



Development of LMS-Based E-Learning for Physical Education Learning in Binjai City

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ABSTRACT

This study aims to develop an LMS-based e-learning product for PJOK learning in Binjai City. This study aims to develop an LMS-based e-learning product for PJOK learning in Binjai City. The methodology used is research and development. The sample was selected using total sampling, comprising 50 seventh-grade students from SMPN 1 Binjai's class VII. The results of the study on a small-scale trial of the level of feasibility of the learning application product 4.4 out of 5.0 are included in the "outstanding" category, which, when converted to a value for product feasibility, the product that has been tested on a small scale is declared "feasible" for use. The results of a large-scale trial of the level of feasibility of the LMS-Based E-Learning Product product are 4.4 out of 5.0, included in the "excellent" category, which, when converted to a product feasibility value, the product that has been tested in the field test is declared "feasible" to be used as an application in the implementation of physical education, sports and health learning (PJOK). The conclusion drawn from the results of both small-scale and large-scale trials in this study falls into the excellent category, indicating that the product developed by the researcher can be utilized as a solution for teaching PJOK learning based on E-Learning principles.

Keywords: E-Learning, LMS Based, Physical Education

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P-ISSN 2613-9421

E-ISSN 2654-8003

Article info

Received : 22 March 2025

Accepted : 29 April 2025

Published : 18 May 2025

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INTRODUCTION

The advancement of technology, particularly in smartphones, has made them viable as portable learning tools, enabling users to access educational content at any time and from anywhere (Humairah & Safutri, 2023). Science and technology are inherently interconnected, often leading to innovations, one of which is the smartphone. Today, smartphones have become a necessity and are widely used across various social groups. In addition to serving as tools for communication, entertainment, and gaming, smartphones are increasingly utilized for accomplishing work-related tasks. The rapid pace of technological development

One of the online learning platforms currently being developed and increasingly utilized is Google Classroom. Google Classroom is a specialized application designed for online learning that can be accessed remotely, enabling teachers to easily create, organize, and distribute assignments (Asep Suharta et al., 2024) (Matsuo et al., 2022). In addition, teachers and students can conduct learning activities at any time through Google Classroom online classes, and students can also learn, listen, read, and submit assignments remotely (Adha Septiana et al., 2020).

In light of existing challenges, the next step is to gather field-based information. Based on preliminary observations, it was found that in PJOK (Physical Education, Sports, and Health) learning, many teachers still utilize general-purpose learning platforms, such as Google Classroom, that are shared across all subjects. As a result, the researchers are motivated to develop a more subject-specific platform by adapting Google Classroom into an LMS-based e-learning system explicitly tailored for PJOK content (Abatal et al., 2024; Dedy et al., 2016). This type of development has previously been implemented at the senior high school and vocational school levels by the North Sumatra Provincial Education Office. Building upon that prior research, the present study introduces additional features, specifically, the integration of a "Self-Reflection" template designed to facilitate students' reflective learning processes. This feature aims to promote positive feedback and deeper learning outcomes from each PJOK learning session (Freddy & Olivia, 2019; Qomarrullah et al., 2023; Maya et al., 2020).

After distributing the questionnaire to respondents, the researcher processed and analyzed the collected data. The analysis revealed that 43 teachers, or 88.7%, had utilized learning application media specifically for PJOK, while seven teachers, or 11.3%, had never used such media (Raibowo et al., 2023; Ridwan et al., 2021). These findings indicate that the majority of PJOK teachers have already integrated learning applications into their classroom instruction. Furthermore, regarding the use of smartphones as a necessity in supporting teachers' needs, particularly in the learning process, the results showed that 48 teachers, or 96.8%, believed that smartphones are essential and facilitate their teaching activities. In contrast, only two teachers, or 3.2%, held a different opinion. Based on these findings, most, if

not all, teachers agree that smartphones are an indispensable tool that significantly supports teaching and learning. The importance of smartphones in education is evident, as they offer accessibility and flexibility, allowing users to engage in learning activities at any time and from anywhere, without the constraints of space or time.

