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Analysis of Factors Affecting the Quality of E-Learning and Student Learning Outcomes

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A B S T R A C T

This research examines the factors affecting the quality of e-learning and student learning outcomes at Universitas Terbuka. We sought to investigate the effect of these variables on the quality of e-learning and observe its impact on student learning outcomes. This study adopts a quantitative approach, where questionnaires are distributed through Google Forms and distributed directly to respondents to assess factors affecting the quality of e-learning and student learning outcomes. The study examined a sample size of 96 students across five regional offices at Universitas Terbuka. The statistical technique used for the analysis is linear regression in SPSS software. The study results indicate that media and material quality positively and significantly impact e-learning quality, while ease of use and information quality show no significant effect. Additionally, ease of use, information quality, material quality and media quality do not significantly affect learning outcomes. However, e-learning quality demonstrates a positive and significant influence on student learning outcomes.

INTRODUCTION

The rapid growth of online education and distance learning can be attributed to the technological advancements over the past few years. These platforms allow learners to access and study educational content anytime. (Allen & Seaman, 2017). The rise of video-based and e-learning instruction has also made these environments more effective (Broadbent & Poon, 2015). In education, digital transformation will strengthen the conventional face-to-face learning environment (Kaliappen et al., 2021).

As technology continues to evolve, its integration into education has become more prominent. E-learning, characterised by digital tools and internet resources, has emerged as a vital component of modern education; technology in modern education, such as the web and computers, has improved students' learning. It has also made retrieving and managing their information easier (Lameras & Arnab, 2022). Development with E-learning can help improve the quality of education by enabling more accessible and flexible learning. Through e-learning, students can access various resources based on their needs (Alenezi, 2023).

The development of communication and information technology is a central component of the educational landscape. It provides us new opportunities and challenges (Sukmayadi & Yahya, 2020). Technological advancements and their use globally make it more plausible for more technologies to be introduced in educational practices in educational institutions that can be categorized as distance learning (Refae et al., 2021). Accuracy, timeliness, completeness, relevance, and consistency are the criteria utilised in assessing a system's information quality within the context of the IS success model (Sahusilawane et al., 2024).

Technological advancements have expanded distance learning, with e-learning improving inclusivity and flexibility. Universitas Terbuka uses such platforms to reach students in remote Indonesian regions. However, challenges remain in enhancing e-learning's quality and impact on learning outcomes. Despite these advancements, there are various problems with e-learning at UT. One of these is the lack of access to learning sites. Although many students and teachers can access laptops and computers, they are not always used for teaching (Eze et al., 2018). These issues often lead to poor academic performance among students not well-acquainted with the e-learning system development (Al-Hunaiyyan et al., 2021; Johannsen et al., 2023). These challenges must be overcome to improve the quality of e-learning to ensure the delivery of the objectives of this learning program, such as self-instruction, which must be prioritized (Soko & Samo, 2022).

Information quality is one of the external factors that drives excellence in learning outcomes. The quality of the information provided to students is very important to give them a positive and enjoyable experience with e-learning; this includes having clear and concise information, providing them with updated content, and having attractive designs (Al-Fraihat et al., 2020). Quality information is relevant to students' needs; when the quality of information is enhanced in terms of accuracy, relevancy, completeness, timeliness, and

attractiveness, better teaching practices and learning outcomes will be fully realized (Riatun & Elissa Dwi Lestari, 2022).

However, the application of e-learning, though its importance in distance education is well-recognized, falls short of expectations at Universitas Terbuka, where it is not fully developed to provide online information retrieval services. There is also inequitable access to the UT website for students to extend their range of learning. In such circumstances, students jeopardise their grades when dealing with the final examination (Ujian Akhir Semester). Students who earn poor grades are not adequately exposed to e-learning services. This unfortunate situation is exacerbated when expanding e-learning opportunities to students in rural and remote areas with e-learning facilities that are limited in their ability to access the resources and manage the website (Ahmad et al., 2024). Another difficulty that students face daily arises when they struggle to understand the learning material delivered by the tutor. These learning materials have not mandated additional facilities such as Open Educational Resources (OER). It could reduce their engagement with learning materials and online classes (Raghavan Sathyan et al., 2022).

Zainal, (2017). Convey that learning achievement is observable and measurable. Determining it is critical to measure what students have achieved individually and collaboratively upon completing a course or a program. Learning achievement serves not only as an indicator of individual success in each course or program but also as a quality indicator of the educational institution. According to (Miranda & Sulaiman, 2022).

