

Investigating Digital Learning Materials Acceptance Through Self-Efficacy and the Technology Acceptance Model

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ARTICLE INFO

Keywords: Digital Learning Materials, Higher Education, Self-Efficacy, TAM

Received : 20, June

Revised : 12, July

Accepted: 22, August

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ABSTRACT

This study aims to examine the causality of the determinants of intention to use digital learning materials in higher education. A quantitative approach and SEM-PLS analysis techniques were used to measure causality between variables in this study. The sample in this study consisted of 116 respondents from two state universities in Indonesia. The results showed that self-efficacy has a positive influence on the perception of usefulness and perceived ease of use of digital learning materials. Meanwhile, the perception of usefulness does not have a positive impact on attitudes towards using digital learning materials. Meanwhile, attitudes towards using digital learning materials have a positive influence on the intention to use digital learning materials, which can encourage students to use digital learning materials more frequently than conventional ones.

INTRODUCTION

Technology is an inseparable aspect of our daily lives. Technology can disrupt various sectors through continuously evolving innovations. This disruption transforms the fabric of life, transforming it from non-existent to existing and becoming a habit. Some technologies simplify our work, offering effectiveness and efficiency in various modern human activities. This positive impact makes people increasingly comfortable with technology in meeting their daily needs.

The current massive escalation of technological development is changing the learning paradigm in the educational sector, which is increasingly integrated with digital technology, which must keep pace with the times. This is especially true in higher education, which plays a key role in the emergence of the latest innovations for the advancement of science and improving the quality of the learning process. Aspects within the learning component are shifting toward digital with the increasing use of educational technology. One such component is teaching materials. Teaching materials are materials prepared by lecturers that serve to achieve predetermined learning objectives in accordance with course learning outcomes. Teaching materials can include textbooks, videos, modules, and e-books, accessible through various digital platforms (Sunley et al., 2019; Tran & Herzig, 2023).

In the current era, teaching materials are shifting toward digital to support a more adaptive learning process. This shift not only transforms the form of teaching materials from traditional to digital but also shifts the learning paradigm, enabling flexible, interactive, and student-centered learning in line with 21st-century learning needs (Adtani et al., 2025; Romero Rodrigo et al., 2025). The transformation of teaching materials to digital currently includes the use of instructional videos, virtual laboratories (Zhang & Hou, 2017), learning management systems, massive open online courses (MOOCs), and virtual reality technology (Hari Rajan et al., 2025), which is increasingly being implemented in higher education, including augmented reality technology (Adi et al., 2025).

Student acceptance of digital learning materials is a crucial factor supporting this transformation in the dynamic higher education environment. High student acceptance of digital technology-based learning materials will further support educational institutions' continued commitment to providing technology to optimally support classroom learning. Conversely, low student acceptance of digital learning materials is a factor inhibiting the penetration of technology-based learning innovations in higher education.

In practice, in the classroom, not all students may be willing to accept digital learning materials, even if they are widely available. This is because confidence in digital learning materials is influenced by perceived usefulness (Pillai et al., 2024) and the ease of using digital learning materials as learning resources to support independent learning activities (Muawanah et al., 2024).

In the context of technology-based learning, self-efficacy is one of the determinants influencing technology acceptance in the teaching and learning process, especially in modern higher education environments. Students with high self-efficacy tend to be more receptive to innovations in learning, manage

technical and academic difficulties, and maintain consistent learning engagement despite facing various digital learning challenges. Self-efficacy is described as confidence in one's ability to organize and execute the actions necessary to achieve predetermined goals through the ability to overcome various learning challenges (Fathema et al., 2015; Mohamed & Al-Haderi, 2013).

Based on the explanation in the introduction, the researchers formulated the following research questions:

1. Does self-efficacy influence the perceived usefulness of digital learning materials?
2. Does self-efficacy influence the perceived ease of use of digital learning materials?
3. Does the perceived usefulness of digital learning materials influence students' attitudes toward using digital learning materials?
4. Does the perceived ease of use of digital learning materials influence students' attitudes toward using digital learning materials?
5. Does the perceived attitude toward using digital learning materials influence students' intentions to use digital learning materials?
6. Does the perceived usefulness mediate the influence of self-efficacy on students' attitudes toward using digital learning materials?
7. Does the perceived ease of use of digital learning materials mediate the influence of self-efficacy on attitudes toward using digital learning materials?