To further strengthen the background of this study, the researcher conducted a preliminary investigation to explore students' perceptions regarding the use of learning applications in the learning process. The findings revealed that 43 students, or 86%, felt that the use of educational media applications made the learning experience more enjoyable and less monotonous. In comparison, seven students, or 14%, held a different view. These results indicate that the majority and nearly all of the students agreed that integrating learning media applications into the educational process contributes to a more engaging and enjoyable learning environment. The use of such applications helps to transform what is often perceived as a rigid learning atmosphere into one that is more dynamic and stimulating. Furthermore, learning applications can effectively capture students' attention, enhance their motivation, and thereby support a more effective and meaningful learning process (Bernhard et al., 2020; Mochamad et al., 2024).

In the learning process, what media makes it easier for students to use? Then there are the results of the questionnaire answers obtained by eight students, or 16% of students, using media in the form of learning applications, while as many as eight students or 16% of students, using media in the form of Google and as many as

Thirty-eight students, or 76%, use the YouTube application. These results suggest that YouTube is the most commonly chosen media platform among students to support their learning activities. This indicates a strong preference for audio-visual content that is easily accessible and engaging.

METHODS

Research and development in this process uses a quantitative approach and a Research and Development (R&D) research design (Sugiyono, 2023). The development aims to produce products based on the findings from field tests. From the explanation above, development is an effort that is carried out consciously, planned, and directed to create or improve an increasingly valuable product, thereby

enhancing quality to create better products. The technique used for selecting subjects in this study is total sampling. The reason for using total sampling is that, according to Okpatrioka (2023) and Rustamana et al. (2024), the population is less than 100, making it the subject of all research.

Technique Analysis data that is done in research using numbers. The Percentage is intended to determine the status of something presented and served remains a percentage.

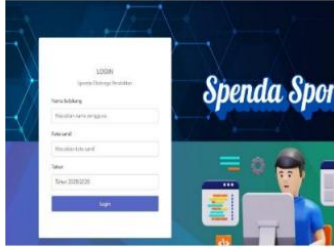
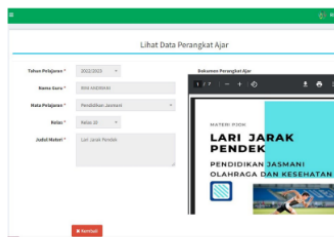
RESULTS AND DISCUSSION

This study aims to develop LMS-based E-Learning to support Physical Education, Sports, and Health (PJOK) learning at the Junior High School (SLTP) level in Binjai City. This application is designed to facilitate online interaction between teachers and students, enabling the efficient delivery of materials, assignments, and evaluations. The development process follows the Waterfall model, which consists of the following stages: (1) Needs Analysis: Identifying the needs of users, including both teachers and students, in the context of PJOK learning. (2) System Design: Designing an intuitive user interface and essential features, such as material management, assignment distribution, and evaluation tools. (3) Implementation: Developing the application using the PHP programming language along with a supporting database system. (4) Testing: Conducting trials to ensure the system's functionality and identify any limitations or issues. (5) Maintenance: Implementing continuous improvements and system updates based on user feedback and experience.

The concept of the Learning Management System originates from the broader framework of e-learning. E-learning emerged from the need for educational content and training tools that are affordable, easily accessible, user-friendly, dynamic, and collaborative. E-learning platforms offer an internet-based infrastructure that facilitates learning through various interactive and participatory methods. The integrated, digital LMS-based e-learning product developed in this study represents just one of many learning applications currently available. Specifically, this study focuses on the development of a web-based Learning Management System (LMS) application for Physical Education learning at the junior high school level. This application is intended to enhance the teaching and

learning process in PJOK by providing a structured, accessible, and interactive digital learning environment.