The usefulness of learning media and the perceived ease of use have been critical considerations in recent years. More recent research has expanded this model to show a direct correlation between these factors and learning outcomes. According to Nagy (2018), Students who consider learning media useful are more likely to improve their academic performance and cognitive engagement. Similarly, (Al-Gahtani, 2016) Revealed that educational technology users are more likely to feel satisfied and motivated. Understanding the various factors that affect the quality of e-learning is very important to ensure that the students' outcomes are improved.

This study aims to identify the influence of media quality, material quality, ease of use, and information quality on the quality of e-learning and to see the influence of e-learning quality on student learning outcomes. This research contributes by investigating key factors such as media quality, material quality, ease of use, and information quality that influence the effectiveness of e-learning. Through a comprehensive analysis, this study highlights the significant role that media and material quality play in enhancing e-learning quality and learning outcomes, thereby filling a research gap in understanding how these factors interrelate on a large scale in distance learning.

LITERATURE REVIEW

Media Quality

High-quality media enhances engagement and retention, fostering better learning outcomes. For instance, Liu et al. noted that the characteristics of online

learning behaviours significantly correlate with course outcomes, suggesting that media quality can directly impact students' academic performance (Liu et al., 2023). Similarly, Darda et al. discussed how media elements must be tailored to student needs to improve learning experiences during the pandemic (Darda et al., 2023).

Material Quality

Material quality, including the relevance and clarity of educational resources, is equally essential. According to Pérez-Pérez et al., students' perceptions of learning outcomes are heavily influenced by the quality of materials provided through learning platforms (Pérez-Pérez et al., 2020). The alignment of material quality with academic standards and learners' expectations ensures that educational resources are informative and enriching, leading to improved engagement and comprehension. Focusing on high-quality educational content ensures students can effectively navigate learning platforms and access valuable information.

Ease of Use

Ease of use pertains to the accessibility and user-friendliness of online learning environments. A systematic review by Dong et al. highlighted that students' self-regulated learning abilities are directly affected by the ease of use of online platforms (Dong et al., 2024). If a system is intuitive and simple to navigate, students can focus more on their learning rather than troubleshooting technical difficulties. Consequently, a well-designed interface fosters a positive learning atmosphere, increasing satisfaction and better academic performance.

Information Quality

Information quality encompasses the accuracy, reliability, and relevance of educational content. In online learning contexts, the credibility of the information provided is paramount, as it shapes students' understanding and ability to apply what they have learned. Liu et al. found that appropriate and accurate information improves educational outcomes (Liu et al., 2023). Strengthening the quality of information presented in online courses improves academic performance and builds students' trust in the educational system, facilitating deeper engagement with the material (Liu et al., 2023; Pérez-Pérez et al., 2020).

Learning Outcomes

The literature indicates that students who engage with quality media and material, navigate user-friendly platforms, and access reliable information tend to achieve better academic results. Moreover, research demonstrates a clear link between these factors and various aspects of student satisfaction and well-being in educational settings (Dong et al., 2024).

METHODOLOGY

Research Method

This study explains the influence of independent variables on dependent variables, focusing on factors that affect the quality of e-learning and student learning outcomes. This study has two models:

$$Y_i=∅_0+∅_1 X_1i+∅_2 X_2i+∅_3 X_3i+〖∅_4 X_4i+e〗_i$$

In model 1, the dependent variable is Y, representing the quality of e-learning. The independent variable X1 is Ease of Use, X2 is Information Quality, X3 is Material Quality, and X4 is Media Quality. The coefficients ∅1, ∅2, and ∅3 reflect the impacts of these factors on Y, while ei represents unexplained variability.

$$Y_i=∅_0+∅_1 X_1i+∅_2 X_2i+∅_3 X_3i+∅_4 X_4i+∅_5 X_5i+e_i$$

In model 2, the dependent variable is Y, representing the learning outcomes. The independent variable X1 is Ease of Use, X2 is Information Quality, X3 is Material Quality, X4 is Media Quality, and X5 is the quality of e-learning. The coefficients ∅1, ∅2, ∅3 and ∅4 reflect the impacts of these factors on Y, while ei represents unexplained variability.

Data

We researched the five regional offices of the Universitas Terbuka: Ambon, Denpasar, Samarinda, Manado and Surabaya. The primary source of study data consisted of responses given by participants to disseminated questionnaires. The research population comprises students from the Universitas Terbuka who use e-learning learning media.

The sampling approach employed in this study is purposive sampling (Supardianto et al., 2019). The population for this study consisted of 96 respondents who were respondents to the survey conducted and utilised the e-learning system. The data for this study was obtained through the administration of questionnaires and the observation process. In the context of data collection, the questionnaire is distributed to participants using Google Forms and distributed directly. The Likert Scale is a commonly used measurement tool by researchers when designing and implementing surveys. The collected data was then analyzed using various multiple linear regression analysis approaches. Analyze results in terms of internal reliability. The Cronbach alpha test with IBM SPSS software was used to analyse the results' internal reliability. It helped to draw suitable conclusions (Elareshi et al., 2022).

