

Use of Digital Learning Management Systems for Enhancing Cognitive Achievement in Vocational Productive Course

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ABSTRACT

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The use of digital technology is increasingly widespread, including in the world of education. Observations in the field found that students' understanding of using digital technology to support learning productive lessons in vocational high schools still needed to improve. The study aims to obtain information about (1) the level of students' understanding of the use of digital learning management systems (DLMS); (2) the level of student perception regarding the availability and quality of DLMS use, and (3) the effectiveness of DLMS implementation in increasing students' understanding of productive subjects. This research is a quantitative study with a proportional random sampling technique. The sample was 194 out of 441 students from three state-owned vocational high schools. Data was collected using questionnaire instruments, observation sheets, and documentation. Data credibility is measured using validity, reliability, normality, and homogeneity tests, while data processing techniques use partial significance tests (t-test) and simultaneous tests (F-test). The research results show that students' understanding of DLMS is quite high, and their perception of the availability and quality of available DLMS is at a good level. This research also found that understanding DLMS and perceptions of DLMS as a learning medium can increase students' cognitive achievement in productive subjects.



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Introduction

The development of digital technology is very rapid, so in the last five years, its products have disrupted almost the entire landscape of the education world. Learning is shifting from traditional student-centered learning to digital learning. This transition makes learning difficult, and students need help quickly facing new trends (Afolabi & Olajuyigbe, 2023). However, these obstacles do not

prevent schools from adapting to face digital disruption in learning. Many countries have invested funds in developing digital technology-based learning systems. Likewise, schools and universities have made digital technology part of the main focus of institutional development (Al-Mamary, 2022).

One of the information technology products in the education sector is digital learning management systems (DLMS). As technology develops, various DLMS have emerged with their characteristics. DLMS is a web-based application that allows students and teachers/instructors to interact with content/learning resources, assessments, and other students and instructors (Şahin & Yurdugül, 2022). Meanwhile, Alshammary & Alhalafawy (2023) and Rosário & Dias (2022) define DLMS as a tool for creating, distributing, tracking, and managing various training and educational materials and student records. Learning Management Systems provide infrastructure that can be used as a learning delivery and management platform through software tools to perform various online learning management tasks (Alfalah, 2023). This article defines DLMS as web-based application software that provides interaction support between students with material and teachers in asynchronous online learning.

Its use in online learning proves that DLMS can improve learning outcomes. The research findings of Oguguo et al. (2021) and Alfalah (2023) revealed that students taught using DLMS performed better than students taught using other packages. Other research reveals that using DLMS based on blockchain and adaptive independent learning can make students capable of setting realistic goals, self-monitoring, self-reflection, and collaboration in online learning (Saadati et al., 2023). The study of Chang et al. (2022) proves that after students use DLMS, they have better learning achievements than before.

Although DLMS can increase learning achievement, its implementation faces significant obstacles. Preliminary research results show that students need help understanding the use of technology, especially DLMS, in learning productive subject matter. On the other hand, the reality on the ground also shows that the level of readiness for implementation still needs to improve in vocational schools at the secondary level, especially those in remote areas. It means that schools still need to improve several factors in implementing DLMS learning, such as technological readiness, self-development, and innovation.

This section should also state that the policy for implementing secondary-level vocational education in Indonesia divides subjects into three types: normative, adaptive, and productive material (Fatkhurrokhman et al., 2018). Normative subjects function to shape students into complete individuals, having the norms of life as individual beings and as social beings as members Use of Digital Learning Management...(Suryantoro, S. A., et al)

of society. The adaptive subject group provides a broad and robust knowledge base, while the productive subject group provides lessons that formwork competencies according to national work competency standards.

The learning strategy used in this study is blended learning. This type of learning is a student-centered learning method that combines traditional face-to-face classes with e-learning activities (Attard & Holmes, 2020; Keržič et al., 2019). Many studies have proven that blended learning can be effective. The application of blended learning significantly influences students' critical and creative thinking abilities, so blended learning can be used as a learning innovation to improve students' critical and creative thinking abilities (Hikmah et al., 2023). Blended learning can encourage teachers to be creative, increase students' interest, and help them learn independently (Kaliaskarova et al., 2022). Using blended learning in the inquiry community can foster good student perception (El Sayad, 2023). It can also attract teachers' sympathy to support learning that uses blended learning as a method due to considerations of accessibility and flexibility (Qassim et al., 2023).