Table 1. Website-Based E-Learning Management System (LMS) Application Product for Physical Education Learning

Appearance	Description
	<ul style="list-style-type: none"> • The writing Spenda Sport Edu has its own philosophical meaning for researchers, namely "Spenda" of SMP Negeri 2 school, "Sport" means sport, "Edu" means education. • Username is the name of the account owner when registering • Password standardized namely 12345 to make it easier for users as a reminder. • The year filled with the current learning year is adjusted to the school situation. • Login in the blue box located at the bottom right, for users who have registered on the Spenda Sport Edu application.
	<p>Device View when clicked will display View teaching device data as shown in the image next to it, which consists of:</p> <ul style="list-style-type: none"> • Academic year 2025/2026 • The name of the teacher Sri Wahyuni Retno Ningsih is according to the owner of the application account • Physical Education Subject Class 7 • The title of the short distance running material is in accordance with the material filled in the application and which is selected. • Side right there Display of teaching device documents, which students can access by downloading them. read And studied. • Red box below there is X menu delete

Individual trial (one to one)

This trial involved three participants, specifically students from Class VII of SMP Negeri 2 Binjai. The assessment of the website-based physical education, sports and health (PJOK) learning application product by students was carried out online using a Google Form questionnaire; previously, students were given a web link to access the application file and then filled out the assessment sheet with a scale of 1-5, students carried out the process of filling out the assessment sheet online via Google Forms. The results of the individual testing (one to one) by three (3) students on the LMS-Based E-Learning Product product. Through the table below, the results of individual testing involving three students help us know the level of feasibility of the LMS-Based E-Learning Product product Website. This information was obtained from the first student who assessed the software aspect

of 4.0, with an average value of 4.0. When converted according to the value conversion table, the average result falls within the "good" category, with a value of 4.0. In the learning design aspect, the score is 4.8 in the category "Very Good," and in the visual communication aspect, the score is 4.6 in the category "Very Good".

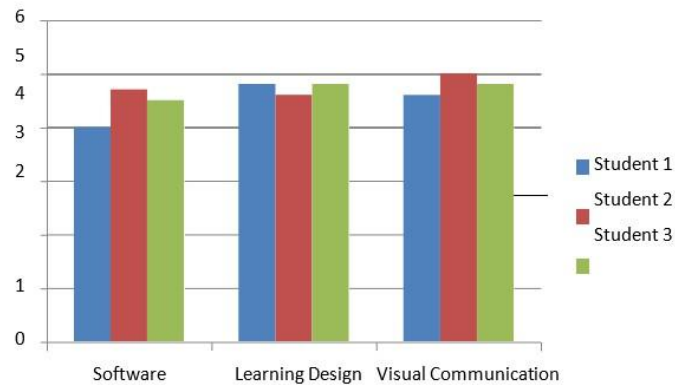


Figure 1. One to One Trial (Individual)

Based on the results of individual testing, the LMS-based e-learning product received an average score of 4.6 out of 5.0. When converted using the feasibility rating scale, this score falls into the "Very Good" category. Therefore, the LMS-based e-learning product is "considered feasible" for use in supporting PJOK learning.

Small Scale Trial

The implementation of the small-scale trial involved five (5) subjects, namely class VII students of SMP Negeri 2 Binjai. The assessment of the E-Learning Product is still carried out online by students through the shared forum.

Table 2. Small Scale Trial Score Acquisition

Student (S)	Average Score of Each Aspect			Total Mean
	Software Design	Learning Design	Visual Communication	
S1	3,5	4,6	4,8	4,3
S2	4,2	4,3	4,4	4,3
S3	4,7	4,2	4,0	4,3
S4	4,5	4,6	4,8	4,6
S5	4,2	4,2	4,8	4,4

Through Table 2. The results of a small-scale trial involving five (5) students were obtained to determine the level of feasibility and practicality. Information was

obtained from the LMS-based e-learning product. Students were asked to assess each aspect to determine the level of suitability of the LMS-Based E-Learning Product. Website, the average score results for each aspect are as follows: 1) software design aspect, in the software aspect, the average score obtained from 1 (S1) is 4.7, which is included in the "excellent" category, student 2 (S2) with an average score of 4.7 which is included in the "excellent" category, student 3 (S3) with an average score of 4.7 in the "excellent" category, student 4 (S4) with an average score of 4.5 in the "very good" category, student 5 (S5) with an average score of 4.2, the category "Excellent".