RESEARCH RESULTS

From the 3rd to the 8th semester, we distributed 105 questionnaires to non-Basic Education students. Of the 105, 101 respondents (96%) returned them. The column labelled “usable returns” includes all the returned forms that could

be used for further data processing. We acquired 96 usable returns for analysis, accounting for 91% of the questionnaires.

Result of Data Analysis

Model 1 presents the analysis of ease of use, information quality, material quality and media quality on the quality of e-learning Data should be sufficiently accurate for the intended objectives of the study and measure what is supposed to be measured. Hence, we settled on test reliability and validity to serve the imperative for maintaining data quality standards. Table 1 shows the regression results of the effect of ease of use, information quality, material quality and media quality on the quality of e-learning.

Table 1. Regression Analysis Model 1

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.848	1.633		.519	.605
	Ease of use	.136	.091	.102	1.485	.141
	Information quality	.043	.093	.039	.465	.643
	Material quality	.550	.113	.412	4.887	.000
	Media quality	.706	.137	.425	5.145	.000
R^2	: 0.782					
F_{Cal}	: 81.868					
Sig	: 0.000					

a. Dependent variable: quality of e-learning

F_{Cal} in ANOVA is 81.868 with a significance of F test showing a p-value of 0,000 (< 0.05). This leads to ease of use, information quality, material quality, and media quality, which are statistically significant in the quality of e-learning. R2 of 0,782 implies that the four independent variables could explain 78.2% of the variation in the quality of e-learning. The remaining 0,218, or 21.8%, accounts for other factors not included in the model.

Regarding the partial test, both media quality and material quality gained a significance of 0.000 (<0.05), with the former standing at 5.145 and the latter at 4.887. Both had positive and significant partial effects on the quality of e-learning. However, the t-statistics of information quality and ease of use are not similar to those of the prior two variables. Information quality gained a significance of 0.643 (>0.05) with a T_{Cal} of 0.645, indicating a positive but insignificant effect on the quality of e-learning. As for ease of use, the significance level is less than 0.05, i.e., 0.141, with T_{Cal} of 1.485, also indicating a positive but insignificant effect on the quality of e-learning.

Model 2 analyses ease of use, information quality, material quality, media quality, and e-learning quality on learning outcomes. Table 2 provides the regression results of the effect of ease of use, information quality, material quality, media quality and e-learning quality on learning outcomes.

Table 2. Regression Analysis Model 2

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.467	1.757		.266	.791
	Ease of use	-.124	.099	-.099	-1.248	.215
	Information quality	.150	.100	.144	1.507	.135
	Material quality	.129	.136	.103	.946	.347
	Media quality	.227	.168	.146	1.355	.179
	Quality of e-learning	.550	.113	.587	4.887	.000

R^2 : 0.717
F_{Cal} : 45.601
Sig : 0.000

a. Dependent variable: learning outcomes

F_{Cal} in ANOVA is 45.601 with a significance of F test showing a p-value of 0,000 (< 0.05). This leads to the simultaneous effect of ease of use, information quality, material quality, and media quality, including the quality of e-learning, being statistically significant in learning outcomes. The resulting r2 of 0.717 implies that the five independent variables could explain 71.7% of the variation in the learning outcomes. The remaining 0,283, or 28.3%, accounts for other factors not included in the model.

Regarding the partial T-test, the quality of e-learning gained a significance of 0.000 (<0.05) with a T_{Cal} of 4.887, indicating a positive and significant effect on learning outcomes. The other independent variables showed an insignificant relationship with learning outcomes, with media quality standing at a significance level of 0.179 (>0.05), material quality at 0.347 (>0.05), information quality at 0.135 (>0.05), and ease of use at 0.141 (>0.05). However, ease of use, though insignificant, showed a positive effect on learning outcomes with a T_{Cal} of 1.485.

DISCUSSION

The Effect of Ease of Use, Information Quality, Material Quality and Media Quality on the Quality of E-Learning

We have looked at the possible statistically significant differences in the dependent variables because of the effects of the independent variables. F test, as previously shown, informs that the simultaneous effect of the independent variables was significant on the quality of e-learning with a probability value of 0,000 < 0,05. This finding provides us with a representation and understanding of the simultaneous relationship between several independent variables and the quality of e-learning. Regarding partial testing, we have understood that material quality and media quality partially significantly affect the quality of e-learning by 5%. Maintaining and improving the quality of learning materials and learning media is very important for the quality of e-learning.