LITERATURE REVIEW

Intention to Use Digital Learning materials

Teaching materials are a collection of materials provided by lecturers that will be used to deliver material in class in a systematic and structured manner. Teaching materials are designed based on the learning outcomes to be achieved according to the applicable curriculum. Teaching materials have the potential to enhance the classroom learning process through more effective delivery. However, their success depends on factors such as individual attitudes toward the teaching materials, environmental support, the availability of adequate technological infrastructure, and effective design. The transformation of teaching materials from conventional to digital learning materials, in particular, requires specific adaptations for lecturers and students to ensure optimal learning. The availability of digital learning materials increases student accessibility, allowing them to access teaching materials anywhere and anytime (Cserkó et al., 2024; Huong et al., 2026).

This research will examine how students use teaching materials as learning resources, specifically regarding their acceptance of digital learning materials in higher education learning activities. The intention to use teaching materials is considered the best predictor of specific behaviors, particularly in the realm of technology acceptance in higher education, as it reflects an individual's readiness to adopt the technology.

Self Efficacy

Self-efficacy is a person's belief in their own ability to perform certain actions or actions to achieve specific outcomes when facing various situations and challenges (Vaughan-Johnston & Jacobson, 2020). Self-efficacy focuses on an individual's belief in their own ability to face challenges and achieve specific goals through consistent effort. Self-efficacy often influences an individual's motivation, behavior, and performance in various life and educational contexts (Cao et al., 2021; Vaughan-Johnston & Jacobson, 2020).

Self-efficacy is task-specific, unlike general concepts such as self-confidence or self-esteem, which are more general and comprehensive. Self-efficacy can be formed through direct experience, direct observation of someone's success, and also through social persuasion and support from the surrounding environment.

In higher education, student self-efficacy is essential for academic success in facing the various demands of modern learning. In this digital era, students are required to be confident in themselves to adapt to the transformational learning process that increasingly relies on the use of digital technology.

H1: Self-efficacy influences the perceived usefulness of digital learning materials

H2: Self-efficacy influences the perceived ease of use of digital learning materials

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a key predictor of technology acceptance (Or, 2024). TAM assumes that a person's use of technology is based on their attitude toward it, which is ultimately influenced by two primary beliefs: the perceived usefulness of the technology and the perceived ease of use. In the context of digital learning materials in higher education, the primary assumption is that a person will utilize digital learning materials if they facilitate and benefit students in the classroom learning process.

H3: Perceived ease of use of digital learning materials influences students' attitudes toward using digital learning materials.

H4: Perceived usefulness of digital learning materials influences students' attitudes toward using digital learning materials.

Attitudes towards the use of digital learning materials

Technology usage attitudes are described as an individual's affective evaluation, whether negative or positive, of a particular technology. Analogously, these attitudes are more like a person's sentiment toward the use of a particular technology. In the context of this research, attitudes are shaped by a person's cognitive attitudes toward digital learning materials implemented in higher education. Students tend to have positive attitudes toward technology if they perceive it as useful in supporting their studies.

H5: Students' attitudes towards digital learning materials influence their intention to use digital learning materials.

From the hypothesis formulated by the researcher, the conceptual framework of this research is presented in Figure 1.

