data is not shared or commingled between different institutions.

This approach offers several key benefits. It reduces the operational overhead of managing separate instances for each institution, simplifies platform maintenance and updates, and enables efficient resource utilization. Furthermore, it provides a flexible and scalable foundation for future growth, allowing the platform to easily onboard new tenants without compromising performance or security. The multi-tenant architecture will be crucial for expanding the reach and impact of edupro.ps across the broader educational landscape.

11. User Stories / Use Cases

These user stories illustrate the new functionalities from the perspective of both students and professors, highlighting the value and practicality of the enhanced Edupro platform.

11.1 Student User Stories

- **As a student**, I want the AI to assess my level in Mathematics, so I know where I stand and what areas I need to improve.
- **As a student**, I want the AI to identify my weak areas in Physics, like 'Electromagnetism,' so I can focus my study and improve my understanding of those specific concepts.
- **As a student**, I want the AI to generate a summary report of my progress in Biology for my professor, so they can better understand my learning trajectory.

- **As a student**, I want the AI to recommend relevant microlearning modules based on my identified weaknesses in Chemistry, allowing me to quickly grasp difficult concepts.
- **As a student**, I want to track my progress over time through visual dashboards, so I can see how much I've improved and stay motivated.

11.2 Professor User Stories

- **As a professor**, I want the AI to generate 10 multiple-choice questions on 'Quantum Mechanics' for my upcoming quiz, saving me time and ensuring the questions are challenging and relevant.
- **As a professor**, I want the AI to help me outline a study plan for 'Introduction to Programming' course covering 12 weeks, ensuring all key concepts are covered and the pacing is appropriate for my students.
- **As a professor**, I want to receive AI-generated reports on student performance in my Calculus course, so I can identify students who are struggling and provide targeted support.
- **As a professor**, I want to be able to customize the AI-generated study plans to match my teaching style and the specific needs of my students.
- **As a professor**, I want the AI to suggest relevant readings and resources to include in my course syllabus, ensuring my students have access to the best possible learning materials.

12. Non-Functional Requirements

The following non-functional requirements are critical to the success of the enhanced edupro.ps platform. These requirements define the quality attributes of the system, ensuring it meets the needs of its users and operates reliably and securely.

- **Performance:**
 - AI query response times should be under 3 seconds for basic queries and under 7 seconds for complex analysis or report generation.
 - Page load times should not exceed 2 seconds.
- **Security:**
 - All sensitive data, including user credentials and personal information, must be encrypted both in transit and at rest.
 - Robust user authentication mechanisms, including secure email registration and password management, must be implemented.
 - Strict authorization controls to ensure users only access data and features appropriate to their roles (student or professor).
 - The application must be protected against common web vulnerabilities such as SQL injection, cross-site scripting (XSS), and cross-site request forgery (CSRF).
- **Scalability:**

- The system must be able to handle a concurrent user base of at least 10,000 students and 1,000 professors without performance degradation.
- The database architecture should be designed to accommodate increasing data volumes, especially with the future implementation of multi-tenancy.
- **Usability:**
 - The user interface must be intuitive and easy to navigate for both students and professors, with clear labeling and consistent design.
 - The platform should provide helpful guidance and tutorials to assist users in utilizing its features effectively.
- **Reliability:**
 - The platform should maintain an uptime of 99.9%.
 - Comprehensive error handling and logging mechanisms should be in place to quickly identify and resolve issues.
- **Accessibility:**
 - The platform must comply with Web Content Accessibility Guidelines (WCAG) 2.1 Level AA to ensure it is accessible to users with disabilities.