The results of the above analysis underline the importance of providing interactive learning media and structured materials to increase student satisfaction in online learning. However, the ease of use and quality of information did not significantly impact, which can be linked to the perception of students who may prioritize the substance rather than the platform's technical features.

These findings are consistent with previous literature showing that the success of e-learning is often influenced more by pedagogical aspects and content interaction by using online digital platforms. Thus, Universitas Terbuka needs to focus on optimizing multimedia-based learning content and ensuring the relevance of teaching materials to student needs.

According to Kurniawan et al. (2024) and Kwangmuang et al. (2021), Virtual, interactive platforms and online collaborations through electronic devices create a more effective way to integrate content and learning methods. Therefore, in distance learning today, students can choose from many media to support learning. Ideally, the media quality chosen under certain learning conditions depends on the learning objectives and how well the material quality can support those objectives.

Other findings are that ease of use and information quality did not significantly affect the quality of e-learning. Though E-learning has expanded rapidly and can potentially extend educational opportunities further, the current design and implementation at Universitas Terbuka have met substantial challenges regarding the insufficiency of facilities and poor participation among particularly least-prepared students. In addition, a study conducted by Hiltz and Turoff (2005) indicates that while technology can support effective learning, all learning experiences that are available face-to-face are also available in a digital form that is at least equally effective. Similarly, Panigrahi et al. (2021) state that Systems and service quality are often linked to student engagement constructs. E-learning institutions should focus more on information systems parameters to ensure learners are engaged. Thus, while the flexibility of e-learning is attractive and supported by adequate information quality, it is very important to maximize its potential.

The Effect of Ease of Use, Information Quality, Material Quality, Media Quality and the Quality of E-Learning on Learning Outcomes

In model 2, we treated the quality of e-learning no longer as an outcome variable but as a predictor variable or independent variable that was predicted to affect the learning outcomes. Similar to model 1, the probability value in model 2 was 0,000 < 0,05, indicating the significant simultaneous effect of ease of use, information quality, material quality, and media quality, including the quality of e-learning on learning outcomes. The partial effect of e-learning quality was also statistically significant in learning outcomes at 5%.

From these results, the quality of e-learning proved to be a significant predictor of student learning outcomes. In contrast, other independent variables, such as media quality, material quality, information quality, and ease of use, did not show a significant relationship. This shows that active student engagement with a quality e-learning system can improve their academic achievement; the practical implications of these findings are the importance of improving the user

experience by adding interactive features and providing guidance for students to maximize the use of e-learning platforms to get maximum learning outcomes

Our finding is consistent with Darliah (2016). We believe e-learning delves into the relationship between students' learning approaches and outcomes. This means that the focus of e-learning methods is on strengthening students' capacities to act progressively through the appropriate acquisition of relevant knowledge and valuable skills to increase the likelihood that learning outcomes provide the best possible learning experiences for all subjects (Agrícolas et al., 2019).

These studies have shown that factors such as media quality, material quality, information quality, and ease of use do not significantly affect students' learning outcomes at Universitas Terbuka. These findings indicate that these factors need to be more robust to improve the performance of online learners. Despite the increasing number of online education programs, many factors preventing students from achieving success remain the same. These include the need for more participation and better-quality learning platforms. According to Arfani et al. (2024), an institution's infrastructure and learning facilities can also be regarded as factors contributing to a better quality of education. Despite the technological infrastructure that can be used to improve education quality, the challenges preventing students from achieving academic success are still significant (Keržič et al., 2021) (Riatun & Elissa Dwi Lestari, 2022) (Taha & Abdulrahman, 2023).

CONCLUSION AND RECOMMENDATION

We have framed the subject of interest theoretically and methodologically and come to several conclusions: Dealing with the variation of ease of use, information quality, material quality, and media quality simultaneously, based on empirical evidence of the F test, helps understand the better quality of e-learning and learning outcomes. The partial T-test in model 1 resulted in a positive and significant effect of media and material quality on the quality of e-learning. In contrast, ease of use and information quality did not fit neatly into this statistical pattern. The partial T-test in model 2 highlights the positive and significant effect of the quality of e-learning on learning outcomes, providing evidence that students who took on e-learning more effectively gained better learning outcomes.

ADVANCED RESEARCH

Subsequent research can expand this study by incorporating mediating or moderating variables such as student motivation, digital literacy, or tutor involvement to better understand the indirect effects on learning outcomes. Comparative studies across different regions or institutions could also reveal contextual differences in e-learning effectiveness. Further, the role of tutor interaction and feedback in shaping e-learning experiences warrants investigation.

ADVANCED RESEARCH

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