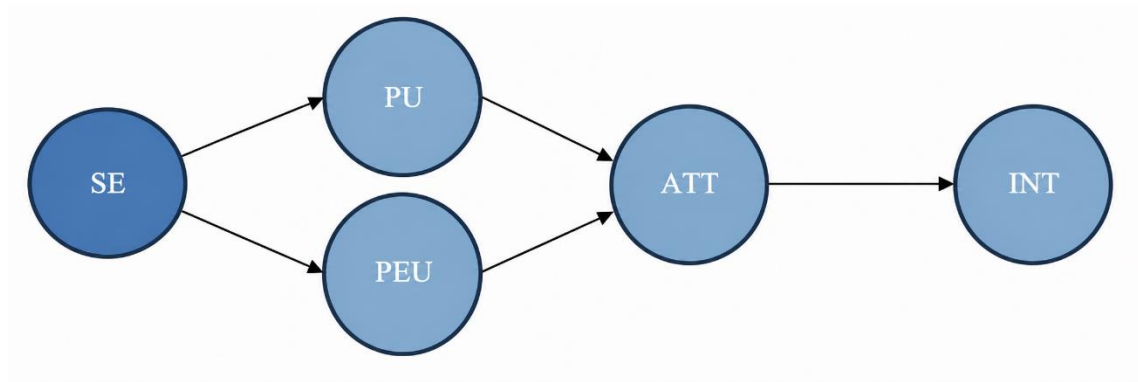


Figure 1. Conceptual Framework

METHODOLOGY

This research uses a quantitative approach focused on testing the relationships between variables by integrating Partial Least Squares-Structural Equational Modeling (PLS-SEM) analysis techniques. Using PLS-SEM as an analysis technique is appropriate for testing complex research models because it predicts the relationships between each variable formulated in the conceptual model.

Data in this study were collected using a Likert scale, which systematically measures respondents' perceptions and is sourced from primary data obtained directly from the research participants. Data collection was conducted by distributing questionnaires to the sample through media easily accessible to respondents. The sampling technique used was purposive sampling, with specific criteria in line with the stated research objectives. The sample criteria in this study were university students, students who had previously used digital learning materials, and those currently actively studying, thus able to provide relevant information.

The value of each variable was measured using indicators from various research sources. The research instruments in this study are presented in Table 1.

Table 1. Research instruments

Variables	Items	Source
Self-Efficacy (SE)	1. I can use digital learning resources or learning materials provided by lecturers (e-books, instructional videos, virtual laboratories and online libraries, learning materials on Sipejar, etc.), even if no one is around to show me how.	Adopted from (Singh et al., 2020) with some modification

	2. I can use online learning facilities, even if I have never used them before.	
	3. I can use digital learning facilities even if I have only seen others use them before trying them myself.	
Perceived usefulness of digital learning materials (PU)	1. I find digital collaboration platforms (Zoom/Hangout/Google Classroom) quite useful for attending lectures. 2. Using online learning platforms (instructional videos, virtual labs and online libraries, learning materials on Sipejar, etc.) makes it easier for me to understand the lecture material. 3. The digital learning materials provided by my lecturers allow me to use them to study anytime and anywhere.	Adopted from (Singh et al., 2020) with some modification
Perceived ease of use digital learning materials (PEU)	1. I found the digital collaboration platform easy to use. 2. The digital learning materials (e-books, instructional videos, virtual laboratories and online libraries, learning materials on Sipejar, etc.) delivered or provided by lecturers were easy to operate.	Adopted from (Singh et al., 2020) with some modification

Attitudes to using digital learning materials (ATT)	1. I am motivated to use digital collaboration platforms for my education. 2. I will use digital learning materials to support my education. 3. I find it easier to learn independently using digital learning materials without the involvement of a lecturer.	Adopted from (Singh et al., 2020) with some modification
Intention to use digital learning materials (INT)	1. I will continue to use digital learning materials to support my education. 2. I will increase the intensity of my use of digital learning materials as my primary learning aid. 3. I intend to use digital learning materials to complete my academic assignments on time without fail.	Adopted from (Singh et al., 2020) with some modification

Source: Primary data

DATA COLLECTION

Data were gathered through a questionnaire administered to participants who satisfied the predetermined sampling criteria. Eligible respondents were active university students with prior experience using digital learning materials as part of their learning activities. The number of valid responses obtained was sufficient to satisfy the recommended sample size requirements for Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis. Consequently, the dataset was considered appropriate for evaluating the proposed structural model and examining the causal relationships among the constructs included in this study.

RESEARCH RESULT

Profile of Respondents

Before conducting causality tests between variables, a summary of the study's respondent profiles was first performed. The profile of the study's respondents can be seen in Table 2.

