The Influence Of The Effectiveness Of The Use Of Learning Management System (Lms) And Learning Independence On Student Learning Outcomes At The Faculty Of Economics And Business, Universitas Negeri Jakarta With Learning Satisfaction As A Mediator Variable

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Abstract. This study aims to analyze the effect of the effectiveness of the use of Learning Management System (LMS) and learning independence on student learning outcomes, with learning satisfaction as a mediating variable. This study uses a quantitative approach involving students of the Faculty of Economics and Business, State University of Jakarta as a sample. The results of the analysis show that LMS has a significant effect on learning outcomes (coefficient = 0.367; p = 0.000), but not significant on learning satisfaction (p = 0.064). Meanwhile, learning independence has a significant influence on learning satisfaction (coefficient = 0.436; p = 0.000) and learning outcomes (coefficient = 0.537; p = 0.000). The R-square values of 0.787 for learning satisfaction and 0.716 for learning outcomes indicate that this model explains more than 70% of the variation in the dependent variable. The mediation effect was found to be significant, especially for the indirect effect of LMS on learning outcomes and learning satisfaction (p = 0.032). This study confirms the importance of strengthening learning independence in online learning.

Keywords: Effectiveness of Learning Management System (LMS), Learning Outcomes, Learning Independence, Learning Satisfaction, Students, Digital Learning.

Introduction

The development of digital technology in the era of the Industrial Revolution 4.0 has brought major changes to the higher education sector. This digital transformation encourages the improvement of learning quality and efficiency, which demands flexible and adaptive methods. Learning Management System (LMS) comes as a solution in managing online learning, strengthening the role of students in learning independently and purposefully. Globally, the corporate Learning Management System (LMS) market is expected to grow by 23% (CAGR 2020-2024), as the need for digital-based learning increases. In Indonesia, LMS adoption has surged since the COVID-19 pandemic, making LMS the main platform for online learning. However, the effectiveness of an Learning Management System (LMS) depends not only on its accessibility, but also on the interactivity of the system and student satisfaction with the learning process. The flexibility of an Learning Management System (LMS) allows students to learn at their own pace, but its success is highly dependent on independent learning and lecturer engagement.

A study by (Yana & Adam, 2019) showed that a blended learning approach with an Learning Management System (LMS) can improve engagement and learning outcomes if supported by appropriate teaching strategies. (Holden Simbolon et al., 2021) also confirmed that the effectiveness of the Learning Management System (LMS) increases when combined with independent learning and active utilization of interactive features. Pre-research results of five students at the Faculty of Economics UNJ revealed that most only accessed the Learning Management System (LMS) when there was an assignment. Discussion forums are not effective without lecturer moderation. Less visually appealing materials also encourage students to look

for references outside the Learning Management System (LMS). Technical barriers such as system glitches and poor network were reported by 80% of the pre-research respondents.

(Dhianti Haeruman et al., 2021) stated that the success of an Learning Management System (LMS) depends on infrastructure readiness, digital literacy, and institutional support. Three out of five students in the pre-research mentioned that their involvement in the Learning Management System (LMS) was strongly influenced by lecturer initiatives. When lecturers actively use forums, upload videos, and give feedback, students feel more satisfied and motivated.

In this context, it is important to examine how the effectiveness of Learning Management System (LMS) use and the level of learning independence affect student learning outcomes, considering the role of learning satisfaction as a mediating variable. This study focuses on students of the Faculty of Economics and Business, State University of Jakarta, who have widely implemented the Learning Management System (LMS). This study is expected to illustrate the relationship between Learning Management System (LMS) effectiveness, learning independence, learning satisfaction, and student learning outcomes as a whole. In this context, it is important to examine how the effectiveness of LMS use and the level of learning independence affect student learning outcomes, by considering the role of learning satisfaction as a mediating variable. This study focuses on students of the Faculty of Economics and Business, State University of Jakarta, who have widely implemented the Learning Management System (LMS).

