Evaluation of the Successful Implementation of a Learning Management System with the ISSM Model in Accounting Supplementary Learning at the Faculty of Economics, State University of Medan

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Abstract. LMS plays a vital role in supporting educational activities conducted outside the traditional classroom environment. This study seeks to evaluate the effectiveness of LMS implementation using the Information Systems Success Model framework designed by DeLone and McLean. This study used a total sampling of 213 students from the Department of Accounting, consisting of the Accounting Education and Accounting Science study programs at the Faculty of Economics, Medan State University, from 2022 to 2024. The data collection process used a structured questionnaire, with analysis conducted using the application (PLS-SEM). The analysis procedure included testing the PLS algorithm, bootstrapping, and hypothesis testing based on p-values and t-statistics. This study tested five hypotheses related to the relationship between five main constructs: information content and instructor quality, learner self-regulation, perceived usefulness, and overall satisfaction with LMS use. Based on the results of the analysis, it shows that five hypotheses have a positive and significant influence: (1) instructor quality on perceived usefulness ($\beta = 0.317$), (2) instructor quality on satisfaction ($\beta = 0.234$), (3) information content quality on perceived usefulness ($\beta = 0.450$), (4) information content quality on satisfaction ($\beta = 0.345$), (5) perceived usefulness on satisfaction ($\beta = 0.191$). All p values are below 0.05 and the t statistic value exceeds 1.96, this indicates statistical significance. These findings highlight the important role of all these variables in increasing the success of learning carried out through LMS.

Keywords: Learning Management System (LMS); ISSM Model; Accounting Education; E –learning.

1 Introduction

The technological revolution in the world of education has driven the transformation of teaching and learning methods in various fields, including accounting. [1]. This revolution poses significant challenges in preparing graduates who are able to face a professional environment that continues to evolve and increasingly prioritizes mastery of technical and non-technical skills. [2]. Tools such as Learning Management Systems (LMS) emerged to facilitate learning management. [3]. The application of a Learning Management System (LMS), especially after the COVID-19 pandemic, has become a promising strategy for improving the quality of learning and the efficiency of material delivery, particularly in the field of accounting. An LMS allows

lecturers and students to access learning materials, collaborate, and manage academic activities flexibly and efficiently. [4]. Although LMS offers easy access and flexibility in learning activities, more effective support is still needed so that students are able to access and use all the features provided optimally. [5]. In the accounting discipline, little research has comprehensively evaluated what makes an LMS an effective learning support tool. [6].

Assessing the implementation of a cloud-based LMS in the accounting education process is essential due to its capacity to offer flexible and convenient access across multiple devices, such as laptops and smartphones. Students can learn anytime and anywhere, which significantly supports learning that requires access to multiple resources. Studies show that an LMS can improve academic efficiency by providing better tools and strategies. An LMS has been used in teaching since 2017, assisting lecturers in face-to-face learning. The LMS used is SIPDA, which can be accessed at sipda.unimed.ac.id and also has an Android app. The SIPDA UNIMED application is open source and supports mobile devices, offering numerous features suitable for both online and on-site learning. The use of learning tools, virtual libraries, and mobile access significantly contribute to academic efficiency. For example, the application of learning tools and virtual libraries has an impact of 80% and 82%, respectively. A cloud-based LMS facilitates better learning management and tracking with features such as learning paths, automatic reminders, and certification tracking. This study aims to evaluate the use of a cloud LMS in accounting learning at the Faculty of Economics, State University of Medan. This also includes identifying the effectiveness of an LMS in supporting accounting learning and how to improve these elements to help educators better design and use an LMS. An LMS is designed to support student learning through various functions such as learning materials, assessment, communication, and learning management.

DeLone and McLean's ISSM framework measures information system success through four principal factors: instructor quality, information content quality, usability, and user satisfaction in the context of a learning system. [7]. In this model, instructor quality and information content quality are important factors influencing user perceptions of a learning system usefulness. If the instructor delivers the material well and the information presented is high-quality, users will perceive the system as useful for learning. This perception of usefulness contributes to user satisfaction, with those who find the system useful tending to be more satisfied with their learning experience. Furthermore, instructor quality and information content also directly influence satisfaction, allowing users to feel satisfied even without fully experiencing the system's benefits. This model suggests that user satisfaction is shaped by a combination of direct and indirect influences from instructor quality and information content, with perceived usefulness acting as an intermediary. In this context, the evaluation of the LMS at the Faculty of Economics, State University of Medan, used the four variables in the DeLone and McLean ISSM model to measure its effectiveness

Based on the background presented above, the research seeks to examine several issues related to the use of a cloud computing-based LMS in accounting teaching at the Faculty of Economics, State University of Medan. These issues include the quality of the information, systems, and services offered by this LMS in supporting the accounting learning process. Furthermore, this study also seeks to explore the extent to which a cloud computing-based LMS can increase users' desire to continue using it for ongoing learning activities. Furthermore, the level of user satisfaction, both instructors and students, with the use of this LMS is an important aspect studied to assess the effectiveness and acceptance of the system in the learning context.