Table 2. Respondents' Profile

Characteristic	Category	Frequency
University	State University of Malang	57
	Sebelas Maret University	59
Gender	Male	49
	Female	67
Semester	2	47
	4	25
	6	33

Source: Primary data

The respondents of this study consisted of students from the State University of Malang (N = 57) and Sebelas Maret University (N = 59). They were male (N = 49) and female (N = 67). The students were in their second, fourth, and sixth semesters.

Measurement Model (Outer Model) Evaluation

Before hypothesis testing, the outer model of the model was first measured. The goal was to assess the validity of the study. Validity serves to assess the instrument's accuracy in explaining the research construct. In the initial testing phase, indicators derived from the attitude variable (1 item), the intention variable (1 item), and the perceived usefulness variable (1 item) did not meet the outer loading threshold of <0.70 in the initial testing iteration. Therefore, these three items were removed from the model. However, the removal of these three items did not damage the model because each variable was still represented by the other items.

Convergent Validity

Convergent validity indicates the extent to which the research indicators explain the research construct. Convergent validity is measured using an outer loading >0.70 for each item and an Average Variance Extracted (AVE) value for each construct >0.50 (Hair, Sarstedt, et al., 2019). The convergent validity test in this study is presented in Table 3.

Table 3. Outer loading and AVE score

Construct	Item / Indicators	Outer Loading	AVE
Self Efficacy (SE)	SE1	0.860	0.707
	SE2	0.844	
	SE3	0.818	
Perceived Usefulness (PU)	PU1	0.792	0.640

	PU2	0.762	
	PU3	0.844	
Perceived ease of Use (PEU)	PEU1	0.874	0.765
	PEU2	0.875	
Attitude toward digital learning materials (ATT)	ATT1	0.913	0.843
	ATT2	0.923	
Intention to use digital learning materials	INT1	0.910	0.833
	INT2	0.915	

Source: Primary data

Table 3 shows that the outer loading values for all items were >0.70 , ranging from 0.762 to 0.923. The AVE value for each construct was >0.50 . Thus, convergent validity was met for all constructs in this study.

Reliability analysis

Reliability is crucial in quantitative research. It measures the consistency or consistency of an instrument in measuring the same event. In PLS-SEM research, reliability is measured using three main indicators: Cronbach's Alpha, rho_A, and Composite Reliability. The minimum threshold for all three is >0.70 (Hair, Black, et al., 2019; Hair, Sarstedt, et al., 2019). The test results for the three reliability indicators are presented in Table 4.

Table 4. Cronbach's Alpha, rho_A and Composite reliability score

Construct	Cronbach's Alpha	rho_A	Composite Reliability
Self Efficacy (SE)	0.793	0.793	0.707
Perceived usefulness (PU)	0.719	0.728	0.640
Perceived ease of use (PEU)	0.693	0.693	0.765
Attitude toward (ATT)	0.814	0.816	0.843
Intention to use digital learning materials (INT)	0.800	0.800	0.833

Source: Primary data

Discriminant Validity

Discriminant validity is a measurement used to determine the extent to which constructs differ empirically from one another. Discriminant validity testing uses the Fornell-Larcker Criterion, which requires the square root of the AVE value for each construct to be greater than the correlation between the other constructs. The discriminant validity test in this study is presented in Table 5.

Table 5. Fornell-Larcker Criterion

Construct	ATT	INT	PEU	PU	SE
AT	0.918				
INT	0.604	0.913			
PEU	0.535	0.455	0.875		
PU	0.505	0.500	0.618	0.800	
SE	0.219	0.229	0.308	0.257	0.841

