

The Influence of Perceived Learning Management System Quality on Student Engagement in the Educational Technology Study Program

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ABSTRACT

This study aims to determine the effect of the perceived quality of the Learning Management System (LMS) on student engagement in the Educational Technology Study Program. The study used a quantitative approach with a cross-sectional survey design, involving 45 students as participants, selected through purposive sampling based on having participated in learning through the Moodle-based LMS for one semester (16 meetings). Data were collected using the LMS Quality Scale (25 items, covering five dimensions, namely system quality, information quality, instructional quality, interaction quality, and learning quality) and the Online Student Engagement/OSE Scale (19 items) to measure student learning engagement. Both instruments were first pilot-tested with 42 respondents before being used in the main data collection. Data analysis included validity and reliability tests (Cronbach's Alpha), classical assumption tests (normality, linearity, and heteroscedasticity), Pearson correlation, and simple linear regression. The results showed that all instrument items were valid and reliable (Cronbach's Alpha LMS Quality Scale = 0.968; OSE Scale = 0.942). The classical assumption tests were fully met. The results of the correlation analysis showed a positive and significant relationship between perceived LMS quality and student engagement ($r = 0.593$; $p < 0.05$). The regression analysis produced the equation $Y = 38.834 + 0.385X$ with $F = 23.300$ ($p < 0.05$) and a coefficient of determination (R^2) of 0.351, which means that perceived LMS quality contributed 35.1% to the variation in student engagement, with an effect size (Cohen's f^2) of 0.542 (large category). These findings confirm that LMS quality plays an important role in encouraging student engagement in technology-based learning.

Keywords: Perceived System Quality, Learning Management System, Student Engagement, Educational Technology

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How to cite : Rahman, A., Fadillah, F., & Az Zahra, S. (2026). The Influence of Perceived Learning Management System Quality on Student Engagement in the Educational Technology Study Program. *Journal of Social and Scientific Education*, 3(2), 526-539. <https://doi.org/10.58230/josse.v3i2.819>

INTRODUCTION

Digital transformation in higher education has driven nearly all universities to integrate technology into the learning process, notably through the use of Learning Management Systems (LMS). An LMS serves as a digital platform for managing content, interactions, assignments, and assessments in both online and blended learning environments (Ningsih et al., 2025). The accelerated adoption of online learning triggered by the COVID-19 pandemic further hastened this shift, compelling higher education institutions worldwide to transition to remote learning within a relatively short timeframe (Bozkurt et al., 2020; Hodges et al., 2020). Although this transition initially presented various technical and pedagogical challenges, studies indicate that LMS-based online learning also creates new opportunities regarding learning flexibility and accessibility (Adedoyin & Soykan, 2023; Dhawan, 2020). Implementing an LMS in higher education has proven capable of enhancing accessibility,

flexibility, and the quality of interaction between lecturers and students, although success depends heavily on the quality of the system used and user readiness (Ningsih et al., 2025).

The quality of information systems, including LMS platforms, has long been a focal point in research regarding information system success. In their updated Information Systems Success Model, DeLone & McLean (2003) assert that system quality and information quality are key determinants influencing usage intention, user satisfaction, and the net benefits derived from an information system (DeLone & McLean, 2003). Consistent with this, Rulinawaty et al. (2024), in their study of Universitas Terbuka students, found that applying the updated DeLone and McLean model had a positive and significant impact on the effectiveness of LMS implementation, highlighting the importance of system quality, information quality, and service quality as predictors of success (Rulinawaty et al., 2024). Similar findings were reported by Al Mulhem (2020), who discovered that quality and organizational factors consistently influence student satisfaction with e-learning system quality, as well as by Alotaibi & Alshahrani (2022), who extended the DeLone and McLean model by incorporating learner quality, instructor quality, and perceived usefulness as predictors of satisfaction and net benefits regarding e-learning platforms. Other empirical studies support this pattern of findings; for instance, Al-Fraihat et al. (2020)—using a model encompassing six quality dimensions (including system, information, and service quality)—found these dimensions to be consistent predictors of successful e-learning implementation in higher education. Similarly, a study by Costa et al. (2012) on Moodle usage in Portuguese universities revealed that students tended to utilize Moodle primarily as a material repository rather than for its interactive features, implying that system design and quality shape student usage patterns of the LMS. Meanwhile, a study by Najmul Islam (2014) regarding sources of LMS user satisfaction and dissatisfaction during the post-adoption phase identified system-related and task-specific factors as drivers of satisfaction, further underscoring the importance of system quality for the LMS user experience. A methodological review by Turnbull et al. (2021) of LMS research in Australia and China found that studies in China more frequently employed quantitative-confirmatory approaches compared to those in Australia, indicating differences in methodological preferences for LMS research across cultural and institutional contexts.