2 Method

This research was conducted at the Faculty of Economics, Medan State University, specifically in the Accounting Department, focusing on students taking accounting courses. Respondents were selected based on the classes taught by the researcher: 213 accounting students from the academic year of 2024-2022. This study was designed to evaluate the extent to which an LMS can address these challenges and improve student learning outcomes. The population in this study included all students in the Accounting Education and Accounting Science study programs. Considering the sample size, the entire population was used as the unit of analysis. The sample consisted of students from classes that had used the UNIMED SIPDA platform in their accounting courses.
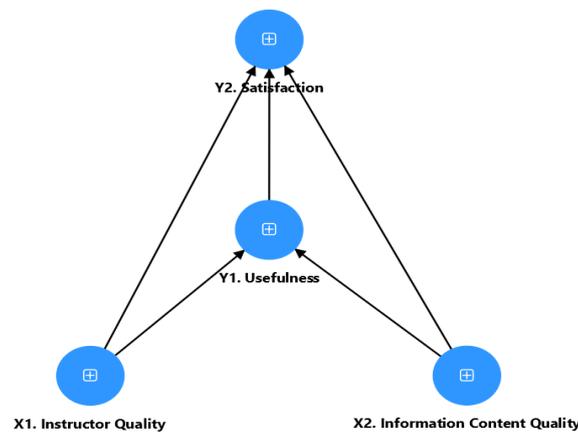

Fig. 1. Model of Relationships Between Variables

This model generates five testable hypotheses to understand the relationships between variables in a learning system. First, it is assumed that instructor quality influences the usability of the learning system. Second, the quality of information content is also predicted to influence usability. Furthermore, system usability is predicted to influence user satisfaction. Furthermore, instructor quality and information content directly influence user satisfaction. These five hypotheses explain the complex relationships among factors contributing to user satisfaction. Data were collected through surveys and interviews with students and lecturers using LMS-based learning. The surveys were carefully designed and assessed by academics to ensure appropriate items. After data collection, analysis was conducted using quantitative and qualitative methods to assess the effectiveness of LMSs in accounting learning. Respondents were selected based on the classes taught by the researchers. This study aimed to assess the extent to which LMSs can address challenges and improve student learning outcomes.

This study employed Structural Equation Modeling – Partial Least Squares (SEM-PLS) as the analytical method for data processing. SEM is a statistical study method used to analyze and address issues related to indicators and latent variables in a study [8]. The SEM method can describe complex relationships between variables. The Partial Least Squares (PLS) method is

an alternative method for estimating SEM models that can accommodate indicators with both reflective and formative properties. PLS was developed as a solution to the constraints inherent in conventional SEM methods [9]. The advantage of SEM-PLS lies in its capacity to manage relatively small sample sizes and its flexibility in using reflective, formative, or a combination of both indicators. Through a special algorithm, this method aims to minimize variance across all dependent variables, so the direction and causal relationships between variables must be explicitly defined [10].

This study used the Partial Least Squares (PLS) data analysis technique. This technique is a Structural Equation Modeling (SEM) method that employs a variance-based or component-based SEM approach. Specifically, the data analysis included: 1. Testing the outer model, including convergent validity, discriminant validity, and composite reliability; 2. Testing the inner model, including R-square, F-square, and path coefficient estimation. Data analysis in this study was conducted using SmartPLS software. SmartPLS uses bootstrapping or random doubling, so the assumption of data normality is not an issue. Hypotheses with p-values below 0.05 indicate a significant variable. Furthermore, this statistic apps do not require a minimum sample size, making it applicable to datasets with small sample sizes.