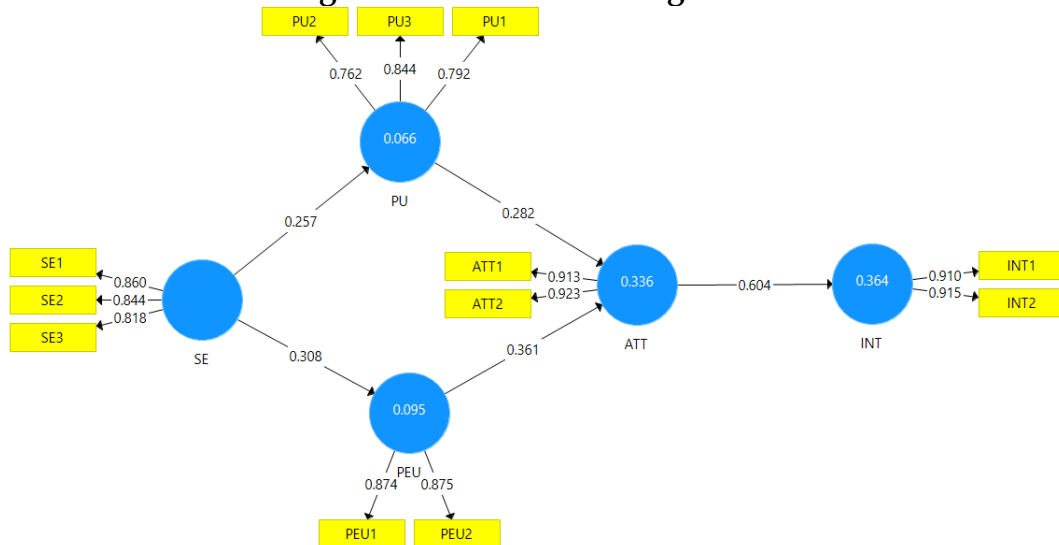
Source: Primary data

Collinearity Statistics

Collinearity tests are used to detect multicollinearity between exogenous variables in a research model. Multicollinearity can distort path coefficient estimates. The ideal VIF value for a construct is <5 (Hair, Black, et al., 2019). The VIF test results show a range from 1.00 to 1.617. This value is well within the tolerance limit, so no multicollinearity issues were found in the model.

Inner Model Analysis

The results of the PLS algorithm are visually presented in Figure 2. Figure 2 shows the outer loading values for all items used in this study.

Figure 2. Result of PLS Algorithm

Inner model evaluation serves to assess the model's predictive power. The inner model analysis in this study used the R^2 measure. The R^2 weighting criteria are as follows: (0.75 = strong; 0.50 = moderate; 0.25: weak). The results of the R^2 calculation for this study are presented in Table 6.

Table 6. R^2 value of the study

Endogenous Variabel	R^2	Category	Pathway
ATT	0.336	Moderate - weak	PEU → ATT PU → ATT
INT	0.364	Moderate - weak	ATT → INT
PEU	0.095	Weak	SE → PEU
PU	0.066	Weak	SE → PU

Source: Primary data

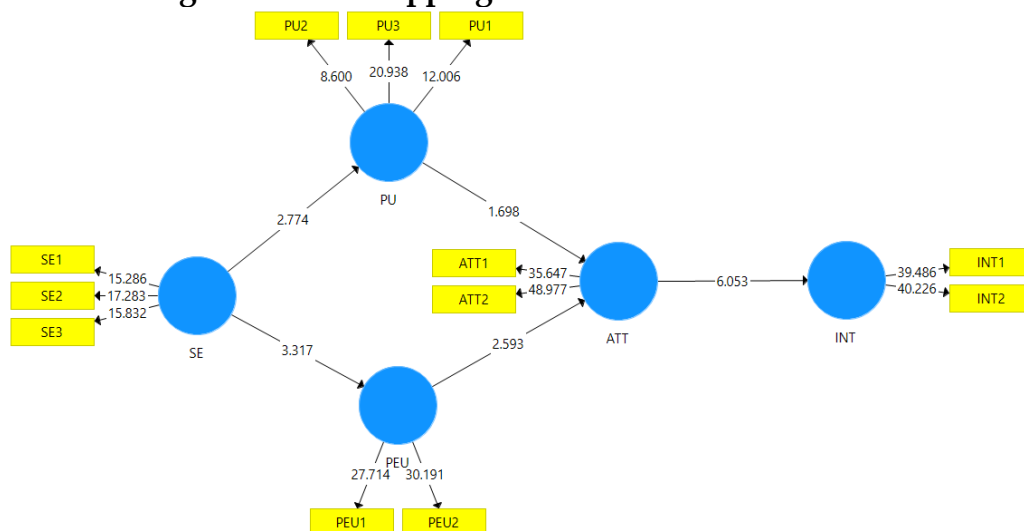
Based on the test results in Table 6, self-efficacy only explains a small portion of perceived usefulness (6.6%) and perceived ease of use (9.5%). These findings indicate that many other factors beyond the tested model contribute to these two perceptions. The perceived ease of use and usefulness variables contributed 33.6% to attitudes toward using digital learning materials. Meanwhile, the attitude toward digital learning materials variable contributed 36.4%. These findings fall into the moderate-weak and weak categories, indicating that many other factors influence the research model.