An in-depth understanding of student needs and the function of DLMS as a support for online learning of productive subjects will be an essential basis for developing effective and responsive learning media. With this understanding, developing appropriate learning media that focuses on students' needs and the potential of DLMS can be a solution to improving the quality of learning of productive subjects.

Method

This study implements quantitative research. The research subjects were students from three state-owned vocational high schools in Banyumas Regency, Central Java Province, Indonesia. The sample was determined using a random sampling technique. The total sample was 194 from 441 students who took one of the productive vocational subjects at their respective schools.

Data collection uses questionnaire instruments and observation sheets. Data credibility determination uses validity and reliability tests, while fulfillment of analysis requirements uses normality and homogeneity tests. This research conducted validity tests on two instruments used to collect data on variables X1 and X2. Each questionnaire contains 10 statement items/questions. The number of trial respondents involved was the same as the research respondents. The validity analysis results show that each item's correlation value to the total value for all items shows a significant correlation with a significance of 5%. It shows that the instruments tested can be declared valid.

This study uses the instrument reliability coefficient to determine the consistency of respondents' answers to questions/statements. The criteria are that a variable is reliable if it provides a Cronbach's Alpha value > 0.60. The trial produced a Cronbach's Alpha of 0.696. In this way, the instrument tested is declared reliable or consistent.

The normality test of the data using the Kolmogorov-Smirnov procedure produces information on all variables involved; the distribution is normal. The homogeneity test produces information on variables X1 and X2, whose variances are declared homogeneous. The results of this requirements test recommend that this research can continue the process to the data analysis stage because it meets the requirements. Data processing techniques using SPSS application software include partial significance tests (T-Test) and simultaneous tests (F Test). For the overall data analysis, the maximum significance level was 5%.

Results and Discussion

Table 1 presents data descriptions of the characteristics of research subjects based on the variable understanding of DLMS and the variable perception of its availability and quality. The data on learning outcome variables were obtained using documentation of student grades in productive online business subjects for the 2022-2023 academic year.

Table 1. Description of data based on research variables

Variable	Observation Score				Median	Modus	Ideal Score			
	Max Score	Min Score	Mean	SD			Max Score	Min Score	Mean	SD
X1	38	33	35,7	1,41	36	35	40	0	20	1,46
X2	39	34	36,2	1,35	36	36	40	0	20	1,46
Y	96	80	83,7	3,79	82	80	100	0	50	3,84

Based on Table 1, the average scores for the variables involved have reached 35.7 (89.3%), 36.2 (90.5%), and 83.7 % for X1, X2, and Y, respectively. All variables give very good scores, indicating that the subject really understands DLMS, has a very good perception of its availability and quality, and has very good learning achievements.

Students' understanding of DLMS (X1)

The frequency distribution of students' understanding of DLMS (X1) can be visualized in Figure 1 below.

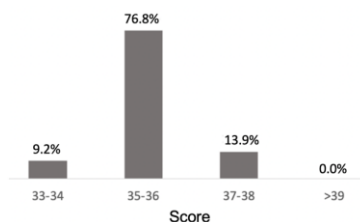


Fig 1: Frequency distribution of students' DLMS understanding

According to Figure 1, it can be seen that most students understand (76.8%), really understand (13.9%), and only 9.2% still need to understand DLMS. The histogram also shows that the distribution of students' DLMS understanding is visually normal because most students have scores around the average value. This situation is very beneficial for schools because this good understanding can directly support the successful implementation of learning using DLMS tools.

Perception of DLMS availability and quality (X2)

Figure 2 below describes the frequency of student perception data regarding the availability and quality of DLMS (X2) obtained through observation.

