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# The Influence of System Quality, Information Quality, and Service Quality on E-Learning User Satisfaction at UIN Walisongo Semarang

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**ABSTRACT**
State Islamic University (UIN) Walisongo Semarang uses the e-learning system as an online learning support, but students still face obstacles such as system errors, slow access, and data that is not updated. This study aims to analyze the influence of system quality, information quality, and service quality on user satisfaction using the DeLone and McLean models. The quantitative method was used through the distribution of questionnaires to 97 students of the 2020 cohort, and the data were analyzed using SmartPLS 3. The results showed that the quality of the system had no significant effect ($t = 0.658$; $p > 0.05$), the quality of service was also insignificant ($t = 1.539$; $p > 0.05$), while the quality of information had a significant effect on user satisfaction ($t = 2.853$; $p < 0.05$). This research contributes to the understanding of the factors that determine the success of e-learning, as well as provides practical implications in the form of the need to improve system stability, improve information features, and strengthen technical services to improve the student learning experience.



## 1. Introduction

Science and technology (IPTEK) are developing rapidly along with the changing times. This leads to the emergence of new technologies that are inevitable because science and technology offer various conveniences for human life. With the current development of science and technology, the community is required to further improve its skills and competencies so that society can balance itself in this modern era. Science and technology itself is the beginning of the success of a nation because it is able to create something new that did not exist before [1]. Science and technology have experienced various advances in several fields, one of which is in the field of education. All forms of the learning process can be done easily. This is characterized by the use of a blended learning model, which is a teaching and learning process that combines traditional learning methods with e-learning (online) methods. Digital technology is gradually replacing the old learning process with new learning methods that are more effective and efficient. This technology plays an important role in making access to knowledge and information easier and wider [2] [3]. The phenomenon of the development of science and technology has a significant impact on the world of education. This is evidenced by the ease of access to learning resources, the application of individual learning models and blended learning, and the use of ICT (such as multimedia and media or e-learning, web-learning, mobile learning, etc. in learning) [4].

E-learning plays an important role in today's era of education. The COVID-19 pandemic is undoubtedly one of the reasons for the use of e-learning in Indonesia. Since the coronavirus spread in Indonesia, the government has tried to stop the spread of the virus through regulations that implement distance learning. Every educational institution is required to conduct distance learning, teachers must teach from home, and students receive materials from home. To support this learning, one of the methods that can be used is to utilize digital learning or e-learning [2]**.** Learning activities are now optimized through the use of information technology at UIN Walisongo Semarang, which is one of the universities

that implements the learning process using e-learning, which can be accessed at URL: https://elearning.walisongo.ac.id/. This e-learning was first published in 2020 with the practice of using the blended learning method. Blended learning activities are carried out online using video conferencing platforms. Instead, assignments and material delivery are executed through a Moodle-based e-learning platform (Modular Object Oriented Dynamic Learning Environment) [5]. E-learning used by UIN Walisongo Semarang in its learning process is expected to be able to improve students' academic achievement because of its flexible and easy-to-use nature. Although e-learning has many benefits, there are also some obstacles in its implementation. Based on the preliminary research conducted, several obstacles were found to be faced by UIN Walisongo Semarang students in using the e-learning system, including frequent system errors, sudden logouts, difficulty accessing the system, slow system response to commands, outdated data, and others. On this basis, this study will further examine system quality, information quality, and service quality in relation to e-learning user satisfaction at UIN Walisongo Semarang.