13. Key Performance Indicators (KPIs) & Success Metrics

The success of Edupro's enhancements will be evaluated using the following KPIs and success metrics:

- **Student Engagement:**
 - Target: 30% increase in active student users within 6 months of launch.
 - Target: Average session duration of 15 minutes per student.
 - Metric: Rate of personalized report generation (e.g., 80% of active students generate a report monthly).
- **Learning Effectiveness:**
 - Target: 10% improvement in student assessment scores (pre- and post-Edupro usage).
 - Metric: Student satisfaction with AI feedback (measured via surveys, target: average rating of 4/5).
- **Professor Efficiency:**
 - Metric: Number of questions generated by AI per professor per month.
 - Target: 20% time saved on study plan creation (estimated via professor feedback).
 - Metric: Professor satisfaction with AI tools (measured via surveys, target: average rating of 4/5).
- **Technical Performance:**
 - Target: System uptime of 99.9%.
 - Target: Average API response time under 2 seconds.

14. Release Plan & Phased Rollout

The release of new edupro.ps features will follow a phased rollout strategy to manage complexity, gather user feedback, and enable rapid iteration.

14.1 Phase 1: MVP Launch

- Focus: Core AI enhancements for students, including level assessment, weakness/strength identification, and basic reports. Initial professor tools for AI-assisted question generation may be included.
- Objective: Validate core AI functionality and gather initial user feedback.

14.2 Phase 2: Expanded Professor Tools & Refined Reporting

- Focus: Expand professor tools to include AI-assisted study plan development. Refine student reporting based on initial feedback. Introduce early microlearning concepts (e.g., content tagging).
- Objective: Enhance professor utility and refine student support mechanisms.

14.3 Phase 3: Advanced AI & Multi-Tenancy

- Focus: Incorporate RAG Agent AI for improved accuracy. Implement multi-tenant database architecture.
- Objective: Enhance AI capabilities and prepare the platform for scalability and broader adoption.

This phased approach allows for continuous monitoring, evaluation, and refinement of the platform, ensuring alignment with user needs and optimal performance at each stage of development.

15. Risks & Dependencies

The successful development and deployment of the enhanced edupro.ps platform are subject to certain risks and dependencies, which require careful management and mitigation strategies.

- **Technical Challenges with AI Integration:** Risk of inaccuracies or limitations in AI-driven features (assessment, content generation). Mitigation: Rigorous testing, prompt engineering refinement, and fallback mechanisms.
- **Data Privacy Concerns:** Risk of violating student data privacy regulations. Mitigation: Implement strict data anonymization and security protocols, ensuring compliance with relevant laws.
- **User Adoption Rates:** Risk of low adoption rates among students or professors. Mitigation: Conduct user research, provide comprehensive training, and offer incentives for early adoption.

- **Dependency on External APIs (ChatGPT):** Reliance on third-party API availability and performance. Mitigation: Establish service level agreements, monitor API performance, and explore alternative AI providers.
- **Internal Team Availability:** Dependency on the availability of developers, designers, and QA engineers. Mitigation: Implement resource planning and cross-training to minimize disruptions.
- **Server Infrastructure Readiness (Injazat):** Dependency on Injazat servers for adequate performance and stability. Mitigation: Collaborate closely with Injazat, conduct load testing, and establish clear communication channels.

16. Assumptions & Constraints

The following assumptions and constraints are critical to the planning and execution of this project.

Assumptions:

- Continued availability and stable performance of the ChatGPT API.
- Sufficient computational resources will be available on the Injazat server.
- Students and professors will be receptive to adopting the new AI tools.
- Ongoing access to relevant domain knowledge for AI model training.

Constraints:

- Budget limitations that may impact feature scope or technology choices.
- A fixed project timeline influences development priorities.
- Reliance on specific technologies (Laravel, Filament, MySQL, Blade).
- Compliance with data privacy laws in Palestine or relevant regions, which may restrict data collection and usage.

17. Appendices & Glossary

This section serves as a placeholder for supplementary materials. It would typically contain a Glossary of Terms, defining specific technical or educational jargon used in the document, and a References section, listing any external documents, research, or specifications cited. For the purposes of this document, these detailed sections are not populated but would provide additional context and resources in a complete product requirements document.