Literature Review

Theoretically, Learning Management System (LMS) is a web-based system that not only functions as a place to upload materials, but also as a learning management tool that supports the entire teaching and learning process-from planning, content management, to evaluation. Ryan K. Ellis (in Widya, Pratomo and Wahanisa, 2021) states that an Learning Management System (LMS) enables thorough and structured tracking of learning activities. Mwhile (Listiawan, 2016) calls LMS an integrated digital learning platform that supports independent and flexible learning.

Learning Management System (LMS) effectiveness can be seen from indicators of successful program implementation, goal achievement, user satisfaction level, input-output efficiency, and overall goal achievement(Faradiba et al., 2021). In practice, LMS has three main functions according to (Delfiana, 2022), namely as a supplement, complement, and substitute for face-to-face learning. All three make an important contribution in accommodating various learning styles and flexibility needs of students. However, the use of Learning Management System (LMS) also has weaknesses, such as limited access to technology, low utilization of interactive features, unattractive material display, and limited digital literacy of lecturers and students. Technical disruptions such as system errors and slow connections are also obstacles that are often found. Understanding these advantages and disadvantages is crucial in assessing how much Learning Management System (LMS) effectiveness can impact student learning outcomes, especially when learning independence and satisfaction with the learning process are considered as determining factors.

In addition to the Learning Management System (LMS), another important factor in achieving learning objectives is learning independence. Learning independence is the ability of students to carry out learning activities that rely on activities, responsibilities, and motivation that exist within students themselves (Rusman, 2014). Student learning independence has an important role in learning activities. Lack of learning independence in students can lead to negative behaviors such as lack of creativity and confidence in thinking (Arifin Maksum & Ika Lestari, 2020).

Widjaja (in UIN Suska Riau)states that indicators of learning independence include: the ability to stand alone, solve problems, make their own decisions, as well as initiative and creativity. Factors that influence learning independence include internal (endogenous) aspects, such as aptitude and self-confidence, and external (exogenous) factors, such as social support and learning environment. Basri (1994) and Biemiller (1998) assert that family environment, teachers, and training opportunities greatly influence the growth of independence.

Paris and Winograd suggested five main principles in learning independence, namely self-assessment, self-regulation, continuous development, reflection on learning, and formation of personal identity. Students who are able to implement these principles tend to have greater responsibility for their learning outcomes, even in

the context of online learning. By understanding the roles and indicators of Learning Management System (LMS) effectiveness and learning independence, this study aims to identify the influence of both variables on student learning outcomes. In addition, learning satisfaction is analyzed as a mediating variable that strengthens the relationship between Learning Management System (LMS) effectiveness and learning independence on learning outcomes within the Faculty of Economics and Business, Universitas Negeri Jakarta.

In addition to the effectiveness of the Learning Management System (LMS) and learning independence, the main indicator of the success of the educational process is student learning outcomes. Learning outcomes reflect changes in students' abilities after following a conscious, directed, and systematic learning process. The Big Indonesian Dictionary defines learning outcomes as achievements obtained from learning efforts, while according to (Arifin Maksum & Ika Lestari, 2020), learning outcomes are the abilities possessed by students after going through the learning process in both cognitive, psychomotor, and affective aspects assessed through the provision of evaluation. Learning outcomes are the values obtained by students after going through a learning process that can be measured through the provision of evaluations or assignments in aspects of knowledge, skills, and attitudes (Arifin Maksum & Ika Lestari, 2020). Furthermore, according to (Aulia Rahmi et al., n.d.) learning outcomes are the achievements of the learning process after undergoing a learning process that is measured using an assessment tool or test. It can be concluded that learning outcomes are a form of achievement of students' abilities that reflect understanding, skills, and attitudes obtained after following a systematic and measurable learning process.

Bloom (in Putra et al., 2024) categorizes learning outcomes into three main domains: cognitive, affective, and psychomotor. The cognitive domain is related to intellectual abilities, such as remembering, understanding, applying, analyzing, synthesizing, and evaluating. The affective domain includes attitudes, values and interests towards learning materials or activities, ranging from accepting to forming character. Meanwhile, the psychomotor domain relates to physical skills and coordinated use of tools, ranging from imitation to performing movements automatically and naturally. Furthermore, Bloom (in Putra et al., 2024) describes the indicators of learning outcomes into concrete forms based on these three domains. In the cognitive domain, the indicators include the ability to remember to evaluate. In the affective domain, students are assessed from readiness to accept values, participate, organize, to make values part of personal character. In the psychomotor domain, the indicators start from the ability to imitate, manipulate, to perform complex movements naturally.