## 2. Method

This study is an explanatory study, which is a type of research used to test the relationship between several variables studied, as shown in Table 1, namely between independent and dependent variables. This study has three independent variables (system quality, information quality, and service quality) and one dependent variable (user satisfaction). The approach used in this study is a quantitative approach. The population in this study consists of 2020 students of UIN Walisongo Semarang, totaling 3,371 students divided into 8 faculties. In sampling, the researcher used the Slovin formula with a confidence level of 10%. Thus, from the calculation using the Slovin formula, 97 samples were obtained. The sampling technique used is stratified random sampling. The source of the data comes from primary data obtained from the distribution of questionnaires through Google Forms, which is distributed by researchers through the WhatsApp application. The researcher distributed questionnaires through friends and WhatsApp groups of UIN Walisongo Semarang students from the class of 2020, who were e-learning users who met the respondents' criteria. The research data measurement tool used interval data with a Likert scale, with 5 points used to answer questions in the questionnaire. Point 1 indicates Strongly Agree, point 2 indicates Agree, point 3 indicates Neutral, point 4 indicates Disagree, and point 5 indicates Strongly Disagree. The data analysis of this study uses the Structural Equation Modelling Partial Least Squares (SEM-PLS) method with SmartPLS software version 3, because SEM can test complex research simultaneously and is able to analyze variables that cannot be measured directly by considering their measurement errors. In addition, SEM-PLS is effective for relatively small samples, making it a solution to the limitations of sample sizes while the models under construction are complex. In SEM-PLS, there are two models of the evaluation stage, namely [6] [7] the measurement model (external model) and the evaluation model (inner model) [8].

### 2.1. Variables and Indicators

**Table 1.** Variables and Indicators

| Independent Variables | Indicators | Items | Not. Thing |
|---|---|---|---|
| *System Quality* (X1) | *Response time* | 1. E-Learning responds quickly to user requests | X1.1 |
| | | 2. E-Learning does not experience errors when used | X1.2 |
| | | 3. E-Learning is able to transfer data quickly | X1.3 |
| | *System Flexibility* | 1. E-Learning can be accessed through the website | X1.4 |
| | | 2. E-Learning is easy to use and can be accessed anytime and anywhere | X1.5 |
| | | 3. Easy-to-understand e-learning features | X1.6 |
| | *Latest* | 1. E-Learning continues to update data according to changes that occur | X1.7 |

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| Independent Variables | Indicators | Items | Not. Thing |
|---|---|---|---|
| | | 2. E-Learning provides up-to-date data without causing errors | X1.8 |
| | | 3. E-Learning provides complete and complete data during the update process | X1.9 |
| *Quality of Information* (X2) | *Completeness* | 1. E-Learning provides detailed information | X2.1 |
| | | 2. E-Learning provides up-to-date information | X2.2 |
| | | 3. E-Learning provides complete information without anything being omitted | X2.3 |
| | *Easy to understand* | 1. E-Learning provides information that is easy to understand and read | X2.4 |
| | | 2. E-Learning provides simple yet clear and concise information | X2.5 |
| | | 3. E-Learning provides easy information. | X2.6 |
| | *Accurate* | 1. E-Learning provides reliable information | X2.7 |
| | | 2. E-Learning provides valid information | X2.8 |
| | | 3. E-Learning provides relevant information | X2.9 |
| | *Consistent* | 1. E-Learning provides error-free information | X2.10 |
| | | 2. E-Learning provides timely information according to the needs of users | X2.11 |
| | | 3. E-Learning provides information in an appropriate format, both in the data structure and notation used | X2.12 |
| *Quality of Service* (X3) | *Guarantee* | 1. E-Learning provides system protection or security | X3.1 |
| | | 2. E-Learning can be accessed according to the needs of the user | X3.2 |
| | | 3. E-Learning works well without any interruptions | X3.3 |
| | *Resolute* | 1. E-Learning understands user needs with fast and relevant responses | X3.4 |
| | | 2. E-learning technicians actively interact with users | X3.5 |
| | | 3. E-learning technicians can solve user problems and needs | X3.6 |
| | *System Responsiveness* | 1. E-learning engineers are very responsive when something goes wrong | X3.7 |
| | | 2. E-Learning can solve problems quickly | X3.8 |
| | | 3. The e-learning technician is easy to contact if the user encounters difficulties. | X3.9 |