Hypothesis Testing

Hypothesis testing was conducted using a bootstrapping procedure with 500 subsamples in SmartPLS 3, at a significance level of $\alpha = 0.05$ (two-tailed). A path is considered significant if the T-statistic is > 1.96 or the P-value is < 0.05 . The results of the direct effect test (H1–H5) are shown in Table 8.

Figure 3 visually presents the bootstrapping test results, showing the T-statistic values for all outer model paths (indicator loadings) and inner model paths (structural path coefficients).

Figure 3. Bootstrapping results of Structural Model



Hypothesis testing was conducted to determine whether the proposed hypotheses were supported by the empirical data. In this study, a hypothesis is declared significant if the T-statistic is > 1.96 or the P-value is < 0.05 . The results of the research hypothesis testing are presented in Table 7.

Table 7. Research Hypothesis Test Results

Hypothesis	Pathways	T-Statistic	P-Values	Finding
H1	SE → PU	2.607	0.009	Supported
H2	SE → PEU	3.447	0.001	Supported
H3	PU → ATT	1.802	0.072	Not Supported
H4	PEU → ATT	2.734	0.006	Supported
H5	ATT → INT	6.070	0.000	Supported

Source: Primary data

Table 7 shows that of the five hypotheses, only one hypothesis was rejected: perceived usefulness on attitudes toward digital learning materials (H3). Self-efficacy was shown to have a positive influence on perceived usefulness of digital learning materials (H1 Supported). Self-efficacy was also shown to have a positive influence on perceived ease of use of digital learning materials (H2 Supported). Meanwhile, perceived ease of use had a positive influence on attitudes toward digital learning materials (H4 Supported). Similarly, attitudes toward digital learning materials had a positive influence on intentions to use digital learning materials (H5 Supported).

After testing the direct effect, a mediation test was used to examine the mediating effects of perceived usefulness and perceived ease of use on the relationship between self-efficacy and attitudes toward using digital learning materials (H6, H7). This test is used to examine the indirect effect of a variable. The results of this study are presented in Table 8.

Table 8. Results of the Indirect Effect Test

Hypothesis	Pathways Mediation	T-Statistics	P-Values	Finding
H6	SE → PU → ATT	1.600	0.110	Not Supported
H7	SE → PEU → ATT	1.824	0.069	Not Supported

Source; Primary data

Table 8 shows that the mediation effect is not supported. This is indicated by the T-statistic not reaching the threshold and the P-value being above 0.05. These results indicate that the variables of perceived ease of use and perceived usefulness did not successfully mediate the influence of self-efficacy on attitudes toward using digital learning materials.

DISCUSSION

The Influence of Self-Efficacy on the Perceived Usefulness and Ease of Use of Digital Learning Materials

Self-efficacy, in this context, refers to a person's confidence in completing a predetermined task. In the context of learning material acceptance, self-efficacy plays a role in shaping the perceived usefulness and ease of use of digital learning materials. The findings of this study indicate that self-efficacy has a significant positive influence on the perceived usefulness and ease of use of digital learning materials. This finding aligns with research conducted by (Aleassa et al., 2022; Panergayo & Aliazas, 2021). Self-efficacy is a key predictor in shaping the perceived ease and usefulness of digital learning materials, ultimately influencing students' intention to use digital learning materials for their learning activities. By increasing self-efficacy, either through training or technical support, users are more likely to accept and utilize digital learning materials effectively. This highlights the importance of interventions focused on strengthening user confidence in using technology.