In addition to the system quality perspective, user acceptance of technology serves as another crucial theoretical foundation for understanding how students interact with an LMS. The Technology Acceptance Model (TAM), developed by Davis (1989), posits that perceived ease of use and perceived usefulness are the primary determinants of attitudes and behaviors regarding technology adoption. When students perceive an LMS as easy to use, accessible at any time, and capable of providing information relevant to their learning needs, their inclination to engage actively in LMS-based learning increases. Beyond TAM, the Community of Inquiry framework developed by Garrison & Anderson (2017) explains how cognitive, social, and teaching presences within an online learning environment contribute to the quality of the student learning experience. A similar perspective is offered by Moore & Kearsley (2012) regarding distance education systems; they emphasize the importance of the interaction between instructors, students, and technology as an integrated learning system.

Student engagement itself is a multidimensional construct encompassing behavioral, emotional, and cognitive aspects of the learning process (Fredricks et al., 2004). Fredricks et

al. (2004) assert that engagement is malleable and responsive to contextual factors—including the quality of the provided learning environment—implying that student engagement is likely influenced by the quality of the digital learning systems they use daily. The conceptualization of student engagement is further enriched by [Appleton et al. \(2008\)](#), who highlight various conceptual and methodological issues regarding its measurement, and by [Kahu \(2013\)](#), who proposes a framework linking engagement to students' structural and psychosocial antecedents. [Kuh \(2009\)](#) adds that student engagement is a vital indicator of the quality of the higher education experience—one that institutional administrators need to understand. In the context of technology-based learning, a systematic mapping by [Bond et al. \(2020\)](#) demonstrate the rapid growth of research regarding student engagement and educational technology in higher education, while a review by [Henrie et al. \(2015\)](#) underscores the need for valid and reliable engagement measurement instruments within technology-mediated learning environments. High levels of engagement have been shown to be closely linked to students' academic achievement and persistence in learning.

Several empirical studies have confirmed the link between the quality of online learning systems and student engagement. In a study of 206 students, [Prabowo & Ikhsan \(2022\)](#) found that system quality, information quality, and service quality within a Learning Management System (LMS) had a positive and significant impact on student engagement in online learning, which in turn influenced their learning satisfaction. In the context of Indonesian higher education, [Rulinawaty et al. \(2024\)](#) also found that applying an information system success model—encompassing system, information, and service quality—positively and significantly affected the effectiveness of LMS implementation among students. Another study by [Martin & Bolliger \(2018\)](#) found that engagement strategies intentionally designed by instructors were perceived by students as crucial factors for online learning success; this aligns with findings by [Martin et al. \(2018\)](#) regarding facilitation strategies that enhance instructor presence and student connectedness. A systematic review by [Martin et al. \(2020\)](#) of 619 online learning studies conducted between 2009 and 2018 identified engagement and learner characteristics as the two most frequently studied themes, highlighting the enduring relevance of student engagement in online learning research. [Redmond et al. \(2018\)](#) complement this perspective with an online engagement framework that encompasses social, cognitive, behavioral, collaborative, and emotional dimensions.

Another development relevant to LMS quality is the use of learning analytics to monitor and support continuous student engagement ([Ferguson, 2012](#); [Siemens, 2013](#)). [Viberg et al. \(2018\)](#) noted that the use of learning analytics in higher education still faces various implementation challenges, despite its potential to enhance institutional understanding of student engagement patterns. However, a systematic review by [Kaliisa et al. \(2024\)](#) found that empirical evidence regarding the impact of learning analytics dashboards on student achievement, motivation, participation, and attitudes remains mixed and inconclusive; consequently, the quality of the LMS design itself remains a primary concern before additional analytic features can yield optimal benefits.