| Dependent Variable | Indicators | Items | Not. Thing |
|---|---|---|---|
| *User Satisfaction* (Y) | *Information Satisfaction* | 1. The information available is quite helpful and meets the needs | Y1.1 |
| | | 2. E-Learning provides relevant, accurate, and reliable information | Y1.2 |
| | | 3. The information presented is easy for users to understand and not too technical | Y1.3 |
| | *Overall Satisfaction* | 1. E-Learning works well according to the expectations and needs of users | Y1.4 |
| | | 2. The e-learning system is easy for users to implement | Y1.5 |
| | | 3. Using e-learning speeds up users' work | Y1.6 |
| | *Effectiveness* | 1. The information provided by e-learning helps users in completing tasks | Y1.7 |
| | | 2. E-Learning makes users more productive in carrying out tasks | Y1.8 |
| | | 3. E-Learning makes it easy for users without spending a lot of time and effort | Y1.9 |
| | *System Satisfaction* | 1. E-Learning provides all the features that users need to carry out tasks | Y1.10 |
| | | 2. The e-learning system ensures the security of the data accessed by users | Y1.11 |
| | | 3. The e-learning system runs smoothly without interruption | Y1.12 |

### 2.2. Evaluation of Measurement Models (External Models)

The measurement model (external model) represents the first phase of model evaluation. This model focuses on the relationship between latent variables and their indicators. The evaluation of this model was carried out using non-parametric assessment criteria that utilized bootstrapping and blindfold procedures. In evaluating this model, the focus is on assessing the validity and reliability of construct and indicator measurements. In SEM-PLS, this measurement stage is referred to as the validity of the test construct. The evaluation of this model includes two measurement models: reflective and formative measurement models [9].

