Design And Construction of Project Based Learning Media Using The Addie Method

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Abstract. Education serves as the cornerstone for life's foundation due to its significant role in fostering change. It is considered a crucial process for achieving balance and perfection in individual and societal development. This balance ensures high-quality education. Effective dissemination of teaching materials is essential in the learning process. Educators must employ creativity to make learning materials engaging and easily comprehensible. Learning media are intermediaries that aid teachers in conveying educational content effectively. The Project-Based Learning (PjBL) model is particularly apt for developing students' critical thinking skills to address contextual problems. PjBL emphasizes problem-solving, communication, material comprehension, and self-regulation. This student-centric model transitions from passive to active learning, fostering problem-solving capabilities. This study focuses on designing and implementing a system using appropriate software development methodologies, resulting in a user-friendly, responsive platform that supports student-teacher interaction and collaboration.

Keywords: *learning media, design, project-based learning, PjBL.*

1 Introduction

Education is a fundamental cornerstone in life because it plays a critical role in facilitating change. It is considered a necessary process for achieving balance and perfection in the development of individuals and society, leading to high-quality education. Improving educational quality can be approached both quantitatively and qualitatively and can be accomplished progressively [1].

Various methods exist for delivering teaching materials during the learning process. Educators need to be creative in presenting these materials to ensure they are interesting, enjoyable, and easily understood by students. Learning media are defined as tools used to assist teachers in conveying educational content effectively. These tools can stimulate students' thoughts, feelings, focus, and will, thereby enhancing the learning process, whether intentionally or unintentionally. Learning media positively impact behavior and attitudes, fostering creativity and dynamism. They are crucial for increasing students' motivation and interest in learning, improving comprehension, making materials more engaging, and condensing information [1].

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The Project-Based Learning (PjBL) model is ideal for fostering students' critical thinking skills necessary to solve real-world problems. PjBL is a teaching approach that emphasizes problem-solving, communication, material comprehension, and self-regulation skills. This student-centered model transitions from passive information reception to active engagement in developing problems and solving them [2]. The PjBL model follows a specific sequence: (1) orient students to the problems they face; (2) organize students into learning groups; (3) guide group investigations; (4) present results; and (5) analyze the outcomes [3].

This research focuses on designing and implementing a system using the appropriate software development methodology. The goal is to create a responsive, user-friendly platform that supports interaction and collaboration between students and teachers. This research aims to contribute positively by providing technological solutions that address the needs and challenges of contemporary education. It seeks to offer practical and conceptual guidance for developing web-based learning platforms, particularly in implementing the PjBL model. A deeper understanding of technology's potential to support learning underpins this research. The main problem this study addresses is the outcome of designing and constructing project-based learning media using the ADDIE method.

2 Literature

2.1 Learning Platform

According to [4], the true essence of learning media involves managing classroom materials, which includes organizing space or learning resources to convey and store various types of content such as text, audio, video, images, graphics, and links accessible to students. The primary objective is to provide easy, structured, and efficient access to learning materials, ensuring they align with learning objectives. Personalization and adaptation are crucial aspects of modern learning media. With technology, learning content can be customized to meet individual students' needs, allowing them to access materials in formats that match their ability level, interests, and personal learning style. This personalization enhances student competence and engagement in the learning process. Learning media can significantly improve teaching and learning activities in the classroom. When communication relies solely on oral methods without media support, students remember about 70% of the material within three hours. However, when visual media is used alone, retention increases to approximately 72%. When visual media is combined with oral communication, students' memory retention soars to around 85%.

2.2 Project-Based Learning

According to [5], project-based learning, also known as Project Based Learning (PjBL), is a method that centers on students by presenting them with problems that encourage collaboration in solving complex and unstructured issues. This approach helps students understand academic concepts and apply their knowledge to develop solutions. The Project Based Learning approach will engage students in inquiry, exploration, and collaboration in the context of real projects. PjBL involves students in inquiry, exploration,

and collaboration through real-world projects. Implementing this approach can foster consistent learning habits, increase student involvement, and stimulate creativity in the learning process [6]. As illustrated in Figure 2.1, according to [7] project-based learning follows a unique series of processes that set it apart from other learning models.