Understanding this dimension of learning outcomes is important because it can show the extent to which students achieve the learning objectives set. In the context of this study, learning outcomes are used as the dependent variable to assess the influence of Learning Management System (LMS) effectiveness and learning independence, and how learning satisfaction mediates the relationship.

satisfaction is a feeling of pleasure or satisfaction that arises when learners compare their expectations with the reality of the learning experience. According to Calli (in Novianto, 2023), learning satisfaction is a subjective perception that shows the suitability of the learning experience to students' expectations. Ko (in Novianto, 2023) views it as a subjective evaluation like a consumer comparing expectations and reality. (Sopiatin, 2010) adds that satisfaction arises when learning services match or exceed expectations, thus increasing motivation and learning engagement. Kotler (in Novianto, 2023) and Oliver emphasize satisfaction as an evaluation of likes or dislikes based on a comparison between expectations and reality. In general, learning satisfaction is students' subjective evaluation of the learning process and outcomes, which is influenced by emotional, cognitive, and perceptual aspects of the quality of education services.

Indicators of learning satisfaction according to Haryati (2021) (in Novianto, 2023) include reliability in the form of consistency and accuracy of learning services; responsiveness, namely the readiness of teachers to respond to student needs; certainty (assurance) which is confidence in the competence of teachers and the quality of learning; empathy, namely the teacher's attention to the individual needs of students; and physical evidence (tangible) which includes facilities, media, and learning support facilities. Factors that influence learning satisfaction according to (Sopiatin, 2010) include rewards for learning outcomes that match student effort; a sense of security in the learning environment both physical and psychological; adequate learning conditions including facilities and social relationships; opportunities to develop themselves through various activities and freedom of expression; and harmonious personal relationships between students and teachers. By

understanding these indicators and factors, the learning process will become more effective, thereby increasing student satisfaction which ultimately contributes positively to their learning outcomes and overall development.

Referring to the theoretical study previously described regarding the effectiveness of the use of Learning Management System (LMS), learning independence, learning satisfaction, and student learning outcomes, a hypothesis model was developed that represented the flow of relationships between the variables studied.

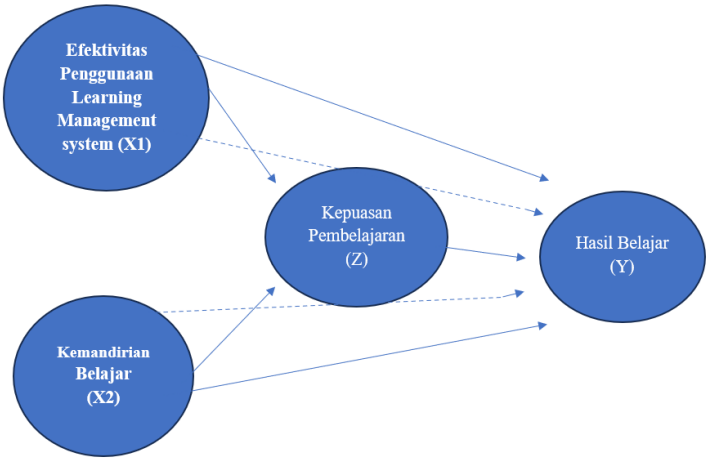

Figure 2 - Hypothesis Model

The hypothesis model describes the structural relationship between the independent, mediating, and dependent variables that are the main focus in this study. The effectiveness of LMS use and learning independence are categorized as independent variables that are assumed to have an influence on student learning outcomes as the dependent variable. Between the two, learning satisfaction is placed as a mediating variable that serves to bridge the relationship between the independent and dependent variables.