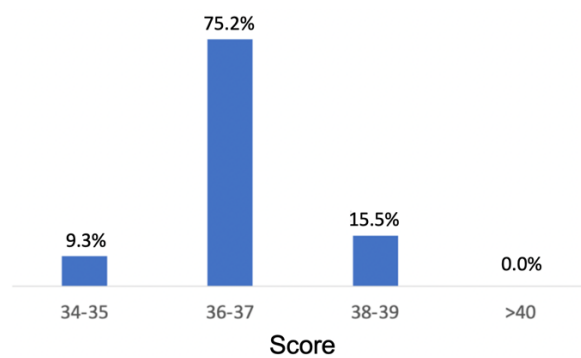


Fig 2: Frequency distribution of students' perception of DLMS availability and quality

Based on Figure 2, the frequency distribution of student perception variable data on the availability and quality of DLMS (X2) visually looks normal. The highest frequency of 146 is found in the 36-37 interval with a relative score of 75.2%, while the lowest frequency of 18 is in the 38-39 interval with a relative score of 9.3%. Most students have an excellent perception of the availability and quality of DLMS in each school. This condition is also an excellent asset for schools in implementing DLMS-based learning, considering that its availability and quality are sufficient.

Student learning outcomes (Y)

Figure 3 below describes the frequency of data on learning outcomes or cognitive achievements of students in productive online business subjects obtained through the documentation method.

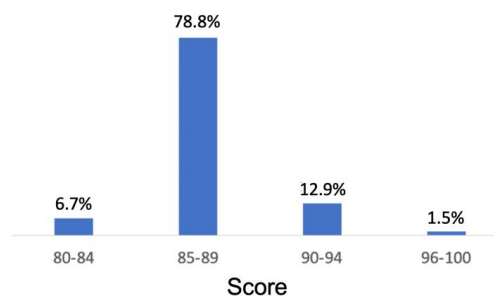


Fig 3: Frequency distribution of students' cognitive achievement

Based on Figure 3, the frequency distribution of student cognitive achievement variable data

looks normal, with the highest frequency being 153 in the 85-89 interval with a relative score of 78.8%, while the lowest frequency of 3 is in the 96-100 interval with a relative score of 1.5%.

Partial Hypothesis Test Using t-Test

The first hypothesis testing of this research uses the t-test. This test is used to see how effective the independent variables, namely students' understanding of DLMS and students' perceptions of its availability and quality, are in explaining the level of student cognitive achievement.

In Table 1, the means of variables X1 and X2 are 35.7 and 36.2, respectively. The values of these two means and how effectively they independently influence variable Y must be determined. The t-test, apart from providing information on the effectiveness of the independent variable's influence on the dependent variable independently, can also determine the differences between independent variables in influencing changes in variable Y. A summary of the t-test using the SPSS application is presented in Table 2 below.

Table 2. Summary of t-test

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std.Error	Beta		
1 (Constant)	4,701	5,212		4,911	0,000
X1	0,432	0,225	0,016	1,191	0,029
X2	0,209	0,259	0,068	1,805	0,002

Based on Table 2, all t values produce significance for X1 and X2 of 0.029 and 0.002, respectively. These significance values are lower than the tolerance limit, which is the criterion for this research, namely 0.05. Thus, the null hypothesis for X1 and X2 is rejected, or the alternative hypothesis is accepted. So, understanding DLMS independently significantly influences cognitive achievement. Likewise, the perception variable regarding the availability and quality of DLMS partially has an effective influence on student learning outcomes in vocational productive subjects, namely online business.

Simultaneous Hypothesis Testing Using F-Test

The simultaneous test will show whether all independent variables entered together or simultaneously effectively explain changes in the dependent variable. This hypothesis testing is often called overall significance testing for regression, and Table 3 summarizes the F-test analysis.

The results of the F-test, as presented in Table 3, show that the value $F=24.360$ has a significance of 0.002. The significance value found is smaller than the tolerance limit set by this research, namely 0.05, so it can be concluded that the null hypothesis is rejected; in other words, the alternative hypothesis is accepted. So, understanding DLMS and perceptions of the availability and quality of

DLMS simultaneously or together effectively influence students' cognitive achievement levels in online business vocational productive subjects.