3 Result and Discussion

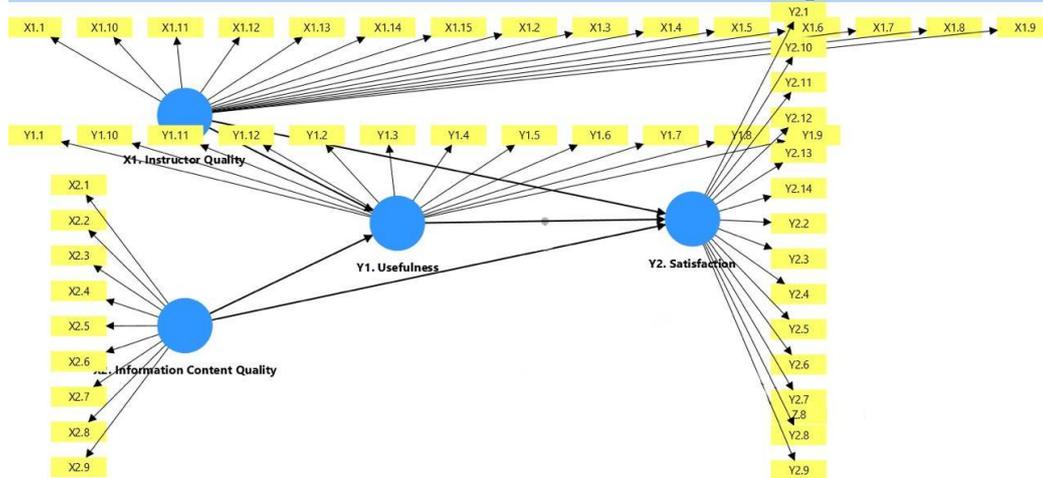The assessment of the measurement model is illustrated in the following research model:

Fig. 2. Research Model in Smart-PLS

For testing the outer model, can be described as follows:

Convergent validity is evaluated based on item reliability, which is reflected in the loading factor value, which indicates the relationship between the question item and the construct being measured. This study used the SmartPLS 4.0 application to test convergent validity, with the reference that an indicator is considered valid if its loading factor value oversteps 0.70 [11].

Table 1. Convergent Validity Results of the Literacy Model

Indicators	(Outer loadings)	Information
X1.11 <- X1. Instructor Quality	0.718	qualify
X1.12 <- X1. Instructor Quality	0.713	qualify
X1.13 <- X1. Instructor Quality	0.779	qualify
X1.2 <- X1. Instructor Quality	0.705	qualify
X1.3 <- X1. Instructor Quality	0.741	qualify
X1.4 <- X1. Instructor Quality	0.809	qualify
X1.5 <- X1. Instructor Quality	0.732	qualify
X1.6 <- X1. Instructor Quality	0.777	qualify
X1.7` <- X1. Instructor Quality	0.729	qualify
X1.8 <- X1. Instructor Quality	0.752	qualify
X1.9 <- X1. Instructor Quality	0.741	qualify
X2.2 <- X2. Information Content Quality	0.775	qualify
X2.3 <- X2. Information Content Quality	0.843	qualify
X2.4 <- X2. Information Content Quality	0.839	qualify
X2.5 <- X2. Information Content Quality	0.821	qualify
X2.6 <- X2. Information Content Quality	0.856	qualify
X2.7 <- X2. Information Content Quality	0.807	qualify
X2.8 <- X2. Information Content Quality	0.864	qualify
X2.9 <- X2. Information Content Quality	0.822	qualify
Y1.10 <- Y1. Usefulness	0.814	qualify
Y1.11 <- Y1. Usefulness	0.796	qualify
Y1.12 <- Y1. Usefulness	0.795	qualify
Y1.3 <- Y1. Usefulness	0.803	qualify
Y1.4 <- Y1. Usefulness	0.795	qualify
Y1.5 <- Y1. Usefulness	0.767	qualify
Y1.7 <- Y1. Usefulness	0.800	qualify
Y1.8 <- Y1. Usefulness	0.815	qualify
Y1.9 <- Y1. Usefulness	0.853	qualify
Y2.1 <- Y2. Satisfaction	0.813	qualify
Y2.10 <- Y2. Satisfaction	0.862	qualify
Y2.11 <- Y2. Satisfaction	0.806	qualify
Y2.12 <- Y2. Satisfaction	0.810	qualify
Y2.13 <- Y2. Satisfaction	0.784	qualify
Y2.14 <- Y2. Satisfaction	0.854	qualify
Y2.2 <- Y2. Satisfaction	0.863	qualify
Y2.3 <- Y2. Satisfaction	0.850	qualify

Y2.4 <- Y2. Satisfaction	0.824	qualify
Y2.5 <- Y2. Satisfaction	0.847	qualify
Y2.6 <- Y2. Satisfaction	0.832	qualify
Y2.8 <- Y2. Satisfaction	0.824	qualify
Y2.9 <- Y2. Satisfaction	0.818	qualify

Based on the test results, all indicators for each variable showed loading factor values consistent with the established indicators. Therefore, all indicators demonstrated good validity in consistently representing the measured constructs, and the model used met the convergent validity requirements for use in the next stage of analysis.