Large Scale Trial

The implementation of the field trial will involve all students of grade VII as representatives for junior high schools. The researcher took a sample of 4 schools, namely SMP Negeri 2 Binjai, SMP Negeri 7 Binjai, SMP Negeri 9 Binjai, and SMP Negeri 12 Binjai, with a total of 4 schools, where each school consisted of 1 class as a representative. The aspects used as assessment indicators for students participating in the field trial or large trial are the same as those used in the aspects of individual trials and small-scale trials. The following is a description of the data obtained from the implementation of the field trial on the feasibility of LMS-based e-learning products.

Table 3. Field Trial / Large Trial Scores Obtained

Student (S)	Average Score of Each Aspect			Total Mean
	Software Design	Learning Design	Visual Communication	
S1	4,3	4,3	4,5	4,3
S2	4,5	4,2	4,5	4,4
S3	4,0	4,4	4,4	4,2
S4	4,0	4,4	4,4	4,2
Amount	4,3	4,5	4,5	4,2

According to Table 3, the results are presented. Assessment of students in each school in the large trial field trial that: the total number of average scores in each aspect, 1) the software design aspect got an average score of 4.3, which is included in the "excellent" category; 2) the learning design aspect got an average score of 4.3, which is included in the "excellent" category; 3) the visual communication aspect got a score of 4.5, which is included in the "excellent" category. Illustration

of the data generated in the field trial of the LMS-Based E-Learning Product product for physical education, sports and health (PJOK) by each student is depicted in the following figure:

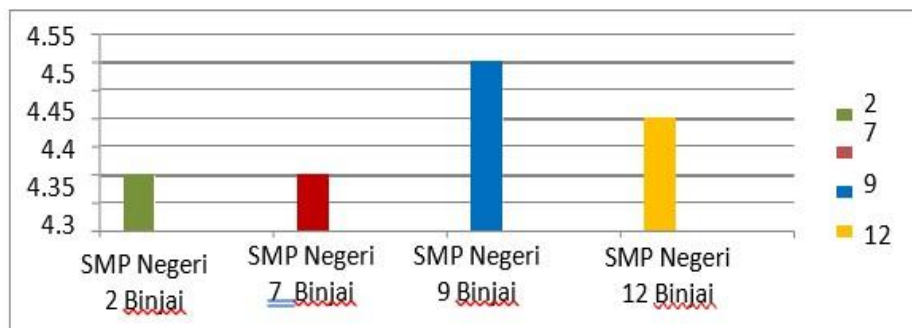


Figure 2. Results of Field Trials of LMS-Based E-Learning Products

Overall, the results of student assessments for each Schools in the large trial field trial, which was attended by four schools, namely SMP Negeri 1 Binjai, SMP Negeri 6 Binjai, SMP Negeri 8 Binjai, and SMP Negeri 14 Binjai, with a total of four schools, regarding the level of feasibility of LMS-based e-learning products. is 4.4 out of 5.0 is included in the "excellent" category, which, when converted into a product's suitability value, shows that the product has been tested in field trials, specified "suitable" to be used as an application in the implementation of physical education, sports and health (PJOK) learning.

The quality of the website-based e-learning application development management system (LMS) is classified as "feasible" based on evaluations from three expert reviewers: media and IT experts, subject matter experts, and practitioner experts. The results of both small-group and large-group trials further support this assessment. Students reported feeling happy and enthusiastic about the product, mainly due to increased interest and motivation to learn, particularly in the PJOK subject, which is expected to have a positive impact on learning outcomes. These positive responses indicate a potential for broader dissemination of the product among other student groups. While the product demonstrates several advantages, it also presents certain limitations. One identified issue is related to the display of YouTube teaching videos, which currently appear in a fixed horizontal format. Although the videos can be switched to landscape mode by adjusting the orientation on students' smartphones, this setup may not be optimal for all users. Another limitation is that the system has not yet separated students by individual

classes; currently, all users are grouped into a single class. These limitations highlight areas for further refinement. These issues will be addressed in future development stages to improve the overall quality and usability of the product. This reflects the ongoing potential for continuous enhancement and innovation in the application.

CONCLUSIONS

The conclusion of this study, based on the results of both small-scale and large-scale trials, indicates that the developed product falls into the "Very Good" category. This suggests that the LMS-based e-learning product designed by the researcher is feasible and effective for implementing PJOK learning through e-learning platforms.

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