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Teachers' Perspectives on the Learning Management System (LMS) in Physics Subject: A Preliminary Study

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Abstract

This paper aims to explore the teachers' perspectives on the LMS in the physics learning process. The research was conducted using a descriptive quantitative method. A total of 31 science and physics teachers participated as the research sample which was determined by purposive sampling technique. Data collection was carried out using a mixed questionnaire consisting of 14 questions which were then distributed online using Google Form. Based on the findings, learning using the LMS offers many advantages, but the findings also show that there are deficiencies in terms of the internet network which has an impact on delays in incoming information to students. Then, the results of the analysis show that 100% of science and physics teachers need the application and development of LMS to make it easier for them to convey physics material so that it is more flexible, effective, and efficient. The LMS expected by the physics teacher contains features such as video conferencing, uploading files/tasks, discussion forms, quizzes, and absences, then the LMS is user-friendly, can be used without the internet, and manages grades automatically. Based on the results of data analysis, it can be concluded that teachers seek the development and implementation of LMS in physics learning.

Keywords: E-Learning; Physics And Science Teacher; Requirement; LMS

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INTRODUCTION

Science and technology progressed significantly in the twenty-first century (Syahriningsih et al., 2018; Wiyono & Zakiyah, 2019). This promotes the application of science, technology, and information findings in the field of education, particularly in teaching and learning activities (Dewantara et al., 2020; Gunawan et al., 2019). According to Susanti & Sholeh (2008), the deployment of technology-based learning is essential. It is anticipated that the use of technology in teaching and learning activities as a tool to convey, explain, and disseminate instructional materials will enhance the efficacy of learning (Gunawan et al., 2019). Using computers is one application of information and communication technology in education. E-learning can be a method of computer utilization (Al-Furqansyah et al., 2021). E-learning enables the execution of learning without face-to-face interaction

with the aid of the internet, so that it is not restricted by geography or time (Riyanti et al., 2021). During the covid-19 epidemic, the availability of e-learning expands the learning media options available to physics teachers.

The Covid-19 pandemic that struck the world in early 2019 has led all community activities, such as teaching and learning, to be conducted at home (Darmalaksana et al., 2020; Nurazri et al., 2021). During the pandemic, the Indonesian government adopted a policy mandating that teaching and learning activities be conducted via distance learning (Wiyono et al., 2020). Hence, the existence of e-learning in the field of education substantially facilitates the process of remote learning. In addition, the use of e-learning as a medium to continue the learning process is one of the best possibilities available. The existence of e-learning also makes it easier for teachers, particularly physics teachers, to provide abstract topics without compromising the substance of the subject matter (Yusuf et al., 2019). Furthermore, the use of e-learning in education can promote the exchange of diverse, interactive, and student-specific instructional materials among teachers (Astuti & Febrian, 2019). Students can also readily access instructional materials and practice questions from any location and at any time (Astuti & Febrian, 2019).

E-learning provides numerous advantages and conveniences for students in the learning process, in addition to those for teachers as educators. E-learning can facilitate student participation and activity in the learning process (Indrayana & Sadikin, 2020). Students can independently express thoughts, respond to instruction, create designs, and investigate challenges in physics (Astuti & Febrian, 2019). E-learning enhances student-teacher engagement in teaching and learning activities. Then, both the teacher and the students can share information about numerous subject-related and self-development-related topics. Thus, the development of e-learning becomes a new requirement in the implementation of learning activities in the classroom.

E-learning development is closely related to LMS. According to Larasati & Andayani (2019), LMS is an integrated, comprehensive system that serves as an e-learning platform. LMS supports its application with numerous functions, such as learning process management, topic administration, lesson material management, online evaluation and tests, chat, and discussion forums (Yauma et al., 2021). The LMS can be utilized at any time and in any location, with no frequency restrictions on the number of students and teachers participating in teaching and learning activities. Some studies indicate that the effectiveness of e-learning with various LMS tends to grow when compared to traditional learning, but the most prominent advantage is the flexibility of learning implementation on e-learning (Elcullada Encarnacion et al., 2020; Irawan & Surjono, 2018; Purwaningsih et al., 2017; Tiari et al., 2020; Yusuf et al., 2020).

Along with the development of technology and information in the 21st century, numerous open-source LMS have emerged. This means that anyone can access the LMS for free without having to pay a subscription fee (Haeruman et al., 2021). In addition to being free, open-source learning management systems are frequently utilized by educators because they are user-friendly and simple to use (Chaw & Tang, 2018). Running an LMS is comparable to utilizing social media in daily life, allowing students to use and access the LMS easily.