These findings reinforce the premise that perceptions of learning system quality are not merely technical factors but also psychological and pedagogical ones that shape student engagement patterns in technology-based learning processes.

Nevertheless, most prior research has focused predominantly on user satisfaction or

net benefits as dependent variables ([Al Mulhem, 2020](#); [Alotaibi & Alshahrani, 2022](#)), while other studies have concentrated on general system implementation effectiveness ([Rulinawaty et al., 2024](#)) rather than specific student engagement. Studies specifically highlighting student engagement within the context of Educational Technology study programs remain limited. Yet, students in Educational Technology programs are the future designers and developers of digital learning systems; thus, understanding how their perceptions of LMS quality influence their own learning engagement is highly relevant from both theoretical and practical perspectives.

Based on this background, this study aims to analyze the influence of perceived Learning Management System quality on student engagement within the Educational Technology study program. The hypothesis proposed in this study is as follows: H0: Perceived Learning Management System quality does not significantly influence student engagement. Ha: The perceived quality of the Learning Management System has a significant effect on student engagement.

METHODS OF RESEARCH

Research Design

This study employs a quantitative approach with a cross-sectional survey design ([Creswell & Creswell, 2017](#)). This design was selected because it enables the researcher to examine the relationships between variables at a specific point in time while efficiently identifying the influence of perceived LMS quality on student engagement. The independent variable in this study is Perceived Learning Management System Quality (X), while the dependent variable is Student Engagement (Y).

Research Participants

The study participants consisted of 45 students from the Educational Technology Study Program, selected using a purposive sampling technique. The selection criteria required participants to have undergone instruction via a Moodle-based Learning Management System (LMS) for a full semester, comprising 16 sessions. These criteria were established to ensure that all participants possessed sufficient experience using the LMS, thereby allowing for the formation of representative perceptions regarding system quality. Purposive sampling was chosen based on methodological grounds—rather than mere convenience—because only students who had used the LMS for a full semester were deemed to have an adequate experiential basis to provide valid assessments or perceptions of the system's quality; students with shorter periods of usage risked providing assessments that might not represent the overall quality of the LMS. Data collection was conducted using a closed-ended questionnaire with a 1–5 Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree), distributed online via Google Forms. Prior to completing the questionnaire, all participants were provided with an explanation regarding the research objectives, their right to withdraw, and data confidentiality assurances; they subsequently indicated their voluntary participation (informed consent) by agreeing to the statement on the initial page of the online questionnaire before proceeding to the main sections.

Research Instruments

The LMS Quality instrument was adapted from [Hwee et al. \(2020\)](#); the original study validated the instrument using 42 items across five dimensions (comprising 13, 7, 5, 8, and 9 items, respectively). For the purposes of this study, the researcher simplified the instrument to 25 items while retaining the same five dimensions—System Quality, Information Quality, Instructional Quality, Interaction Quality, and Learning Quality—with each dimension represented by 5 items.

Student engagement was measured using an adaptation of the Online Student Engagement Scale ([Dixson, 2015](#)). The original version consisted of 19 items covering four dimensions—Skills Engagement, Emotional Engagement, Participation Engagement, and Performance Engagement—with an uneven distribution of items (7, 4, 6, and 2 items, respectively). In this study, the researcher restructured the instrument to achieve a more balanced distribution of items across dimensions ($5-5-5-5 = 20$ items) by adding one item to the Performance Engagement dimension, formulated in accordance with the dimension's content indicators from the original scale. A pilot test involving 42 respondents subsequently led to the elimination of the additional item (Y13) in the Performance Engagement dimension because its item-total correlation value fell below the researcher's established criteria; consequently, the final instrument used for the main data collection consisted of 19 items with a 5-5-5-4 distribution. The operationalization of the two research variables, including the item structure resulting from this adaptation, is presented in Table 1.