The next evaluation stage is carried out by measuring the square root value of AVE and comparing it to the level of correlation between constructs, where the square root of AVE must be higher than the correlation between constructs. A literacy model is considered to demonstrate sufficient discriminant validity when the square root of the AVE for each construct exceeds the correlation coefficients between that construct and others within the model. An AVE value is regarded as acceptable when it is above 0.5.

Table 2. AVE Value Results

Variable	Variance Extracted (AVE)
X1. Instructor Quality	0.556
X2. Information Content Quality	0.687
Y1. Usefulness	0.647
Y2. Satisfaction	0.689

All dimension variables have an AVE value exceeding 0.50, which indicates that the proportion of variance of each indicator item is successfully defined by the construct it measures. Overall, all variables demonstrate AVE values above 0.50, thereby confirming that the convergent validity of the variables is established. Therefore, the discriminant validity for all variables is met. Overall, the discriminant validity evaluation is met and the next test is continued.

Internal Consistency Reliability evaluates how consistently an indicator reflects the latent construct it is designed to measure [12]. The tool used was Cronbach's alpha. A Cronbach's alpha value between 0.60 and 0.70 is considered to indicate an adequate level of reliability. [13], and the targeted Cronbach's alpha value is exceeding 0.6 [14].

Table 3. Internal Consistency Reliability Results

Variable	Cronbach's alpha	Information
X1. Instructor Quality	0.920	qualify
X2. Information Content Quality	0.935	qualify
Y1. Usefulness	0.932	qualify
Y2. Satisfaction	0.962	qualify

Referring to the table above, all construct variables including Instructor Quality, Information Content Quality, Usefulness, and Satisfaction demonstrate Cronbach's alpha values exceeding 0.6. This indicates that each dimension meets the minimum threshold for internal consistency reliability, and thus, can be considered reliable.

The R-Square coefficient was utilized to assess the proportion of variance in the endogenous variables that can be explained by the exogenous variables in the research model. Based on the analysis, the R-Square value for the Usefulness variable is 0.544, indicating that Instructor Quality and Information Content Quality together account for 54.4% of the variance in Usefulness, while the remaining 45.6% is influenced by other factors outside the model. In contrast, the R-Square value for the Satisfaction variable is 0.790, suggesting that the combined influence of Instructor Quality, Information Content Quality, and Usefulness explains 79% of its variance. The remaining 21% is attributed to variables not included in the model. According to standard interpretation guidelines, the R-Square value for Usefulness is classified as moderate, whereas the value for Satisfaction is considered substantial. Therefore, the model demonstrates a strong explanatory power for the variables examined F-Square analysis is used as an indicator to assess the level of influence of exogenous variables on endogenous variables in the research model. The F-Square value indicates that all variables, namely Instructor Quality, Information Content Quality, and Usefulness, have values above 0.02. Specifically, the effect of Instructor Quality on Usefulness is 0.065 and on Satisfaction is 0.068. Information Content Quality has a value of 0.130 on Usefulness and 0.128 on Satisfaction. Usefulness also has an effect on Satisfaction with a value of 0.065. All of these values are in the moderate effect category, above 0.02 but not yet reaching the large category [13]. In conclusion, all relationships between variables in this model are significant enough to support the structural validity of the research.

To satisfy the model fit criteria, the SRMR value must be below 0.05. However, according to guidelines from the official SmartPLS website, several model fit indices can serve as benchmarks, including: an RMS Theta (Root Mean Square Theta) value of 0.102, an SRMR (Standardized Root Mean Square Residual) value less than 0.10, and an NFI (Normed Fit Index) value greater than 0.9. Based on the model fit assessment conducted in this study, the following values were obtained:

Table 4. Model Fit Results

Indicators	Saturated model	Estimation model
SRMR	0.052	0.059
d_ULS	3.411	4.437
d_G	2.118	2.218
Chi-square	2258.471	2287.519
NFI	0.775	0.772

Based on the values listed in the model fit table, the SRMR value was 0.052, which is smaller than 0.102 for both the saturated and estimated models. This indicates that the applied literacy model meets the model fit criteria. However, for other criteria, such as the NFI value, the model does not meet the established standards.