The Influence of Perceived Usefulness on Attitudes toward Using Digital Learning Materials

Perceived usefulness refers to a person's belief that using learning materials will improve their productivity and abilities in the learning process. The availability of digital learning materials is expected to have a positive impact on students. When users perceive digital learning materials, they will improve their performance or learning outcomes. This includes the view that the technology can provide significant benefits in the learning process (Mustofa et al., 2025; Rubiyanti et al., 2023). The findings in this study indicate that perceived usefulness does not influence attitudes toward using digital learning materials. This finding may be influenced by negative experiences students may have had, leading to the perception that digital learning materials have no impact. This implication requires lecturers to be able to convince students that digital learning materials are essentially the same as conventional learning materials, but in a different format.

The Influence of Perceived Ease of Use on Attitudes Regarding the Use of Digital Learning Materials

The findings of this study indicate that perceived ease of use has a positive and significant influence on attitudes regarding the use of digital learning materials. Perceived ease of use reflects a person's belief that using digital learning materials is not difficult and can be done easily. High perceptions of ease of use increase user engagement in the digital learning process, which ultimately contributes to learning effectiveness (Xin et al., 2025)

The Influence of Attitudes Regarding the Use of Digital Learning Materials on Intention to Use Digital Learning Materials

Usage attitudes refer to an individual's positive or negative evaluation of the use of digital learning materials. These attitudes can be influenced by various factors, including prior experience, perceived ease of use, and perceived usefulness. The findings of this study indicate that attitudes toward the use of digital learning materials have a positive influence, meaning that when students have a positive view of digital learning materials, it increases their likelihood of adopting digital learning materials in their learning process.

The mediating role of perceived usefulness and perceived ease of use

The second mediation hypothesis in this study was not fully proven. Perceived usefulness and perceived ease of use failed to mediate the influence of self-efficacy on attitudes toward using digital learning materials. This failure of perceived usefulness to mediate is consistent with the insignificant influence of perceived usefulness on attitudes toward using learning materials. Therefore, structurally, there is no basis for perceived usefulness to be a pathway from self-efficacy to attitudes toward using learning materials.

Meanwhile, mediation through perceived ease of use indicates an indirect effect that is not yet strong enough to warrant a conclusion at this time. Future research could potentially increase the sample size to a larger size, potentially achieving significance through a larger sample size.

CONCLUSIONS AND RECOMMENDATIONS

This study aims to examine the determinants of student acceptance of digital learning materials in the context of higher education in Indonesia. The study involved 116 respondents from two state universities in Indonesia who met the sample criteria. PLS-SEM analysis was used as the primary data analysis technique to examine the relationships between the research constructs.

This study successfully found a positive and significant influence of self-efficacy on students' perceived usefulness and perceived ease of use of digital learning materials in supporting their learning activities. This further confirms that higher student self-confidence strengthens their perceptions of digital learning materials in terms of both usefulness and ease of use.

However, perceived usefulness did not influence attitudes toward using digital learning materials among the respondents in this study. This is a novel finding that offers a different perspective from previous research, challenging the prevailing dominance. The findings of this study have implications for universities in the future: when developing teaching materials, they must prioritize ease of use first to foster positive student attitudes before it can translate into usefulness.

ADVANCED RESEARCH

Future research needs to expand this sample by involving more universities. Adopting a longitudinal design will also be critical; it allows researchers to track how students' acceptance of digital learning materials shifts over time, rather than just taking a temporary snapshot. Beyond expanding the sample, the Technology Acceptance Model (TAM) itself should be broader. Integrating factors like digital literacy, trust, and lecturer support will drastically improve the model's explanatory power, offering a much clearer picture of digital adoption.

ACKNOWLEDGMENT

This research was made possible through institutional funding provided by the Faculty of Economics and Business, State University of Malang, which we sincerely acknowledge. Special thanks must go to the students of State University of Malang and Universitas Sebelas Maret for voluntarily contributing their valuable time and insight. Their strong engagement during data collection was crucial in ensuring we gathered rich insights to complete this study exactly as planned

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