Table 1 Operationalization of Research Variables

Variable	Dimension	Number of items
The LMS Quality (X)	System Quality	5
	Information Quality	5
	Instructional Quality	5
	Interaction Quality	5
	Learning Quality	5
	Subtotal	25
Student Engagement (Y)	Skills Engagement	5
	Emotional Engagement	5
	Participation Engagement	5
	Performance Engagement	4
	Subtotal	19

The item structure for Variable Y was derived by the researcher by reconfiguring the Online Student Engagement Scale ([Dixson, 2015](#))—originally comprising 19 items with an uneven distribution (7-4-6-2)—into a more balanced initial distribution (5 items per dimension, totaling 20 items). The Performance Engagement dimension retained 4 of the researcher's 5 initial items after one item (Y13) was removed during the pilot test phase for failing to meet validity criteria. Before being used for the main data collection, both instruments underwent a pilot test to evaluate their validity and reliability. The procedures and results of the instrument pilot testing are detailed in the following subsection.

Instrument Pilot Testing

Prior to the main data collection phase, both research instruments—the LMS Quality Scale and the Online Student Engagement (OSE) Scale—underwent pilot testing to determine

the validity and reliability of each item. The pilot test involved 42 respondents who shared characteristics similar to the research population but were not included as participants in the main study. This separation of respondent groups was intentional to ensure that pilot test respondents did not complete the questionnaire again during the main data collection phase, thereby avoiding potential measurement bias resulting from repeated exposure to the same instrument items. Validity testing at this stage utilized the corrected item-total correlation technique—measuring the correlation between an individual item's score and the total score calculated after excluding that specific item—while reliability was assessed using the Cronbach's Alpha coefficient.

LMS Quality Scale Pilot Test Results. Analysis revealed that all 25 items on the LMS Quality Scale demonstrated positive and significant item-total correlation coefficients with the total score ($p < 0.05$), with correlation values ranging from 0.479 to 0.850. All values exceeded the critical r -table value at the 5% significance level; consequently, all 25 items were deemed valid and suitable for use. The reliability test yielded a Cronbach's Alpha value of 0.943, well above the 0.70 minimum threshold and falling into the "excellent" reliability category.

Online Student Engagement (OSE) Scale Pilot Test Results. During the pilot test phase, the OSE Scale—initially comprising 20 items—was administered to 42 respondents. Analysis showed that 19 of the 20 items exhibited corrected item-total correlation coefficients ranging from 0.401 to 0.770. One item, Y13, yielded a corrected item-total correlation of 0.315 ($p = 0.042$). Although the correlation was statistically significant, the coefficient was below the predetermined minimum criterion of 0.40 for adequate item discrimination. Therefore, Y13 was considered to have insufficient item discrimination and was eliminated from the instrument prior to the main data collection phase. Following the elimination of item Y13, a reliability test on the remaining 19 items yielded a Cronbach's Alpha of 0.934, indicating a very high (excellent) level of internal consistency.

Instrument Evaluation Using Main Research Data. The two instruments—comprising the 25-item LMS Quality Scale and the 19-item OSE Scale (following the elimination of item Y13 during the pilot phase)—were subsequently used to collect data from 45 participants for the main study. At this stage, the quality of the instruments was re-evaluated using the main research data. The results indicated that all 25 items of the LMS Quality Scale met validity criteria and achieved a Cronbach's Alpha of 0.968 (very high). Similarly, all 19 items of the final OSE Scale demonstrated good validity and achieved a Cronbach's Alpha of 0.942, indicating a very high (excellent) level of reliability. These values demonstrate that all instrument items possessed adequate item discrimination to measure the intended constructs.

Based on these pilot tests and evaluations, the final instruments used for data analysis consisted of the 25-item LMS Quality Scale and the 19-item Online Student Engagement (OSE) Scale. Both instruments met validity requirements and demonstrated very high reliability during both the pilot testing and main data collection phases. Thus, both instruments were deemed suitable for use in data collection for this study.

Data Analysis Techniques

The data analysis techniques employed in this study comprise the following stages:

1. Item validity testing using the corrected item-total correlation technique. An item was considered to demonstrate adequate item discrimination when the corrected item-total

correlation coefficient was ≥ 0.40 . Items with coefficients below 0.40 were considered insufficient and were subject to elimination. Statistical significance ($p < 0.05$) was examined as supporting information rather than as the sole criterion for item retention.

