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Evaluation of the Quality of Online Learning during the Covid-19 post Pandemic: An Empirical Study at Indonesian University

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Abstract

The purpose of this study was to analyze the effect of system quality on online learning user satisfaction, the effect of information quality on online learning user satisfaction, the effect of service quality on online learning user satisfaction. This research uses quantitative methods. The instrument used in the quantitative method is an online questionnaire through social media given to university students in Indonesia. The research object was students using the e-learning system, a total of 670 students who were determined by the simple random sampling method. The questionnaire was designed in the form of questions using a Likert scale of 1 to 7. After the distribution of the instrument was carried out, then analysis of the data was obtained using structural equation modeling (SEM) with the SmartPLS 3.0 software tool to determine validity, reliability and hypothesis testing. The results of this study are quality the system has a positive and significant effect on online learning user satisfaction, the quality of information has a positive and significant effect on online learning user satisfaction, service quality has a positive and significant effect on online learning user satisfaction.

Keywords: Online Learning, Indonesian University, system quality, information quality, service quality

Introduction

The Covid-19 pandemic prompted the government to implement several policies. Especially in the education sector, the government has implemented a social distancing policy, or better known as physical distancing, which requires people to maintain physical distance from each other in order to minimize the spread of Covid-19. The government released a remote (online) learning policy that is carried out from home. This is because learning must continue to be carried out to meet the needs of education in Indonesia. With this policy, it will influence the learning activities carried out by students and educators. So like it or not, there must be the right solution to deal with this remote policy, namely by changing learning that used to be conventional to virtual. According to Altameemi et al. (2021); Alkhawaja et al. (2022);Al-Maroof et al. (2021);Azzi et al. (2022); Burney et al. (2022) Many educational institutions, from elementary to higher levels, have started to change their learning process by studying online or online. The aim is to keep learning activities carried out while prioritizing the safety of students and educators. However, in the implementation of distance learning this results in changes in attitudes and learning outcomes from students. Because over time there is boredom in learning which causes student learning outcomes to not meet the minimum completeness criteria. According to Al-Adwan et al. (2012) a pleasant learning atmosphere and process must be obtained in education, this is intended so that students are interested in learning and make it easier in terms of understanding the material presented by educators. The era of the industrial revolution 4.0 is one of the challenges that must be faced and lived by countries in the world, including Indonesia. The Industrial Revolution 4.0 will cause major changes in all fields. One of the areas affected by the Industrial Revolution 4.0 is the field of education. According to Burney et al. (2022) education is one of the fields that produces quality human resources and is able to compete with other human resources who certainly have the 4C capabilities (critical thinking, creative, collaborative and communication). To produce resources that have 4C capabilities, educational institutions develop learning methods that are in accordance with the demands and in accordance with the development of the Industrial Revolution 4.0 era. Higher education institutions (Universities) are facing major changes in their various environments. Today's college students are growing up with the internet and digital devices.

In this digital era, the use of technology in Indonesia shows an increasing trend, one of the means of using technology in Indonesia is the internet. Indonesia is currently ranked sixth in the number of internet users. Conventional learning systems are considered no longer in accordance with the times, apart from being caused by a shift in education that was previously focus on lecturers to focus on students and the environment around them. According to Altameemi et al. (2021); Alkhawaja et al. (2022);Al-Maroof et al. (2021);Azzi et al. (2022); Burney et al. (2022) some students feel that conventional learning systems are unattractive and unable to grow their interest in continuing to learn. So that the presence of technology and information is an important solution to foster student learning interest in using internet technology in Indonesia in 2016 as many as 102.8 million users. It is estimated that in the next 2 years (2018) internet users in Indonesia will reach 123 million people or more than half of Indonesia's population. When compared with data on internet users in the world in 2016, Indonesia's position is in sixth place under China, US, Japan, India, Brazil and Japan. The phenomenon of the development and use of science and technology, as described above, greatly influences the trend of change in the world of education. This is indicated by: (1) learning resources are very easy to find, (2) the use and utilization of ICT such as media and multimedia as well as e-learning, mobile learning, web-learning and others in learning activities, and (3) learning models with systems individual learning or blended learning. The e-Learning system provides new hope as an alternative solution to most of the educational problems in Indonesia,

with functions that can be tailored to the needs, either as a supplement (additional), complementary (complementary), or substitution (substitute) for learning activities in the classroom that are so far used. It is hoped that the use of the e-learning system will be able to assist students in improving learning both in the classroom and outside the classroom. Individuals and groups will take advantage of the e-learning system if the system can provide benefits for them.