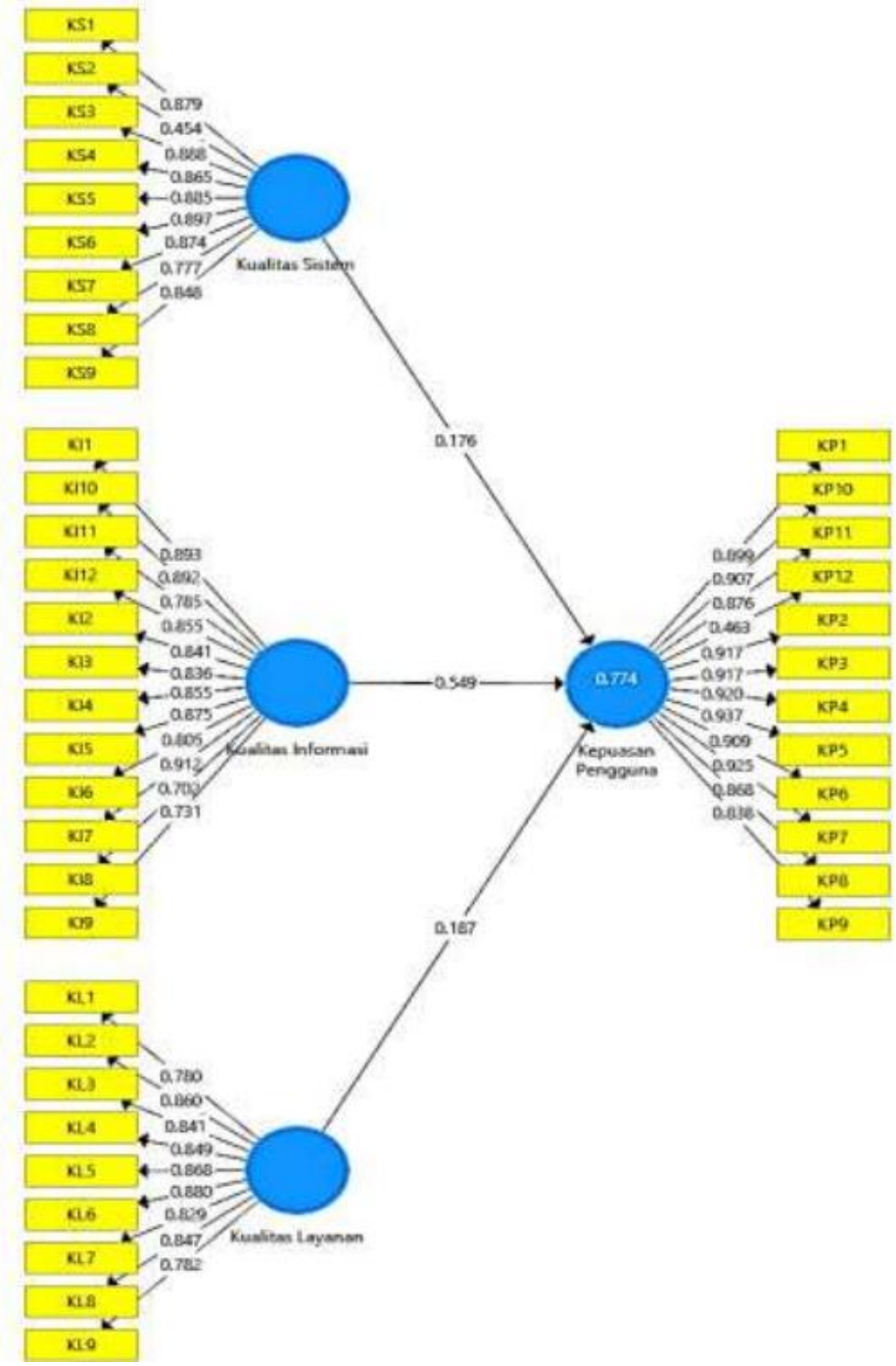


**Figure 1**. Model PLS SEM

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In SEM-PLS, the determination of the type of indicator is an important aspect because the model evaluation procedure differs between reflective and formative indicators. In this study, the variables of system quality, information quality, service quality, and user satisfaction were modeled as reflective constructs, so that the measurement evaluation was carried out through convergent validity, discriminant validity, and reliability tests. The validity of the convergence is seen from the AVE value, which must exceed 0.5, and the loading factor above 0.7. The validity of the discriminant is ensured through a higher cross-loading value on the construct than on other constructs, as well as a larger AVE value than the correlation between constructs. Construct reliability was measured using Composite Reliability (> 0.7) and Cronbach's Alpha. However, the study also included Variance Inflation Factor (VIF) testing, which is commonly used in formative constructs to ensure that there is no multicollinearity between indicators. The inclusion of the VIF test needs to be explained so that the reader does not assume that all variables are formative, as well as provide clarity that the analysis is carried out to confirm the stability of the model, even though the main construct is reflective.

Formative measurement, on the other hand, is concerned with ensuring that each mark specifies certain properties within the domain of construction. In formative measurement, indicators are supposed to actively contribute to the definition of the construct rather than reflecting latent variables. This method draws attention to the ways in which both measurement models assess the relationship between the construct and its indicators [9].

### 2.3. Evaluation of Structural Models (Inner Model)

This model focuses on theoretically based relationships between latent variables. In the structural model (inner model), the evaluation is carried out in two components: R-square and significance level [10]. In structural analysis, R-squares and significance are two important components. The R-squared, which can be classified as strong (0.75), medium (0.50), or weak (0.25), indicates the variance described by independent variables in a model. Statistics from the examined pathways were also used to assess the relevance of the structural model. Strong negative correlations correlate with a standard line coefficient of -1, whereas strong positive correlations correlate with a standard line coefficient of +1. The formula, where the standard deviation obtained by bootstrapping is used to determine the t-statistic. The average value for the 10% significance level is 1.65, for the 5% significance level is 2.58, and for the 1% significance level is 2.58 [11]. Here is an illustration of how the variables relate to each other.