2. Reliability testing using the Cronbach's Alpha coefficient, with the criterion that the instrument is considered reliable if the alpha value is greater than 0.70.
3. Classical assumption testing, including residual normality testing (Shapiro-Wilk), linearity testing (ANOVA-based Test of Linearity), and heteroscedasticity testing (Glejser test).
4. Pearson correlation testing to determine the strength and direction of the relationship between variables.
5. Simple linear regression analysis to examine the effect of Variable X on Variable Y, supplemented by the coefficient of determination (R^2) and Cohen's f^2 effect size to assess the magnitude of the effect in both statistical and practical terms.

All data analyses were conducted using statistical software with a significance level (α) of 0.05. The procedures for classical assumption testing, correlation testing, and simple linear regression in this study adhere to multivariate data analysis guidelines as outlined by [Field \(2024\)](#), [Hair et al. \(2019\)](#), and [Tabachnick & Fidell \(2018\)](#).

RESULTS AND DISCUSSION

Results

Descriptive statistics for the total scores of both variables are presented in Table 2.

Table 2 Descriptive Statistics of Total Scores for the Research Variables

Variable	N	Mean	SD	Min-Max
Perceived LMS Quality (X)	45	103.31	13.524	63-125
Student Engagement (Y)	45	78.58	8.776	57-95

As described in the Method section, the re-evaluation of instrument quality on the main research data ($n = 45$) showed that all 25 items of the LMS Quality Scale and all 19 items of the Online Student Engagement Scale (after eliminating item Y13 during the pilot test) had computed r -values greater than the r -table value (0.294 at $n = 45$, $\alpha = 0.05$), so that all instrument items were declared valid, with corrected item-total correlation coefficients summarized in the Method section. The reliability test on the main research data yielded a Cronbach's Alpha of 0.968 for the LMS Quality Scale and 0.942 for the Online Student Engagement Scale, as presented in Table 3. Both values are well above the 0.70 threshold, indicating that the research instruments had a very good level of internal consistency at the main data collection stage.

Table 3 Summary of Validity and Reliability Test Results on the Main Research Data

Instrument	Final Number of Items	Cronbach's Alpha	Remarks
LMS Quality Scale (X)	25 of 25	0.968	Highly Reliable
Student Engagement Scale (Y)	19 of 20	0.942	Highly Reliable

Before hypothesis testing was carried out, classical assumption tests were first conducted, covering tests of normality, linearity, and heteroscedasticity. A summary of the classical assumption test results is presented in Table 4.

Table 4 Summary of Classical Assumption Test Results

Assumption Test	Test Statistic	Sig.	Decision
Normality (Shapiro-Wilk)	W = 0.978	0.551	Residuals are normally distributed
Linearity (Deviation from Linearity)	F = 1.241	0.327	The relationship is linear
Heteroscedasticity (Glejser Test)	t = 0.433	0.667	No heteroscedasticity is present

With all classical assumptions satisfied, simple linear regression analysis is appropriate for testing the research hypothesis. The results of the Pearson correlation test are presented in Table 5.

Table 5 Pearson Correlation Test Results

Relationship Between Variables	r	Sig. (2-tailed)	Strength of Relationship
Perceived LMS Quality (X) - Student Engagement (Y)	0.593	0.000	Large, positive, significant

The results of the simple linear regression analysis are presented in Table 6. The resulting regression model is $Y = 38.834 + 0.385X$.