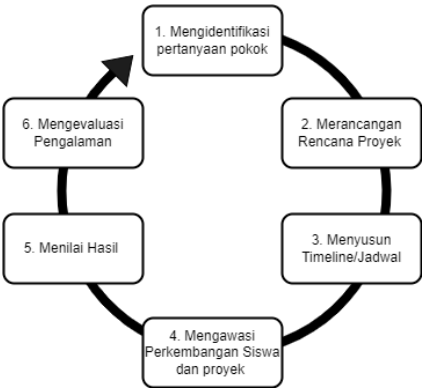
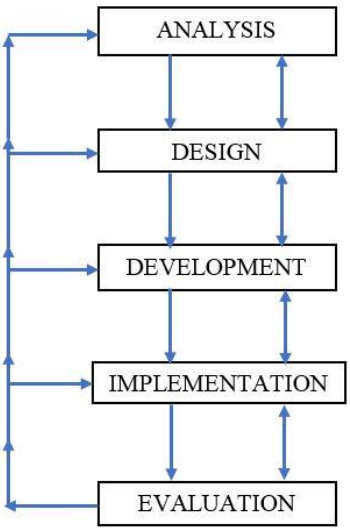


Fig. 1. Project Based Learning Stage Syntax

3 Methodology

3.1 ADDIE

The ADDIE Development Model, as its name indicates, comprises five stages of development: Analysis, Design, Development or Production, Implementation or Delivery, and Evaluation. Developed by Dick and Carey in 1996, it is used for designing learning systems.



In the ADDIE development research model, the first step is to analyze the necessity of creating new products (such as models, methods, media, or teaching materials) and to assess their feasibility and requirements. This development often stems from identifying issues in existing products that may no longer meet the needs of the target audience, learning environment, technological advancements, or student characteristics. The design phase in the ADDIE model involves systematically crafting the concept and content of the product. Detailed plans and clear instructions for implementing the product design or manufacturing process are created at this stage. These conceptual designs then form the foundation for the next phase. In the development phase, the previously conceptualized product designs are brought to life. This involves creating a tangible product ready for implementation, along with developing instruments to measure the product's performance. The implementation phase involves applying the product as per the designed plan to gather initial feedback. This feedback, obtained through questions related to the product development objectives, helps in understanding the product's effectiveness. The evaluation stage involves gathering feedback from product users to make necessary revisions based on the evaluation results or unmet needs. The ultimate goal of this stage is to measure the success of the development objectives, ensuring the product meets its intended purpose.

4 Results and Discussion

4.1 User Access

Creating a use case diagram involves designing a visual representation used to analyze and plan a system by illustrating the interactions between various actors. In this study, the actors include students, teachers, and administrators. The use case diagram is shown in Figure 3, and the description of users and their activities is detailed in table 1.