## 3. Results and Discussion

To determine the influence of each variable, data processing with SmartPLS involves several phases of model evaluation, which are described as follows.

### 3.1. Outdoor Models

#### a. Reflective Measurement

i. Convergent Validity Test

**Table 2.** Reliability and Validity of Construction

| Indicators | Average Variance Extracted (AVE) | Alpha Cronbach | Composite Reliability |
|---|---|---|---|
| User Satisfaction (Y) | 0.816 | 0.977 | 0.980 |
| Quality of Information (X2) | 0.696 | 0.960 | 0.965 |
| Quality of Service (X3) | 0.702 | 0.947 | 0.955 |
| System Quality (X1) | 0.752 | 0.953 | 0.960 |

Convergent validity testing can be performed by checking the validity of each indicator with an AVE value that must be higher than 0.5 for each variable, so that the convergent validity value can be considered good [12]. Based on the data processing results shown in Table 2, it can be seen that the AVE (Average Variance Extracted) value for all variables is above 0.5. Therefore, all AVE values are met, and the mentioned variables can be considered valid.

ii. Discriminatory Validity Test

Discriminatory validity checks can also be performed, taking into account AVE values. AVE values of more than 0.5 indicate that construction can be considered good. Since Table 2 shows that the AVE value meets the requirement of > 0.5, it can be concluded that the discriminant validity is well met [13].

iii. Reliability Test

There are two criteria that can be used to measure the reliability structure. In particular, the reliability of the alpha and Cronbach's composites can be used as two metrics to assess the reliability of the test of construction. As can be seen from the table below, a variable is considered reliable if its value for Cronbach's alpha and composite reliability is above 0.7. Based on Table 2 above, it can be observed that the values for Cronbach's alpha and composite reliability of all variables are above 0.7. Therefore, these variables show good reliability.

**b. Formative Measurement**

The results of the Variance Inflation Factor (VIF) are presented in the table below:

**Table 3.** Value of Variance Inflation Factor (VIF)

| | **Variance Inflation Factor (VIF)** |
|---|---|
| User Satisfaction (Y) | |
| Quality of Information (X2) | 7.347 |
| Quality of Service (X3) | 3.878 |
| System Quality (X1) | 7.830 |

Table 3 above shows that all variables have VIF values below 10. Therefore, it can be concluded that there is no multicollinearity between the variables that affect user satisfaction.

### 3.2. Inner Model

**a. R-Square**

R-Square's results for user satisfaction can be seen in the table below.

**Table 4.** R-Square Value User Satisfaction

| | **R Square** |
|---|---|
| User Satisfaction (US) | 0.757 |

The R-squared value in Table 6 shows that user satisfaction is 0.757 (more than 0.67), indicating that the model is good. System quality (X1), information quality (X2), and service quality (X3) are the factors that affect 75.7% of user satisfaction. Meanwhile, 24.3% were influenced by factors outside of X1, X2 and X3.

**b. Meaning**

The following tests examine whether the relationship between the system, information, quality of service, and user satisfaction is significant. This can be determined from the estimated Path Coefficient value through the bootstrapping process if the t-statistic value is greater than 1.96 (5% significance table).

**Table 5.** Path Coefficients

| | **Statistics T (\|O/STDEV\|)** |
|---|---|
| Quality of Information - > User Satisfaction | 2.853 |
| Quality of Service - > User Satisfaction | 1.539 |
| System Quality -> User Satisfaction | 0.658 |

The study analyzes in Table 5 the variables that affect user satisfaction, with special attention paid to information quality, service quality, and system quality. With a t-statistical value of 2.853, which exceeds the threshold of 1.96, it becomes clear that the analysis shows a significant impact on information quality on user satisfaction. The quality of service and the quality of the system, on the other hand, have t-statistical values of 1.539 and 0.658, respectively, below the crucial limit of 1.96, which

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indicates that they have no visible impact on user satisfaction. These results show how important information quality is in determining user experience, even though the quality of systems and services seems to have little immediate impact.