Table 3. Summary of F-Test

Model	Sum of Squares	df	mean Square	F	Sig.
Regression	10,488	2	205,244	24,36	,002
Residual	2781,85	191	14,565		
Total	2792,34	193			

DISCUSSION

This research's descriptive analysis shows that students' average level of understanding, perception, and cognitive achievement is in a good category. This finding differs from the research results by Amporful (2023); when students use DLMS, they lose motivation and view this device as an ineffective way of learning at school. Because students are not trained and equipped in advance with the knowledge and skills needed to use DLMS, the school does not provide technical support to guide students in learning through DLMS. High data costs, slow internet access, and unstable Wi-Fi connectivity at schools are also causes of students' poor perception of DLMS.

Sumardi et al. (2021), before developing the LMS, in their preliminary study, found facts that contradicted this research, namely that the availability of facilities had not been able to optimize the implementation of learning. These results cause some students to be unable to participate in online learning properly. This finding can be understood because, at that time, the world faced the COVID-19 pandemic, so students did not have experience using LMS-based online learning. It was different when this research was conducted because, after the pandemic, students gained much experience learning using LMS, so their understanding was quite good before they took part in the designed blended learning.

Even though several previous studies have provided different results, many studies have found that students perceive LMS positively. For example, Chipps et al. (2015) found that more than 75% of students responded positively to using LMS. This positive response comes from ease of use (resources, tasks, feedback) and aspects of LMS benefits. Even Ganeser and Robert (2021) found that more than 80% of students positively perceived the use of LMS. They view that LMS

1. offers features that can function as a medium to involve students in learning activities,
2. helps easily download reading materials and videos,
3. provide good flexibility in the use of time and space during the learning phase,
4. convenient to post comments based on assignments given by a teacher,

5. can be used to track learning progress during the learning process,
6. provide facilities to process and ensure task completion,
7. moreover, it allows students to manage their class activities well.

Effective use of DLMS can make the learning process interactive and student-centered, meeting the needs of diverse learners (Veluvali & Suriseti, 2022). LMSs are also helpful in reflecting students' knowledge gaps when preparing for class (Odekeye et al., 2023). The most recent research conducted by Furqon et al. (2023) found that using LMS benefits academic cognitive performance and provides positive perceptions among students and those taking part in online learning. From the teacher side, Simelane-Mnisi (2023) found that 90.5% of teachers agreed that learning activities with LMS fostered high student interaction and involvement.

In general, this study found that the variables of understanding and students' perceptions of the availability and quality of DLMS effectively influenced students' cognitive achievement. Several previous studies have proven the same results as this research. Qamarya et al. (2023) found that LMS was effectively used in the learning process. This finding is supported by the results of other studies, which found that implementing LMS in learning can increase academic performance. After controlling for other factors, LMS accounts for 25% of the variation in academic achievement (Sappaile et al., 2023). The higher the level of LMS effectiveness, the higher the level of student involvement in learning, which impacts increasing academic performance (Samson & Yango, 2023). The great potential of LMS in increasing students' cognitive achievement was also discovered by Budiman et al. (2023). LMS provides accessibility and flexibility, allowing students to access learning materials anytime and anywhere, overcoming space and time constraints. The interactive and collaborative features of the LMS facilitate interaction and collaboration between students and teachers so that students can share ideas, understanding, and experiences with fellow students and teachers. Through LMS, teachers can monitor student progress in real time and provide fast feedback, thereby assisting in learning evaluation.

Conclusion

This research has illustrated that students' understanding of DLMS obtained before online learning is held has a vital role in increasing cognitive achievement. Likewise, students' perceptions of the availability and quality of LMS content have a significant influence on improving students' academic performance. This research recommends that school management organize training to equip students with the knowledge, skills, and understanding needed to use DLMS more effectively before online learning is held. School management must also partner with existing

telecommunications networks to provide affordable data packets for students so that connectivity problems for accessing DLMS can be resolved.

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