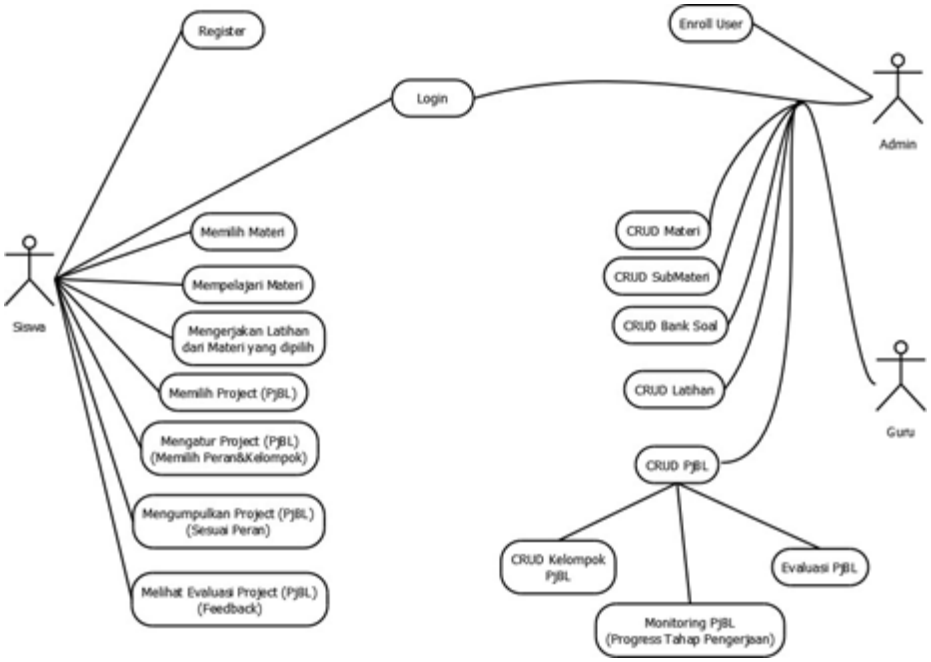


Fig. 3. Activity flow of analyze and design.

Table 1. Use case definition.

Use Case	Actor Action	System Response
Register	Users register if they do not have an account	The system performs credential validation for the registration process
Login	After the user has registered, the user carries out the login process	The system validates credentials for the login process
Selecting Materials	After the user (student) has completed the login process, the user can immediately check what materials can be studied and select the materials to be studied	
Studying the Material	User (student) enters the material he wants to study	The system checks whether the user has completed all the selected material
Do exercises from selected material	Users (students) who have been validated by the system can immediately work on the exercises	The system checks the exercises that have been completed by the user

Selecting a Project (PjBL)	After all the exercises have been completed, the user (student) can continue to select the PjBL project	
Managing Project (PjBL)	After the user (student) selects a project, the user sets up the PjBL project role and selects the project group	The system saves the settings that have been made by the user (student)
Collecting PjBL Projects according to role	After that, the user (student) collects assignments according to the previously selected role to be assessed	The system stores assignments that have been collected by users (students)
Viewing PjBL Project Evaluation	After the assignment is assessed, the user (student) can see feedback from the project submission	The system displays feedback on tasks that have been submitted
Enroll User (Admin)	Specifically for admin roles, you can perform CRUD on user roles (students/teachers)	The system performs CRUD on users according to the role entered by the admin
CRUD Material (Admin/Teacher)	After the admin/teacher logs in, the admin/teacher can immediately perform CRUD on the material	The system performs CRUD data storage of materials
CRUD SubMaterial (Admin/Material)	After the admin/teacher logs in, the admin/teacher can immediately perform CRUD on sub-materials	The system performs sub-material data storage
CRUD Question Bank (Admin/Teacher)	After the admin/teacher logs in, the admin/teacher can perform CRUD questions & answers in the form of essays or multiple choice	The system stores data on essay or multiple-choice questions
CRUD Exercises (Admin/Teacher)	After the admin/teacher logs in, the admin/teacher can perform CRUD exercises and can input essay or multiple choice questions & answers in the exercises	The system stores practice data along with questions and answers that have been entered
CRUD PjBL Group (Admin/Teacher)	After the admin/teacher logs in, the admin/teacher can perform CRUD for the PjBL Group starting from how many groups are in the project and their roles in the project	The system stores PjBL group data

PjBL Monitoring (Admin/Teacher)	Admin/Teachers can also check the progress of the projects that have been completed with users (students)	
PjBL Evaluation (Teacher)	Specifically, the teacher role can provide feedback for each project assignment that has been collected	The system performs transactions on feedback data provided by teachers for each project assignment that has been collected

4.2 User Interface

The user interface (UI) serves as the medium through which a program and its users communicate, facilitating easier interaction with the program. This interface can take various forms, such as screens (layouts), keyboards, and mice, allowing users to engage with applications or websites. The following figures illustrate the user interface design for PjBL-based learning media.