Prior studies identified the usage of LMS in the physics learning process, but the LMS employed has not varied (Samsudin & Januhari, 2019; Sirwan et al., 2021; Yusuf et al., 2019). Based on the results of observations conducted,

WhatsApp and Google Classroom are the most common platforms used by teachers for remote learning, accompanied with learning media such as Student Worksheets (*Lembar Kerja Peserta Didik* or LKPD) and Power Point Presentations (PPT) (Al-Furqansyah et al., 2021; Wiyono et al., 2020). This will make it certainly challenging for students to comprehend abstract physics theories (Susilowati et al., 2022). In fact, Google Classroom is not the only open-source learning management system. Much more comprehensive and user-friendly LMSs are available for the learning process. Thus, it is crucial to develop e-learning by focusing on the features of an LMS that can suit the needs of both students and teachers during the physics learning process.

Before designing e-learning, researchers must understand teachers' goals and problems in executing the learning process utilizing LMS for physics learning. The process of transmitting physics knowledge from teachers to students becomes more flexible, effective, and efficient when the appropriate LMS is selected throughout the establishment of e-learning. The researcher will distribute questionnaires to educators to determine their perspectives. Based on the conclusions of the preceding discussion, the purpose of this research is to determine the obstacles and requirements of LMS implementation in physics subjects in schools as a preliminary study for the development of e-learning in physics learning.

METHOD

The research was conducted using a quantitative descriptive method. The focus of this research was to analyze the perspectives of science and physics teachers on the use of LMS in physics learning (Haeruman et al., 2021). This research was adapted as in Zulherman's study (2021) with some adjustments. A total of 31 high school and junior high school physics teachers were involved in this research. The sample was selected using purposive sampling, which is a sampling technique with certain considerations (Creswell & Poth, 2018). These considerations were teachers who teach physics subjects at the high school and junior high school levels. The demographic information of the sample identity is detailed in Table 1.

Table 1 Demographic information of the respondent

Variable	Category	N (%)
Gender	Woman	20 (64.52)
	Man	11 (35.48)
Workplace	Senior High School	17 (54.84)
	Junior High School	14 (45.16)
Teaching experience	0-5 years	19 (61.29)
	5-10 years	1 (3.22)
	10-15 years	3 (9.67)
	More than 15 years	8 (25.82)

Data collection was carried out using a questionnaire. The type of questionnaire used was a mixed questionnaire, which is a combination of open and closed questionnaires (Ahmad, 2021). Mixed questionnaires allow respondents to provide answers that can be adjusted to the actual situation (Hardini et al., 2022; Sugiyono, 2016). Indicators of questionnaire instruments in this survey included experience in learning physics using LMS, development needs, and obstacles to implement LMS in learning. Validity and reliability tests were conducted on the questionnaire to establish whether or not it was an appropriate research instrument (Yusup, 2018). There were fourteen questions in the questionnaire that was distributed online to teachers via *google form*.

The data analysis technique used in this research was the descriptive

statistical analysis method (Ahmad, 2021). The analysis was carried out by describing the acquired data and calculating the distribution of data by computing the average (Ahmad, 2021). The results of the open questionnaire were used as supporting data to examine the obstacles faced by teachers in carrying out the physics learning using e-learning and the elements that teachers require in the employed e-learning.

RESULTS AND DISCUSSION

The Needs of LMS Usage in Physics Learning

Based on the results of the respondent interviews, all physics teachers stated that the LMS is necessary for the learning process, especially in online physics learning. During the COVID-19 pandemic, 93.64% or 29 physics teachers agreed that the use of LMS helped them deliver interesting teaching materials. In addition, all physics teachers argue that the use of LMS in the learning process helps them improve concept understanding, critical thinking skills, creativity, communication, and collaboration among students in learning, especially in materials that require tools so that physics learning can be more real even though it is carried out online. This is in line with the results of Wiyono's research (2022) that shows the use of LMS such as Moodle in physics learning, especially in the material about wave, can improve students' communication and collaboration skills. The results of the N-gain analysis showed that students' communication skills scored 0.62 in the medium category and 0.68 in the medium category for collaboration skills. In addition, the research by Masnur & Ismail (2021) and Riyanti (2020) show that the application of LMS in the learning process is effective in improving students' critical and creative thinking skills in the medium category. However, teachers must still pay attention to the learning models and approaches used before implementing the learning process using e-learning to maximize the improvement of students' thinking skills, such as applying the STEM approach, the PjBL model, the PBL model, etc. (Riyanti, 2020).