This model is based on the premise that the success of digital learning depends not only on the availability of technology such as LMS, but also on how students use the system actively and independently, and the extent to which they are satisfied with their learning experience. Previous research shows that effective LMS utilization-if accompanied by active interaction and lecturer support-can lead to improved learning outcomes (Holden Simbolon et al., 2021). However, the effect on learning satisfaction may arise indirectly through improved academic outcomes.

In addition, learning independence plays an important role in encouraging students to organize, control and evaluate their learning process independently. Students who have a high level of independence tend to show greater engagement in learning and feel higher satisfaction, which ultimately has a positive impact on learning outcomes.

As such, this hypothetical model not only explains the direct relationship between the key variables, but also identifies indirect mechanisms that strengthen the understanding of how digital learning processes can be optimized. The existence of mediating variables such as learning satisfaction allows this study to describe a more complete and realistic influence transition process in the context of technology-based higher education.

Methods

The type of research used in this study is quantitative research with a descriptive correlational approach. This study aims to determine the effect of the effectiveness of the use of Learning Management System (LMS) and learning independence on student learning outcomes, with learning satisfaction as a mediating variable. The research was conducted deliberately and systematically to test the relationship between variables and formulate a meaningful influence model in the context of online learning in higher education. The subjects in this study were active students of the Faculty of Economics and Business, State University of Jakarta who had used the Learning Management System (LMS) actively for at least one semester. The number of respondents

was 102 students who were selected using purposive sampling technique with the following criteria: (1) active students, (2) UNJ Learning Management System (LMS) users, and (3) willing to fill out the questionnaire voluntarily. The research was conducted for two months, from April to June 2025, and the data was collected online through Google Form..

The research instrument was a closed questionnaire using a five-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree". The instrument includes variables of LMS effectiveness, learning independence, learning satisfaction, and learning outcomes. The validity and reliability of the instruments were tested using loading factor values (≥ 0.70), Cronbach's Alpha (≥ 0.90), and Composite Reliability, all of which showed results that met the requirements of quantitative analysis. This research design utilizes a structural approach in path analysis to test the direct and indirect effects between variables. Statistical tests were conducted to see the relationship between Learning Management System (LMS) effectiveness and learning independence on learning outcomes, either directly or through learning satisfaction as a mediator. The collected data were analyzed using statistical software to produce a valid and empirically significant relationship model. This research is expected to provide an in-depth understanding of the contribution of Learning Management System (LMS) and learning independence in supporting effective online learning, as well as emphasizing the importance of student satisfaction as a relationship amplifier to the achievement of learning outcomes.

Result and Discussion

Based on the validity testing results, all indicators across the constructs demonstrate satisfactory levels of validity, as indicated by their loading factor values exceeding the threshold of 0.70. For the construct of LMS Usage Effectiveness (X1), loading factors range from 0.729 to 0.873, indicating that all indicators effectively represent the underlying construct. Similarly, indicators for Learning Independence (X2) exhibit strong validity, with loading factor values between 0.709 and 0.829. The construct of Learning Satisfaction (Y) also shows robust indicator contributions, with values ranging from 0.795 to 0.880. Additionally, the Student Learning Outcomes construct (Z) meets the validity criteria, with loading factors between 0.705 and 0.847. These results confirm that all measurement items are valid and reliable for representing their respective constructs. Thus, the measurement model employed in this study demonstrates strong construct validity, supporting its appropriateness for further structural analysis.

Table 1 - Cronbach's Alpha & Composite Reliability

	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
X1	0.950	0.952	0.956	0.647
X2	0.903	0.907	0.922	0.596
Y	0.936	0.937	0.947	0.690
Z	0.948	0.950	0.954	0.617

Based on the reliability test results, all variables in this study—namely X1 (Effectiveness of Learning Management System (LMS) Usage), X2 (Learning Independence), Y (Learning Satisfaction), and Z (Student Learning Outcomes)—demonstrate excellent reliability levels. This is evidenced by the Cronbach's Alpha values, all of which exceed 0.90, with the highest value of 0.950 observed in variable X1 and the lowest at 0.903 in variable X2. Furthermore, the Composite Reliability values (both rho_A and rho_C) for all constructs are above the minimum threshold of 0.70, indicating strong internal consistency. The Average Variance Extracted (AVE) values also surpass the 0.50 criterion, confirming that each construct explains more than 50% of the variance in its respective indicators. Therefore, it can be concluded that all research instruments meet the reliability requirements and are suitable for further analytical procedures.