Hypothesis testing is conducted using the results derived from the inner model analysis, which encompasses R-Square values, parameter estimates, and t-statistics. The acceptance or rejection of hypotheses depends on evaluating the significance of relationships between constructs, utilizing both the t-statistic and p-value. This testing procedure is based on bootstrapping, where the criteria require the t-statistic to be greater than 1.96 at a 5% significance level, alongside a positive beta coefficient.
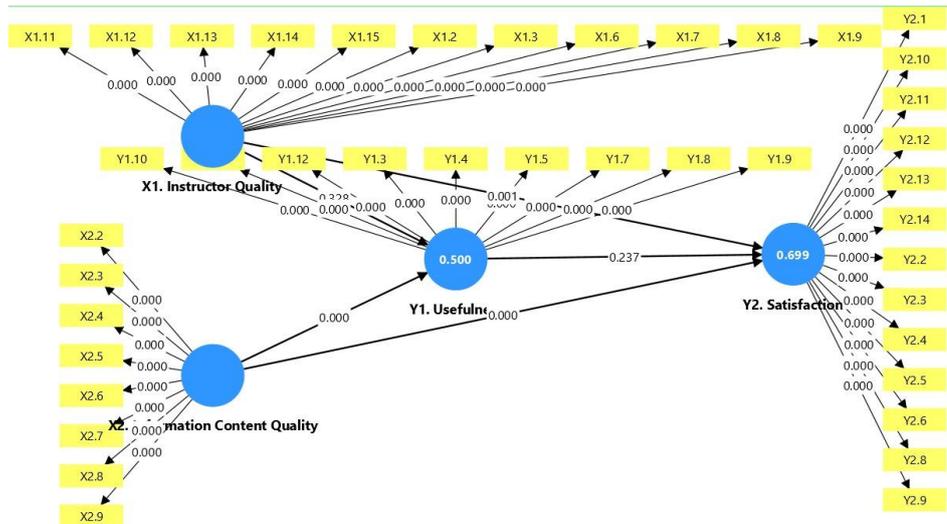

Figure 3. Bootstrapping Value Results

Based on the figure, it shows that all variables consisting of Instructor Quality, Information Content Quality, Usefulness, and Satisfaction have p-values smaller than 0.05, such as the Smart Governance and Smart Living variables against the Smart City Dimension & Development Strategy variables.

Table 5. Hypothesis Results

Variable	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1. Instructor Quality -> Y1. Usefulness	0.317	0.323	0.087	3.660	0.000
X1. Instructor Quality -> Y2. Satisfaction	0.234	0.237	0.066	3.521	0.000
X2. Information Content Quality -> Y1. Usefulness	0.450	0.446	0.088	5.095	0.000
X2. Information Content Quality -> Y2. Satisfaction	0.345	0.343	0.073	4.719	0.000
Y1. Usefulness -> Y2. Satisfaction	0.191	0.190	0.058	3.312	0.001

The first through seventh hypotheses were designed to test whether the Instructor Quality and Information Content Quality variables have a positive and significant influence on the Usefulness and Satisfaction variables. The details of the hypothesis testing are presented as follows:

- The influence of Instructor Quality on Usefulness is revealed to be positive, as indicated by a beta coefficient of 0.317, a t-value of 3.660, and a p-value of 0.000, which falls below the 5% significance threshold.

- The influence of Instructor Quality on Satisfaction also shows a positive effect, supported by a beta coefficient of 0.234, a t-value of 3.521, and a p-value of 0.000, remaining below the 5% threshold.
- The influence of Instructor Quality on Information Content Quality indicated by a beta coefficient of 0.450, a t-value of 5.095, and a p-value of 0.000, remaining below the 5% threshold.
- The influence of Information Content Quality on Satisfaction indicates a positive effect, reflected in a beta coefficient of 0.345, a t-value of 4.719, and a p-value of 0.000, which lies under the 5% threshold.
- The influence of Usefulness on Satisfaction also results in a positive outcome, reflected by a beta coefficient of 0.191, a t-value of 3.312, and a p-value of 0.000, falling below the 5% significance threshold.