Table 6 Simple Linear Regression Results

Model	B	SE	Beta	t	Sig.	R	R ²	F	Sig. F
(Constant)	38.834	8.301	–	4.678	0.000	0.593	0.351	23.300	0.000
XTOTAL	0.385	0.080	0.593	4.827	0.000				

The regression coefficient for Variable X of 0.385, with a standard error of 0.080 and a standardized Beta of 0.593, indicates the magnitude of the effect of Perceived LMS Quality on Student Engagement in standardized score units. The calculated t-value for the regression coefficient of Variable X of 4.827, with Sig. = 0.000 (< 0.05), indicates that Perceived LMS Quality has a significant effect on Student Engagement. The simultaneous test (ANOVA) yielded F = 23.300 with Sig. = 0.000 (< 0.05), confirming the significance of the overall regression model. The coefficient of determination (R²) of 0.351 indicates that Perceived LMS Quality is able to explain 35.1% of the variation in Student Engagement, while the remaining 64.9% is explained by other factors outside the model, such as learning motivation, lecturer support, or the social environment of learning. Meanwhile, Cohen's f² effect size of 0.542 falls into the large category, indicating that the effect is practically meaningful, not merely statistically significant.

Discussion

The results of this study show that perceived quality of the Learning Management System has a positive and significant effect on student engagement in the Educational Technology Study Program. This finding is consistent with the information systems success model proposed by [DeLone & McLean \(2003\)](#), who asserted that system quality and information quality are important determinants of usage behavior and the perceived benefits experienced by information system users. This finding is also consistent with the results of [Al-Fraihat et al. \(2020\)](#), who concluded that the dimensions of system, information, and service quality jointly determine the success of e-learning. The better students' perceptions of the ease of use, accessibility, and clarity of information on the LMS, the higher their level of engagement in LMS-based learning activities.

This finding also reinforces the results of [Prabowo & Ikhsan \(2022\)](#), who found that system quality, information quality, and service quality of the LMS have a positive and significant effect on student engagement in online learning. The consistency of these results indicates that the relationship between digital learning system quality and student engagement is relatively stable, both in the context of a larger population and in a smaller, more specific population such as in this study. In addition, the findings of this study are also consistent with those of [Rulinawaty et al. \(2024\)](#) in the context of higher education institutions in Indonesia, who found that applying the information systems success model - encompassing system quality, information quality, and service quality - has a positive and significant effect on the effectiveness of LMS implementation, as well as with the descriptive literature review by [Ningsih et al. \(2025\)](#), which asserted that LMS implementation helps drive student engagement in higher education settings. The convergence of these findings across different contexts strengthens the argument that system quality is not merely a technical supporting factor, but also a factor that directly shapes students' learning behavior patterns. Nevertheless, the methodological review by [Turnbull et al. \(2021\)](#) cautions that LMS research across countries tends to employ differing methodological approaches (e.g., a preference for quantitative-confirmatory methods in China compared with Australia), so generalizing LMS quality-engagement findings across cultures and institutions still needs to be done with caution.

From a theoretical interpretation perspective, the Technology Acceptance Model ([Davis, 1989](#)) provides a complementary explanation for the observed relationship between perceived LMS quality and student engagement. However, TAM was not used as the direct measurement framework for the LMS Quality Scale in this study. The instrument was operationally adapted from the five-dimensional framework of [Hwee et al. \(2020\)](#), comprising System Quality, Information Quality, Instructional Quality, Interaction Quality, and Learning Quality. Therefore, the TAM constructs of perceived usefulness and perceived ease of use were not directly measured as separate dimensions of the LMS Quality Scale. Rather, TAM is used as a complementary theoretical lens to explain why positive perceptions of LMS characteristics may be associated with greater student engagement. From this perspective, when students perceive the LMS as useful and easy to use, they may be more inclined to access learning materials, complete assignments, and participate actively in LMS-based learning activities. This interpretation is consistent with the multidimensional nature of engagement ([Fredricks et al., 2004](#); [Appleton et al., 2008](#); [Kahu, 2013](#)). The Community of Inquiry framework ([Garrison & Anderson, 2017](#)) and the online engagement framework ([Redmond et al., 2018](#)) provide additional theoretical perspectives for interpreting the findings, rather than serving as direct frameworks for constructing the LMS Quality Scale. In particular, the instructional and interactional aspects represented in the LMS Quality instrument can be interpreted in relation to the quality of students' online learning experiences, including cognitive, social, and teaching presence emphasized by the Community of Inquiry framework. Similarly, the online engagement framework of [Redmond et al. \(2018\)](#) helps contextualize student engagement as a multidimensional construct involving social, cognitive, behavioral, collaborative, and emotional dimensions. Thus, these frameworks are used to interpret the observed relationship between LMS quality and student engagement, while the operational measurement of LMS quality remains grounded in the five-dimensional framework of [Hwee et al. \(2020\)](#).