Multicollinearity testing was conducted to determine whether there is a high linear correlation among the independent variables in the regression model. A commonly used indicator for detecting multicollinearity is the Variance Inflation Factor (VIF), where a value below 5 is generally considered acceptable and indicates no serious multicollinearity. Based on the results presented in the table, all indicators exhibit VIF values below the commonly accepted threshold of 5.00, with the highest VIF recorded at 4.328 (for indicator x1.5) and the lowest at 1.811 (for indicator x2.9). Since all VIF values are below 5, it can be concluded that there is no indication of multicollinearity within the regression model. This implies that the independent variables do not exhibit high intercorrelation, thereby ensuring the stability and accuracy of the regression estimates.

Table 2 - Fornell-Larcker Criterion

	X1	**X2**	**Y**	**Z**
X1	0.804			
X2	0.775	0.772		
Y	0.781	0.850	0.831	
Z	0.768	0.820	0.825	0.793

According to the Fornell-Larcker criterion, a construct demonstrates good discriminant validity when the square root of its Average Variance Extracted (AVE)—displayed on the main diagonal of the correlation matrix in bold—is greater than its correlations with other constructs in the same row or column. The square root values of AVE for each construct are as follows: X1 = 0.804, X2 = 0.850, Y = 0.831, and Z = 0.793. Each of these values exceeds the corresponding inter-construct correlations. For example, the square root of AVE for X1 (0.804) is higher than its correlations with X2 (0.775), Y (0.781), and Z (0.768). Likewise, X2's AVE square root (0.850) is greater than its correlations with X1 (0.775), Y (0.772), and Z (0.820), and similar patterns are observed for constructs Y and Z. These findings indicate that each construct is empirically distinct from the others, fulfilling the discriminant validity criteria of the Fornell-Larcker test. This supports the construct validity of the measurement model and reinforces the appropriateness of the constructs for further structural analysis.

The R-square value for the variable Y (Learning Satisfaction) is 0.787, indicating that 78.7% of the variance in learning satisfaction can be explained by the variables Effectiveness of LMS Usage (X1) and Learning Independence (X2), while the remaining 21.3% is attributed to factors outside the model. Meanwhile, the R-square value for the variable Z (Student Learning Outcomes) is 0.716, which means that 71.6% of the variance in student learning outcomes is explained by LMS usage, learning independence, and learning satisfaction as a mediating variable, with the remaining 28.4% accounted for by other variables not included in the model. The adjusted R-square values, which are 0.781 for variable Y and 0.710 for variable Z, reflect adjustments for the number of predictors in the model and indicate that the predictive power of the model remains stable despite its complexity. Overall, these values fall within the strong category, as they exceed the 0.67. Therefore, it can be concluded that the research model possesses good predictive capability for the dependent variables Y and Z and supports the structural validity of the proposed model.

The F-square (f^2) value in the PLS-SEM model is used to assess the relative impact of an independent construct on a dependent construct within the structural model. According to Cohen's (1988) guidelines, f^2 values are interpreted as follows: 0.02 indicates a small effect, 0.15 a medium effect, and 0.35 a large effect. The analysis results indicate that the effect of X1 (Effectiveness of Learning Management System (LMS) Usage) on Y (Learning Satisfaction) yields an f^2 value of 0.068, which falls within the small effect category. In contrast, the influence of X1 on Z (Student Learning Outcomes) registers an f^2 of 0.154, reaching the threshold for a medium effect, suggesting a moderately significant contribution to learning outcomes. The construct X2 (Learning Independence) exhibits a stronger impact, with an f^2 of 0.251 on Y—classified as a medium-to-large effect—and an f^2 of 0.444 on Z, representing a large effect. This underscores the dominant role of X2 in influencing student learning outcomes. Meanwhile, the impact of Y on Z is reflected in an f^2 value of 0.126, which is considered a small-to-medium effect, indicating that while learning satisfaction contributes to learning outcomes, its influence is relatively moderate.