### 3.3. Discussion

Before discussing the results of hypothesis testing, it is important to affirm that quantitative research requires the formulation of a clear and explicit hypothesis, which is ideally placed after the research objective and before the methods section. Therefore, this study needs to add a special section that formulates a hypothesis regarding the influence of system quality, information quality, and service quality on e-learning user satisfaction. The addition does not change the substance of the hypothesis that has been tested but clarifies the scientific structure of the article so that the reader understands the direction of the test being carried out. After the existence of the hypothesis is explicitly affirmed, the test results can be interpreted, where a hypothesis is declared acceptable if its significance value (p-value) < 0.05 and the t-statistical value exceeds 1.96. On this basis, the findings of this research can be analyzed more systematically in the next discussion.

**a. Hypothesis 1 The Effect of System Quality (X1) on User Satisfaction (Y)**

**Table 6.** Hypothesis Test Results 1 (H1)

| | Statistics T (\|O/STDEV\|) | P value |
|---|---|---|
| Quality of Service -> User Satisfaction | 0.658 | 0.511 |

The results of the analysis showed that the quality of the system (X1) had no significant effect on user satisfaction (Y), so the first hypothesis was rejected. This is evidenced by a t-statistic value of 0.658, which is below the t-table value of 1.96. It is important to clarify that the R-Square value of 75.7% does not reflect a correlation between X1 and Y, but rather indicates the proportion of user satisfaction variance that is collectively explained by three independent variables, namely system quality, information quality, and service quality. Thus, even though system quality does not have a direct effect on satisfaction, this aspect still needs to be improved to support the overall performance of e-learning, such as improving access stability, improving system speed, and updating data regularly to keep the user experience optimal.

This hypothesis is supported by the results of Samuel Sihotang [14], Yemin Setiawan [15], Muhammad Fakhrurrozi Satyadarma and Syamsudin [16], who found the effect of system quality on user satisfaction. However, these results contradict the study of Bernadeta Asri Rejeki Tulodo and Achmad Solichin [17], who stated that the quality of the system has no impact on user satisfaction. A study conducted by Vicky Arvianto and Wendi Usino [18] also concluded that system quality does not have a significant impact on user satisfaction. This is supported by a t-statistical significance value of 0.859, which is below the t-table value of 1.96, as well as by the fact that the contribution to user satisfaction is only 5.1%. This can be seen as an indication that the quality of the system is characterized by instability, such as slow document retrieval, the occurrence of errors or bugs, and the lack of system functions required by the user. Therefore, the operations team must continuously monitor and improve the quality of the system.

Therefore, the e-learning operational team at UIN Walisongo Semarang must pay more attention and improve the quality of the e-learning system to meet user expectations. The obstacles experienced by students when using e-learning cause their dissatisfaction with the existing system. Based on the results of the questionnaire received, students' expectations for UIN Walisongo e-learning in the future are that the performance of the system is expected to be further improved and improved. A system that often experiences sudden errors and is less responsive makes students less satisfied with the performance of e-learning. Students have difficulty accessing materials in e-learning because courses are mixed in several semesters; It would be best if they were organized by semester to avoid confusing students. In

addition, the features of the e-learning platform should be further updated to make the appearance of the system more attractive. The continuous development of science and technology should contribute to the better use of e-learning, as it is basically aimed at facilitating the learning process for teachers and learners. The use of a good system will make learning more effective and efficient for its users.