Nevertheless, the coefficient of determination of 0.351 indicates that 64.9% of the

variation in student engagement is still explained by factors outside system quality, such as lecturer support, academic climate, intrinsic motivation, and students' digital literacy competence. This finding is consistent with the research of [Al Mulhem \(2020\)](#) and [Alotaibi & Alshahrani \(2022\)](#), who also highlighted that organizational and individual factors contribute to the success of e-learning system use beyond system quality alone. This is also in line with the review by [Kaliisa et al. \(2024\)](#), who found that adding technological features such as learning analytics dashboards does not automatically increase student engagement without adequate system design quality and pedagogical support. Thus, although LMS quality has been shown to have a significant and practically meaningful effect (Cohen's $f^2 = 0.542$, large category) on student engagement, improving student engagement overall still requires a multifactor approach that does not focus solely on the technical aspects of the system.

This finding has practical implications for managers of the Educational Technology Study Program and LMS developers, namely the need for ongoing attention to improving system quality - whether in terms of ease of navigation, technical stability, clarity of information, or interactive features - as one strategy for encouraging student engagement in technology-based learning. This is in line with the recommendation of [Rulinawaty et al. \(2024\)](#), who suggested that higher education administrators regularly implement an information systems success evaluation model to ensure sustained LMS quality, as well as the recommendation of [Martin & Bolliger \(2018\)](#) and [Martin et al. \(2018\)](#) that instructors deliberately design engagement strategies that make optimal use of the LMS's interactive features.

This study is not without a number of limitations that should be considered when interpreting its results. First, the sample size was relatively small ($n = 45$) and was drawn entirely from a single study program, namely the Educational Technology Study Program, so the results may not necessarily be generalized to students from other study programs or higher education institutions with different LMS user characteristics. Second, the cross-sectional design used captured students' perceptions at only one point in time, so it cannot explain the dynamics of the relationship between LMS quality and student engagement over time. Third, the research data were entirely self-reported through questionnaires, making them potentially susceptible to perception bias and respondents' tendency to provide socially desirable answers (social desirability bias). In addition, because both the independent variable (perceived LMS quality) and the dependent variable (student engagement) were measured using self-report instruments administered to the same respondents at the same time, the findings may be susceptible to common method bias. This shared measurement method may have inflated the observed association between the two constructs. Given these limitations, the results of this study should be interpreted as an initial picture of the relationship between perceived LMS quality and student engagement within the specific study context. Future research should consider using multiple data sources, different measurement methods, or temporally separated measurements, together with larger and more diverse samples and longitudinal designs, to reduce the potential influence of common method bias and strengthen the generalizability of the findings.

CONCLUSIONS

Based on the data analysis and discussion, it can be concluded that the perceived quality of the Learning Management System (LMS) has a positive and significant effect on student engagement within the Educational Technology Study Program ($r = 0.593$; $F = 23.300$; $\text{Sig.} = 0.000 < 0.05$), with a contribution of 35.1% ($R^2 = 0.351$) and a large effect size (Cohen's $f^2 = 0.542$). Consequently, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a) is accepted. The more positive students' perceptions of LMS quality are, the higher their level of engagement in the learning process. It should be emphasized that these findings apply to the specific context of Educational Technology students with a limited sample size; therefore, interpretation and generalization of the results require caution and should be validated across broader and more diverse student populations before application to other study programs or institutions.

This study recommends that program administrators and digital learning system developers continue to enhance LMS quality regarding ease of use, accessibility, information quality, and interactivity. Future research should consider incorporating other variables—such as learning motivation, lecturer support, or digital literacy—and expanding the sample size and scope to allow for broader generalizability of the findings. Future studies could also explore the mapping of student engagement and educational technology in a broader sense, as suggested by Bond et al. (2020), including an examination of the role of learning analytics (Ferguson, 2012; Siemens, 2013; Viberg et al., 2018) as a complement to evaluating the quality of digital learning systems.

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