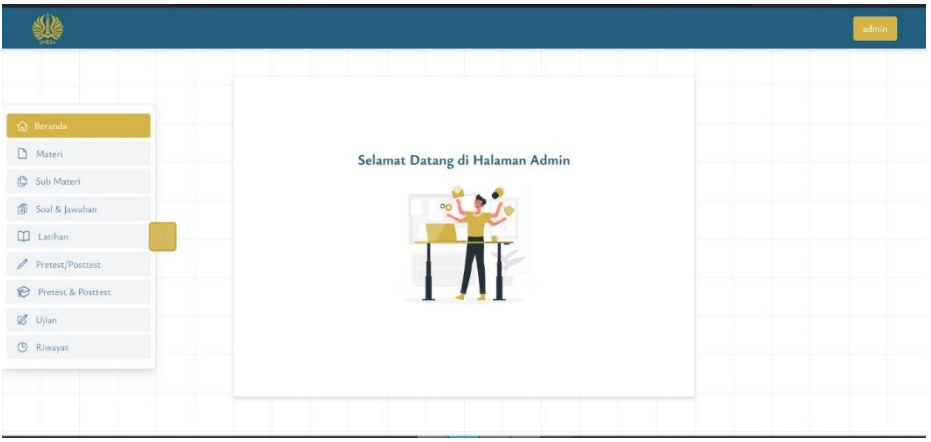


Fig. 4. Dashboard page

Fig. 5. Project-based page-timeline

Fig. 6. Project-based page-task

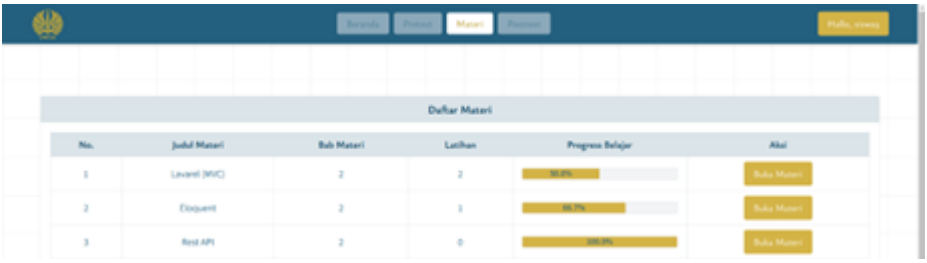


Fig. 7. Project-based page-monitoring

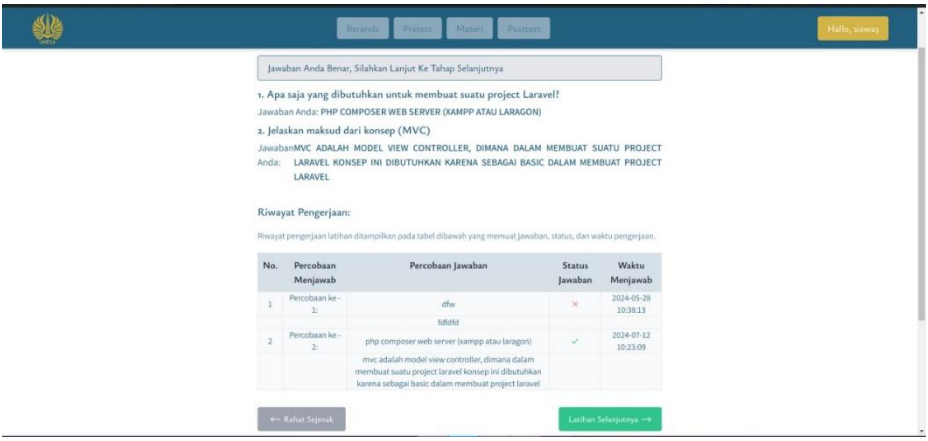


Fig. 8. Project-based page-evaluation

8 Summary

Website-based learning media products are created using Visual Studio Code with PHP version 8.2 and above, along with support from React.js and the Laravel framework. MySQL is utilized for the database system, and XAMPP is used for the local server. The development of this learning media adheres to the Research method and the ADDIE model. Future research can explore alternative methods for development. Additionally, a focus on disability components should be incorporated to align with the Mission of the Ministry of Education, Culture, Research, and Technology, which aims to achieve high-quality, equitable, and sustainable education supported by infrastructure and technology. To further the objectives of the Ministry, which include expanding access to fair and inclusive quality education for students, research must focus on the preparedness of Indonesian Education to provide fair and inclusive services.

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