Table 3 - Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 -> Y	0.184	0.177	0.100	1.850	0.064
X1 -> Z	0.367	0.360	0.102	3.607	0.000
X2 -> Y	0.436	0.437	0.092	4.747	0.000
X2 -> Z	0.537	0.546	0.091	5.908	0.000
Z -> Y	0.330	0.335	0.108	3.049	0.002

Based on the hypothesis testing results, the study reveals several key direct relationships among the variables. The effectiveness of LMS usage (X1) does not have a statistically significant direct effect on learning satisfaction (Y), despite showing a positive coefficient, indicating the influence is not strong enough at the 5% significance level. However, X1 significantly and positively affects student learning outcomes (Z), suggesting that better LMS utilization contributes to improved academic performance. Learning independence (X2) demonstrates a strong and significant impact on both learning satisfaction and learning outcomes, highlighting its crucial role in enhancing both the learning experience and academic achievement. Additionally, learning outcomes (Z) significantly influence learning satisfaction, implying that students with better academic results tend to report higher satisfaction with their learning process. Overall, while X1 directly influences only learning outcomes, X2 significantly affects both outcomes and satisfaction. The significance of Z's effect on Y also indicates the possibility of an indirect (mediating) relationship, where learning outcomes may mediate the effects of X1 and X2 on learning satisfaction, providing a deeper understanding of the structural dynamics within the research model.

Table 4 - Specific Indirect Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 -> Y	0.121	0.122	0.057	2.140	0.032
X2 -> Y	0.177	0.182	0.064	2.777	0.006

The analysis of indirect effects reveals the mediating role of learning outcomes (Z) in the relationship between the independent variables—effectiveness of LMS usage (X1) and learning independence (X2)—and learning satisfaction (Y). The indirect effect of X1 on Y through Z is statistically significant (coefficient = 0.121, p = 0.032), indicating a partial mediation. This is particularly relevant since the direct effect of X1 on Y was not significant, suggesting that the pathway from Learning Management System (LMS) effectiveness to learning satisfaction operates primarily through improved learning outcomes. Similarly, X2 also exhibits a significant indirect effect on Y via Z (coefficient = 0.177, p = 0.006), with both its direct and indirect effects being significant, further supporting the presence of partial mediation. These findings underscore the critical role of learning outcomes as a mediator that enhances the impact of both Learning Management System (LMS) effectiveness and learning independence on student satisfaction.

Conclusion

Based on the research findings, it can be concluded that the academic achievement of students in the Faculty of Economics and Business at Universitas Negeri Jakarta is significantly influenced by three key factors: the effectiveness of Learning Management System (LMS) usage, learning autonomy, and learning satisfaction. The study found that effective use of LMS positively and significantly impacts student learning outcomes, although it does not directly enhance learning satisfaction. Instead, Learning Management System (LMS) contributes indirectly to satisfaction through improved academic performance, indicating a partial mediation by learning outcome. Learning autonomy emerged as the strongest predictor in the model, showing significant positive effects on both learning outcomes and learning satisfaction. Students who are more self-directed in their studies tend to achieve better academic results and feel more satisfied with their learning experiences. Furthermore, learning satisfaction was found to significantly mediate the relationship between the independent variables and student achievement, highlighting its role as a motivational and emotional driver

of academic success. In summary, the study underscores the importance of integrating technological tools like Learning Management System (LMS) with strategies that foster student autonomy and satisfaction. Educational institutions are encouraged to not only provide digital learning platforms but also create a supportive learning environment that empowers students and enhances their engagement and satisfaction—key elements for achieving superior learning outcomes.

For future researchers interested in exploring similar topics, it is recommended to expand the scope of the study in terms of location, sample size, and the range of variables used. Further research could involve different faculties or universities to obtain more generalizable and representative results. Additionally, incorporating other variables such as learning motivation, learning styles, technological readiness, or social support could provide a more comprehensive understanding of the factors that influence student learning outcomes and satisfaction.

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