Table 2 LMS that known by the physics teachers at school

Platform	Frequency	%
Google classroom	29	93.54
Moodle	7	22.58
Schoology	13	41.93
Edmodo	10	32.25
Chamilo	7	22.58
Canvas	14	45.16
Sakai	0	0
Blackboard	0	0
Learning House	13	41.93
Class Room	11	35.48
Sevima Edlink	2	6.45

The results of the research presented in Table 2 show information on the LMS known by physics teachers at school. There are eleven types of learning management systems that educational and non-educational institutions frequently employ. Google Classroom is a well-known LMS among school teachers, as indicated by the research finding with a percentage of 93.54 percent. Google Classroom is user-friendly, free, cloud-based, and supports several Google services and Learning Tool Interoperability (LTI), among other benefits (Iftakhar, 2018; Reddivari & Gattupalli, 2021). This is consistent with earlier study indicating that easy-to-use LMS such as Google Classroom and Schoology are more appealing to educators, since these findings will affect educators' ability to develop LMS to meet the needs of the learning process (Andriani et al., 2018; Haeruman et al., 2021). However, Google Classroom has limitations, such as the inability to insert text and images in videos (Zakaria et al.,

2021). In addition, Google Classroom does not permit writing equations directly on the given form, making it rather challenging for physics teachers to produce instructional materials that contain numerous physics and math equations (Susanti et al., 2022).

The other LMS showed based on the research findings are LMS Canvas by 45.16%, Schoology by 41.93%, Rumah Belajar by 41.93%, Classroom by 35.48%, Edmodo by 32.25%, Moodle by 22.58%, Chamilo by 22.58%, Sevina Edlink by 6.45%, Sakai and Blackboard by 0%. These ten Learning Management Systems are less well-known LMS and has not been utilized extensively in the learning process, particularly at the senior and junior high school levels. Canvas Instructure, Blackboard, Sakai, Schoology, and Moodle are utilized frequently in the learning process in developed countries such as the United States, the United Kingdom, Canada, and Australia (Fraenkel & Wallen, 2012; Turnbull et al., 2022).

Based on these findings, it is evident that teachers in Indonesia and developed countries such as the United States, the United Kingdom, Canada, and Australia have different levels of LMS expertise. This is affected by the knowledge and capacity of physics teachers at the SMA/MA and SMP/MTS levels to handle their LMSs. This perspective is reinforced by the findings presented in Table 2, which detail the LMS mastered by high school physics teachers. Google classroom is mastered by 96.7% of physics teachers compared to less than 50% for other platforms. Hence, it is necessary for physics teachers to increase their competency as educators, particularly in terms of the use of technology and information in the learning process. In order to assist the implementation of a higher quality physics learning process and improve student learning outcomes, it is undeniable that the use of technology and information is a necessity and requirement in the learning process today (Azizah et al., 2017).

Table 3 LMS that mastered by physics teachers at school

Platform	Frequency	%
Google classroom	30	96.77
Moodle	0	0
Schoology	11	35.48
Edmodo	4	12.90
Chamilo	2	6.45
Canvas	7	22.58
Sakai	0	0
Blackboard	0	0
Learning House	3	9.67
Class Room	6	19.35
Sevima Edlink	2	6.45

At the outset of the COVID-19 epidemic, the needs of physics teachers were limited to remotely delivering content to students (online). However, as time passes, physics teachers conducting teaching and learning activities require additional features in the system used to facilitate a seamless physics learning process. Table 5 demonstrates the features that physics teachers require in LMS to assist the online learning of physics.

Table 4 LMS Features

Platform	Frequency	%
Video conference	21	67.74
Capability to upload files	26	83.87
Providing discussion form	24	77.41
User Friendly	24	77.41
Providing online Quiz features	22	70.96
Providing attendance feature	22	70.96
Can be used without internet	1	3.22
Automatic scores management	1	3.22

The feature that the teachers need the most is the capacity to submit files or assignments to the LMS with 83.87 percent, followed by the availability of user-friendly discussion forms with 77.41 percent. The presence of a discussion form within the LMS facilitates the teacher's direct supervision over the learning process. Students can connect with one other through asking and responding questions (Setiono, 2021). Discussion activities are well recorded through the system so the teachers are able to observe students' participation and engagement in the physics learning process (Rizal & Walidain, 2019). In addition, the discussion form can facilitate the learning of students with auditory and visual learning preferences (Mishra et al., 2020).

Features such as the availability of online quizzes and attendance are a consideration for 70.96% of teachers when selecting an LMS, according to further findings. In addition, 3.22 percent of teachers believe that the LMS should be able to conduct automatic assessments, simplifying the learning assessment process for teachers. This will enhance the effectiveness and efficiency of the learning process, particularly during the covid-19 pandemic (Setiawan et al., 2021). Moreover, 3.22% of teachers believe that the LMS can be utilized offline. Nevertheless, the offered LMS is currently only accessible over the Internet. For the LMS to be usable without an internet connection, additional development is required. However, many LMSs are now open-source, allowing anyone to use them without paying additional costs for subscriptions beyond the internet limit consumed (Haeruman et al., 2021).

