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DEVELOPMENT OF PROJECT-BASED LEARNING HYBRID MODULES TO SUPPORT THE INDEPENDENT LEARNING CURRICULUM

Sukidin¹, Linda Fajarwati², Senny Weyara Dienda Saputri², Choirul Hudha³ and Putri Wulandari⁴

¹Social Science Education Department
Universitas Jember
Sukidin.fkip@unej.ac.id

²Special Education Department
Universitas Jember
Lindafajarwati@unej.ac.id

³Early Childhood Education Department
Universitas Jember
senny.fkip@unej.ac.id

⁴Economic Education Department
Universitas Jember
choirulhudha@unej.ac.id

⁵Economic Education Department
Universitas Jember
putriwulandari@unej.ac.id

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ABSTRACT

This study aims to produce hybrid vocational learning modules using the PjBL model. This study applies the Research and Development method with the ADDIE model, which at this stage has been implemented to develop LMS features to accommodate Project-Based Learning, namely module creation, discussion forums, student worksheets, and virtual classrooms. The LMS was tested by teachers and students at SMKN 1 Jember. Based on the results of a questionnaire distributed to teacher and student respondents, it was found that the feasibility of the LMS was rated 95.75% by teachers and 95.75% by students. The advantages of the LMS as assessed by teachers were its speed, relevance, and benefits, especially for learning efficiency and effectiveness. Meanwhile, from the students' perspective, the advantages were that the LMS could improve efficiency and develop learning services. The main weakness complained about was the reliability of the system because there were still several bugs and process failures due to network problems. Data security was also a concern for teachers, while students were more concerned about the ease of understanding the system.

KEYWORDS: Project-based learning; learning media; hybrid modules.

1. INTRODUCTION

Along with the formation of the Directorate General of Vocational Education as a separate structure within the organizational structure of the Ministry of Education, Culture, Research, and Technology, efforts to revitalize vocational education continue to be made. One of these efforts is to strengthen the concept of link and match between vocational education and the business and industrial world (DUDI) through alignment programs, improvement of performance-based curriculum (OBE), and the Vocational Center of Excellence program in vocational schools (<https://ditpsd.kemdikbud.go.id>, 2021; <https://vokasi.kemdikbud.go.id>, 2020). The OBE curriculum implemented by SMK is aimed at achieving the following competency standards: a) preparing students to become members of society who are faithful and devoted to God Almighty and have noble character, b) instilling character based on the values of Pancasila, c) skills to improve student competence so that they can live independently and pursue further education in accordance with their profession (Government Regulation Number 4 of 2020 concerning Amendments to Government Regulation Number 57 of 2021, concerning National Education Standards). The ultimate goal of this curriculum is to improve the quality of human resources absorbed into the world of work at home and abroad, continue their studies, and become entrepreneurs. In this curriculum, project-based learning carried out in real life in the business and industrial world is the main learning method. This is in accordance with the mandate of the Director General of Vocational Education that the project-based learning model will be a compulsory subject in vocational schools to be implemented for 3 semesters (www.tribunews.com, May 17, 2022).

Project-Based Learning is a learning model that emphasizes the inquiry process in completing specific project tasks (Hamidah et al., 2020). This PjBL model applies learning steps starting from topic selection, problem determination, project design to solve problems, preparation of an implementation timeline, project completion, to evaluation. Specifically for vocational schools, Jalinus et al. (2017) suggest seven steps for implementing PjBL that resemble the implementation of projects in the industrial world, namely (1) formulating the expected learning outcomes or results, (2) understanding the concepts in the learning material, (3) skills training, (4) designing the project theme, 5) preparing a project proposal, 6) implementing the project, and 7) presenting the results. The development of ICT technology has brought about the digitization of education, including the use of various internet-based applications as learning tools.

Hybrid learning is learning that combines face-to-face learning and online learning (Olapiriyakul & Scher, 2006; Verawati & Desprayoga, 2019). In hybrid learning, teachers and students can still carry out face-to-face learning if conditions allow or if it is considered to be much more effective than if it were carried out virtually. Hybrid learning also requires the use of computers, laptops, or smartphones as the main medium of interaction with both teachers and learning resources in the system. The existence of a Learning Management System as a supporting component also requires the internet as a prerequisite for learning interactions.

The advantage of hybrid learning is that it is effective and efficient (Gultom et al., 2022). Hybrid

learning has high flexibility and adaptability in terms of learning time, the diversity of learning resources provided, and the arrangement of group and individual activities, thereby facilitating different learning styles for students. Students can also develop various social and technological skills, two of which are difficult to obtain when using face-to-face or online models. Hybrid learning can also cut costs such as transportation, accommodation, and others, making learning more efficient.