In the PLS-SEM approach, the direct effect is known as the path coefficient. This coefficient quantifies both the strength and the direction of the relationship between the constructs under investigation and is utilized to evaluate the proposed hypotheses in the study. Their values lie within a standardized scale from -1 to 1, where figures approaching 1 signify a strong positive association, while those nearing -1 suggest a strong negative linkage). Furthermore, the results of the direct effect analysis on the literacy model of this study are presented in the following table:

Table 6. Direct Effects Value Results

Variable	Y1. Usefulness	Y2. Satisfaction
X1. Instructor Quality	0.317	
X1. Instructor Quality		0.294
X2. Information Content Quality	0.450	
X2. Information Content Quality		0.432
Y1. Usefulness		0.191

- The direct effect of Instructor Quality on Usefulness is 0.317, indicating that higher Instructor Quality significantly increases Usefulness.
- The direct effect of Instructor Quality on Satisfaction is 0.294, indicating that higher Instructor Quality significantly increases Satisfaction.
- The direct effect of Information Content Quality on Usefulness is 0.450, indicating that higher Information Content Quality significantly increases Usefulness.

- The direct effect of Information Content Quality on Satisfaction is 0.432, indicating that higher Information Content Quality significantly increases Satisfaction.
- The direct effect of Usefulness on the Satisfaction Dimension is 0.191, indicating that higher Usefulness significantly increases Satisfaction.

The results above show that all variables of Instructor Quality, Information Content Quality, Usefulness, and Satisfaction have a direct influence on each of their variables.

The results of the path analysis indicate that both instructor quality and the quality of information content exert a statistically significant positive influence on users' perceived usefulness of the learning system. In other words, students who perceive instructors as responsive and learning materials as comprehensive/up-to-date tend to rate the learning system as more useful. This finding supports previous research. [15][16] which states that good material design and effective instructor teaching methods can increase the perceived usefulness of learning technology, as well as strengthen system value and student satisfaction. Perceived usefulness has been shown to be an important mediator that directly influences learning satisfaction. Students' satisfaction tends to increase as they perceive that the LMS or e-learning system effectively enhances their learning performance. Put differently, the perceived usefulness of an online learning platform serves as a significant predictor of learners' satisfaction.

In addition to perceived usefulness, instructor quality and information content also have an indirect influence on student satisfaction. Supportive instructors and comprehensive learning materials can increase satisfaction, although their effects occur through perceived usefulness. Other research [17] also shows that responsive and thoughtful instructors can increase e-learning user satisfaction, although content quality alone does not always have a direct impact.

Overall, this research model demonstrates that the instructional dimensions (instructor and content) and perceived usefulness can collectively significantly explain students' learning satisfaction levels. These findings reinforce previous literature demonstrating the relationship between instructor quality, content, and perceived usefulness in determining the success of a learning system. Therefore, enhancing the role of instructors and providing informative content is crucial to supporting learning effectiveness, particularly for accounting students at the Faculty of Economics, State University of Medan.

4 Conclusion

The conclusions summarized by the researchers in the study "Evaluating the Success of Implementing a Learning Management System with the ISSM Model in Additional Accounting Learning at the Faculty of Economics, State University of Medan" showed that Overall, this research model explains 54.4% of the variation in perceived usefulness and 79% in satisfaction, which is considered substantial. This means that the majority of student satisfaction with the LMS can be explained by instructor quality, content quality, and perceived usefulness. Therefore, the success of an LMS implementation is not solely determined by technological aspects but is also significantly influenced by the quality of learning provided through the system. The findings highlight the crucial roles of content quality, instructor effectiveness, and learner autonomy in enhancing the success of learning conducted through Learning Management Systems. At the same time, students are encouraged to increase their learning independence while still receiving adequate instructional guidance. These overall results

demonstrate that the success of the SIPDA LMS lies in the synergy between instructors, content, and students' perceived usefulness, ultimately increasing satisfaction and the effectiveness of accounting learning in higher education.

Suggestion for Lecturers or instructors need to be provided with ongoing training in LMS utilization, both pedagogically and technically. This is important because instructor quality has been shown to significantly influence student perceptions of usability and satisfaction. Instructors are advised to more actively utilize interactive LMS features, such as discussion forums, quizzes, and learning videos, to increase student engagement. And also Teaching materials uploaded to the LMS should be consistently updated, relevant to developments in accounting science, and presented in more interactive formats (e.g., videos, infographics, and simulations). Meanwhile Content needs to be developed with student needs in mind to strengthen conceptual understanding and practical skills. Integrating the LMS with other applications, such as plagiarism checkers or accounting software, can be considered to make learning more contextual and practical. And last Regular monitoring and evaluation are necessary to assess the extent to which the LMS actually improves student learning outcomes.

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