Obstacles and Problems of the LMS Usage in Physics Learning

A total of 31 science and physics teachers were involved in this research. Respondents were teachers at the high school and junior high school levels. This research obtained data on the needs, opportunities and challenges of using LMS in the physics learning process at school. This needs analysis becomes a database and reflection for all elements of education in improving the quality of learning, especially e-learning-based physics learning. Based on the survey that has been conducted, the results show that as many as 19.4% of physics teachers in schools do not know the LMS and as many as 35.5% of the teachers have never applied LMS in the physics learning process at school. The research findings from respondents revealed that network problems are the main cause and consideration for many teachers who have not employed the LMS in teaching and learning activities. The network problems stated are the unstable connection, so only a few students can follow physics learning using the LMS. Furthermore, the communication tools owned by students are inadequate to carry out learning using the LMS and the location where students and teachers live causes uneven distribution of connections. In consequence, these connection issues create communication obstacles between students and teachers. Representative comments include:

> G8 “The challenge is not being able to follow the learning process at all times, which is related to the lack of technological equipment among the students.”
>
> G2 “Signal issues because I teach at rural areas.”
>
> G15 “The signal network frequently impedes the learning process.”

The additional challenge for some teachers utilizing online learning with an LMS is monitoring difficulties during the learning process. Several respondents stated that not all students are present at the beginning of the online lesson. Several students are listed as present but are not actively engaged in the learning

process. In addition, the absence of intense interaction between students and teachers creates a barrier for physics learning via LMS. Here is an example of a written response to this issue:

G5 "There is frequently a delay in the delivery of information to students."

G4 "Students do not respond to the teacher when using the LMS."

G1 "Students do not understand the material presented."

G24 "Students do not utilize the learning stages in the LMS."

G30 "It appears that the LMS reduces teacher and student communication."

These findings are in line with research conducted by Widayoko (2021): teacher-designed discussion activities do not operate ideally, as evidenced by a level of student engagement that is inconsistent with attendance participation. Hence, teachers must employ and construct discussion activities so that every student may actively participate in online teaching and learning activities. The lack of educators' and students' technical understanding about the use of technology is a further obstacle for physics teachers. Several of them are new to online learning. Several teachers argue that the platform's LMS features make it difficult to manage learning administration. The following are representative comments:

G18 "I have never directly utilized the LMS and do not fully comprehend the utilization of online learning platforms or applications."

G20 "Teachers and students do not comprehend the LMS fully."

G21 "Students encounter some technical difficulties, for instance when submitting assignments through the LMS."

Sani et al. (2021) stated that technology-related issues are one of the most challenging aspects of the learning process. For example, students are constrained in converting files from JPG to PDF when they want to submit assignments (Widayoko, 2021). The findings are in accordance with research conducted by Koc & Bakir (2010), which demonstrates that a lack of knowledge and internet network issues hinder the implementation of technology in the learning process.

Physics is an applied discipline of study. Many sub materials are explored using a mathematical and applicative approach. Thus, contextual application of the physics learning process is required (Widayoko, 2021). The existence of obstacles and issues in physics learning during the COVID-19 outbreak necessitates that educators maximize their creativity, particularly in establishing an e-learning-based physics learning process. By using an appropriate LMS and addressing the demands of teaching and learning activities, teachers can deliver physics content with features that facilitate the physics learning process more effectively. This demonstrates the necessity for innovation in the development of LMS-based e-learning that is acceptable and satisfies the objectives of the physics learning process, while also taking into account the learning approach that will be implemented.

CONCLUSION

This research examines the perspectives of teachers on the use of LMS in the physics learning process, focusing on the obstacles and requirements of LMS implementation in the physics subject at school. Although it is acknowledged that learning with a digital LMS offers numerous benefits, the findings indicate that learning with an LMS is constrained in terms of the internet network, which causes a delay in delivering the information to the students.

The research findings revealed that 100% of scientific and physics teachers need the implementation and

development of LMS as a learning media to help them in presenting physics materials to be more flexible, effective and efficient. The LMS expected by teachers in the learning process includes video conferencing, uploading files/assignments, discussion forms, quizzes, and attendance tracking. Additionally, they expect the LMS to be user-friendly, used without the internet usage, and automatically manage scores. Based on the results of the data analysis, it can be stated that physics teachers seek the development and implementation of LMS. For the further research, the researcher suggests developing e-learning in physics learning by focusing on the needs and the learning approach employed.

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