A module is a unit of learning material that students can study independently (pusdiklat.personas.go.id, 2022). It contains clear components and instructions so that students can follow them sequentially without the intervention of a teacher. Modules are also packaged systematically and attractively with materials, methods, and evaluations that students can use independently to achieve the expected competencies. Modules have several characteristics, including (1) they can be studied independently by anyone, (2) learning objectives are specifically formulated based on behavior, and (3) they open opportunities for students to progress continuously according to their respective abilities. (4) Independent learning teaching packages open opportunities for students to develop themselves optimally, (5) they have sufficient information capacity. The association, structure, and sequence of learning materials are systematically organized so that students learn spontaneously, and (6) there are clear instructions with integrated evaluations at the end of each learning session (Rahmawati et al., 2019; Tribelas & Almunawaroh, 2020). These characteristics are inherent and serve as indicators of a good module.

In hybrid learning, teaching modules are needed to help students learn the material independently. In this process, important topics can be discussed and practiced further in face-to-face meetings with teachers. So far, learning modules in hybrid learning tend to be developed on a web-based platform (e.g., Origenes, 2022) and e-modules in the form of digital resources (Rusmanto & Rukun, 2020). No hybrid learning modules have been found that are integrated into a Learning Management System.

Project-Based Learning (PJBL) is a learning model that emphasizes the inquiry process in completing specific project tasks (Hamidah et al., 2020), or in other words, using project tasks as an effort to solve an essential problem. The PJBL model generally applies the following learning steps: 1) selecting topics and learning objectives, 2) studying materials related to the topic, 3) formulating important questions as the focus of the project, 3) designing projects to solve problems, 4) compiling an implementation timeline, 5) completing projects, 6) assessing projects, and 8) evaluating projects in the form of reflection and feedback. Specifically in vocational schools, Jalinus et al. (2017) suggest seven steps for implementing PBL that resemble project implementation in the industrial world, namely 1) formulating the expected learning outcomes or results, 2) understanding the concepts in the learning material, 3) practicing skills, 4) designing the project theme, 5) preparing the project proposal, 6) implementing the project, and 7) presenting the results. This PjBL model is useful in improving learning outcomes in vocational education, according to a meta-analysis conducted by Fadhillah et al. (2021). The online implementation of PjBL also shows high effectiveness as long as the digital modules are well developed (Laili et al., 2019).

2. RESEARCH METHOD

This research design adopts the development model from Molenda and Reiser (2003), namely the ADDIE model. This model consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. This model was chosen based on the assumption that the stages in this model are arranged systematically, making it easier for researchers to carry out each stage.

The analysis stage is the process of defining the hybrid learning system in vocational education. At this stage, researchers identify the requirements for system development. The things to be identified are learning content, learning methods, and learning assessment. The output of this stage is the components of the hybrid learning system.

The design stage is the process of packaging the system components into a more structured form to facilitate the researcher in the development process. This stage is carried out by creating a design on paper in the form of a flowchart. The development stage is carried out by implementing the flowchart to create a complete system. The output of this stage is a hybrid learning system that complies with system development rules and is ready to be implemented. The implementation stage is the process of turning the system design into an actual system. Thus, the output of this stage is a hybrid learning system that is ready to be tested. The evaluation stage is the process of assessing whether the system that has been created has fulfilled the objectives for which it was created. The evaluation is carried out by testing the system in real conditions. The system will be tested at SMKN 1 Jember. The output of this stage is user feedback and a list of system errors (bugs), which are then used as a reference for system improvements.

The results of the modifications to these stages can be seen in the following figure:

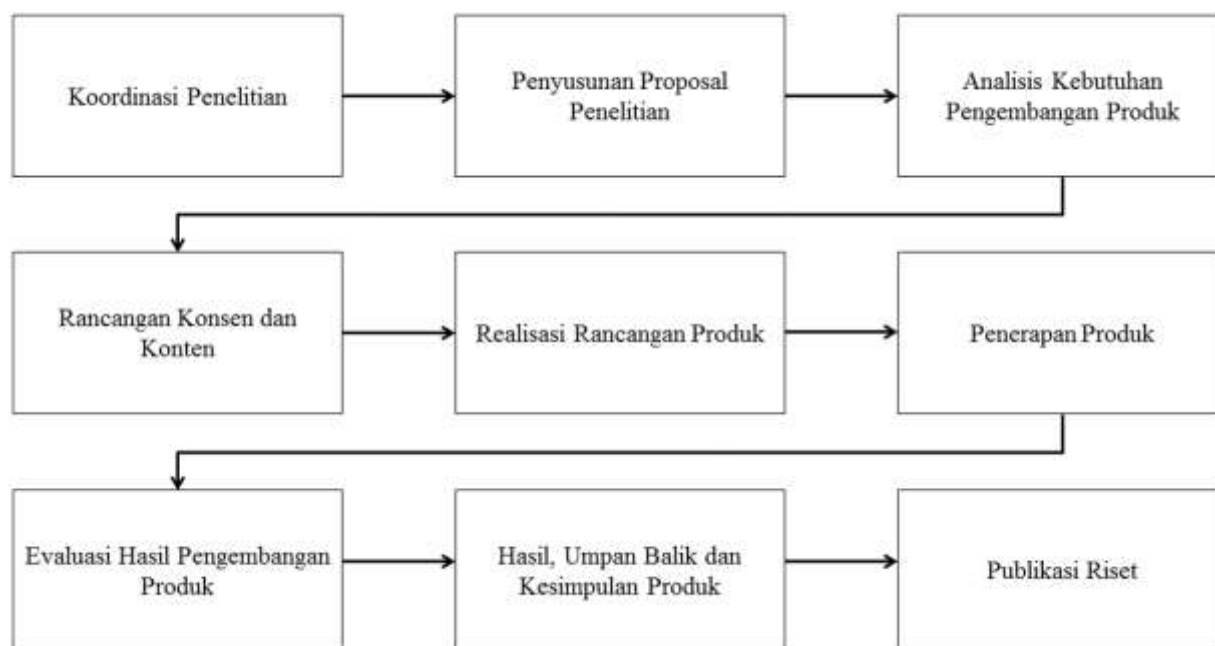


Figure1. Research Design

Data collection for this research was carried out through observation, interviews, documentation studies, and questionnaires, which were conducted in an integrated and complementary manner. Observations were made to gather information related to the real problems faced by the partner, SMKN 1 Jember, which would then be resolved through the creation of a hybrid learning system. Interviews were conducted to gather information from potential users regarding system content requirements. Documentation studies were conducted to examine literature related to system content. Meanwhile, questionnaires were administered during system validation by both experts and users

3. RESULTS AND DISCUSSION

This study used Research and Development with the ADDIE model. At the analysis stage, this study conducted a Focus Group Discussion on June 13, 2023, at SMKN 1 Jember. The focus of the FGD was to explore the implementation of Project-Based Learning at SKMN 1 Jember and the need to develop an LMS created by the research team to accommodate hybrid learning at the school.

The results of this analysis stage showed that Project-Based Learning at SMKN 1 Jember in the even semester of 2022/2023 was carried out offline considering that the Covid-19 pandemic status had been revoked, so learning was carried out offline again. However, teachers felt that it would be helpful if learning could be carried out in a hybrid manner, especially during the process of coaching students at their respective practice locations. The LMS developed by the research team still requires several features to implement the hybrid PJBL stages, namely an upload module menu, features to facilitate online discussions, a Student Worksheet (LKPD) menu, and a virtual classroom feature for delivering learning materials needed by students to complete their assignments. During the design and development phase, this research added the necessary features to implement the hybrid PJBL learning module. As a follow-up to the design phase, a limited test was conducted with 10 students and 4 teachers at SMKN 1 Jember. The results of the product can be seen in the following table.

Table1. Test the LMS			Limited Results of
	4. Flexibility	95	-
	5. Security	70	80
	6. Completeness	95	90
	7. Relevance	100	90
	8. Accuracy	90	-
	9. Precision	95	-
	10. Ease of understanding the system	95	72
	11. Developer responsiveness	80	-
	12. Data security guarantee	80	-
	13. Developer attention to user needs	90	-
	14. Likelihood of application implementation	90	-
	15. Benefits	100	92
	16. Supports learning	-	82
	17. Satisfaction	90	80
	18. Added value to facilitate work/learning	100	88
	19. Added value for providing information	85	84
	20. Added value for increasing productivity	95	-
	21. Added value to improve effectiveness	100	-
	22. Added value to develop learning services	100	94
	23. Added value for learning efficiency	-	92
	24. Added value for helping to master learning	-	86

25. Eligibility score	95.75	90.43
26. Category	Valid	Valid

Based on the results of the questionnaire distributed to teacher and student respondents, it was found that the suitability of the LMS was rated by teachers at 95.75% and by students at 90.43%. These results indicate that both teachers and students consider the LMS suitable for implementation. The advantages of the LMS as assessed by teachers are its speed, relevance, and benefits, especially for learning efficiency and effectiveness. Meanwhile, students consider the advantages to be the LMS's ability to improve efficiency and develop learning services.

The main weakness complained about was the reliability of the system because there were still several bugs and process failures due to network problems. Data security was also a concern for teachers, while students were more concerned with the ease of understanding the system.

4. CONCLUSION

From the research results, the LMS design required to implement PjBL is the addition of features such as modules, discussion forums, student worksheets, and virtual classrooms to accommodate online and offline learning steps in the PjBL stages.

The limited trial of the LMS among teachers and students at SMKN 1 Jember in October 2023 obtained a feasibility score of 95.75% for teachers and 90.43% for students. This shows that the LMS is feasible for implementation. Areas that need to be strengthened are system reliability, data security, and ease of understanding the system.

Recommendations for further research include fixing bugs in the system, improving data security, and simplifying the steps for using the LMS with adequate instructions and tutorials.

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