**b. Hypothesis 2 The Effect of Information Quality (X2) on User Satisfaction (Y)**

**Table 7.** Hypothesis Test Results 2 (H2)

| | Original Sample (O) | Statistics T (\|O/STDEV\|) | P value |
|---|---|---|---|
| Quality of Information - > User Satisfaction | 0.563 | 2.853 | 0.005 |

The above results show that the quality of information (X2) has an effect on user satisfaction (Y), which means that the second hypothesis is accepted. This directly indicates that the quality of information (X2) affects user satisfaction (Y), as it has a t-value of 2.853 > t-table (1.96). It can be said that the higher the quality of the information provided, the greater the user satisfaction when using a system. The results of the study show that the quality of information in the e-learning system facilitates student participation in courses, assignment submission, and access to materials or assignments from instructors. It can be said that the quality of information provided by the e-learning system of UIN Walisongo Semarang is very comprehensive, easy to understand, accurate, and consistent in providing information. This causes students to feel satisfied with the quality of the information provided.

The results of this hypothesis are consistent with the research of Nisrina Nur Asyifa [19], which shows that information quality has a positive impact on user satisfaction. This is based on the results of the analysis, which showed that user satisfaction had an influence of 56.1% on system quality, information quality, and service quality, while the remaining 43.9% was influenced by other variables that were not analyzed. This is also supported by research by Nisrina Nur Asyifa [20], Novita Sari *et al* [21], and Syahfitri *et al*. [22], which shows that information quality affects user satisfaction. This indicates that the higher the quality of information provided by the system, the greater the user satisfaction.

**c. Hypothesis 3 The Effect of Service Quality (X3) on User Satisfaction (Y)**

**Table 8.** Hypothesis Test Results 3 (H3)

| | Original Sample (O) | Statistics T (\|O/STDEV\|) | P value |
|---|---|---|---|
| Quality of Service -> User Satisfaction | 0.171 | 1.539 | 0.124 |

The above results show that the quality of service (X3) does not affect user satisfaction (Y), which means that the third hypothesis is rejected. This directly indicates that the quality of the service (X3) does not affect user satisfaction (Y), since the t-value is 1.539, which is smaller than the t-value of the table (1.96). The results of this study show that the quality of service has not been able to increase student involvement in using the e-learning system. Field studies show that the lack of services provided by e-learning, which helps users complete tasks, hinders the students' learning process. In addition, there is a system error or incorrect data input, but the technician is slow to respond, and the problem remains unresolved. Therefore, it can be said that the quality of the services provided does not guarantee the effectiveness of the use of e-learning, the lack of empathy from technicians in overcoming user difficulties, and the system has not been able to solve problems quickly.

The findings of the study show that only the quality of information has a significant effect on user satisfaction, so improvement recommendations need to be focused on strengthening the information aspect in e-learning. Efforts that can be made include standardizing the format of material presentation to be more consistent and easy to understand, providing training to lecturers on the preparation of informative and structured digital content, and integrating relevant external learning resources to enrich learning materials. This optimization of information quality is expected to improve the student learning

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experience and ensure that UIN Walisongo Semarang's e-learning is not only easily accessible but also provides high-quality content and supports the achievement of learning goals. The results of this study are not in line with the research of Nuni Nurhalimah and Ade Nurhayati KD [23], Abdul Gofur [24], and Mahira et al [ 25], who concluded that service quality has a positive impact on user satisfaction.

## 4. Conclusion

Evaluating the e-learning program of UIN Walisongo Semarang is the purpose of this study. Given the results, the researchers came to a number of conclusions. Hypothesis 1 was initially rejected because the quality of the system did not affect user satisfaction, as indicated by the t-value of 0.658, which was below the critical t-value of 1.96. The t-value of 2.853, which exceeds the critical t-value of 1.96, supports Hypothesis 2 and suggests that the quality of variable information has a significant impact on user satisfaction. Hypothesis 3 is rejected because the t-value of 1.539 is below the critical value of 1.96, indicating that the quality of service does not affect user satisfaction. While it shows a modest impact of system and service quality, our study emphasizes the importance of information quality in determining user satisfaction.

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