Research conducted by Alkhawaja et al. (2022);Al-Maroof et al. (2021) on e-learning system users using the moodle platform by comparing learning with conventional methods and e-learning system methods and to find out the gap between high achieving students and low achieving students. The results showed that there was a negative relationship between the efficiency of the e-learning system and accessibility to computers, whereas there was a positive relationship between the frequency of taking the e-learning system and students' test scores. Many information system success models have been developed by experts researcher Altameemi et al. (2021); Alkhawaja et al. (2022) from several models of information system success, Burney et al. (2022) received much attention from subsequent researchers Adwan et al. (2012)proved that the success of an information system is influenced by the quality of the information system and the quality of the information produced from the system concerned and the quality of the service. This study focuses on individual perceptions, namely individual perceptions related to system quality, information quality, service quality, use, and user satisfaction with the use of e-learning systems. Individual readiness for technology refers to a person's predisposition to accept and use technology to accomplish goals in everyday life and at work.

Literature Review

System Quality

System quality in the information system success model According to Sudargini et al. (2021); Stojan et al. (2022), namely the desired characteristics of information systems, has described sub-indicators which are instruments in measuring system quality. The desired characteristics of an information system, according to Szopiński et al. (2022); Tao et al. (2022) are easy to use, flexible, system reliability, and easy to learn as well as intuitive features, sophistication, flexibility, and response time. By fulfilling these characteristics a system can be said to have a positive impact. From the results of research conducted that the quality of the system shows a good percentage, one of the reasons is that a good quality system will make the system comfortable to use, of course this has an impact on user satisfaction. This is in line with the opinion of Sudargini et al. (2021); Szopiński et al. (2022) stated that the effect of system quality is very large on system use. So with a good system quality, users will feel comfortable in using e-learning. System quality is a measurement of information system processes that focuses on the results of the interaction between the user and the system. System quality has attributes such as equipment availability, equipment reliability, ease of use, and response time which are determining factors why an information system is used or not used. According to Sudargini et al.. (2021); Stojan et al. (2022) argues that there are several usability principles, namely the online environment, namely, navigation, response time, credibility, and content. From various literatures that there are four dimensions of system quality, namely: navigation, ease of use, response time, and security. According to Szopiński et al. (2022); Tao et al. (2022) suggests that there are three dimensions of system quality, these three dimensions are: access, usability, and navigation. System quality can be measured by looking at its functional part, namely usability. Usability is part of the principle of interaction between human computers which provides a set of important instructions about instructional design. Tao et al.

(2022) argues that usability consists of four basic principles in online activities, namely: navigation, timelines, credibility, and content. According to Stojan et al. (2022); Tao et al. (2022) argues that several important elements in website use are consistency, ease of use, clarity in interacting, ease of reading information arrangements, speed, and website layout/design. Thus the level of use of the e-learning system is better so that students can be more motivated to use the e-learning system.

Information Quality

Information quality in the information system success model According to Falola et al. (2022); Gupta et al. (2021), namely the desired characteristics of information systems, has also described the sub-indicators which are instruments in measuring the quality of information. Information quality is the desired characteristic of the information system output, namely, relevant, understandable, accuracy, concise, complete, timely, and useful. With good quality information, it will make it easier for users to get information, it will be easier, and learn and understand more. easy. That way the developed e-learning will give satisfaction to users. This is in line with the opinion expressed by Mohammadi et al. (2021); Mwila et al. (2021);Pallavi et al. (2022) from the results of the research conducted, it shows that the quality of information has a positive impact on user satisfaction. So it can be said that with good quality information it will produce a user satisfaction that has an impact on the use of e-learning. Information quality is related to system use, user satisfaction, and net benefits. Information quality has attributes such as information obtained from a system, accuracy information, relevance of information, timeliness, and completeness of information. Information quality is often a key dimension of end-user satisfaction as a result of which information quality is often not distinguished as a unique construct but is measured as a component of user satisfaction. The quality of information referred to in this study is the user's perception of the quality of information produced by the internet used by students to obtain the information they need. Some of the characteristics used to assess the quality of information include accuracy, timeliness, relevance, informativeness, and competitiveness. The quality of information is the level of relevance, timeliness), safety and presented with good information design in a website. The best quality information can be provided by the internet when it can be obtained easily (not difficult to find), organized (organized), and available in large quantities.The quality of information can also be seen by the potential to produce unlimited information both within the organization and outside the organization. According to Mwila et al. (2021);Pallavi et al. (2022) quality information is information that is accurate, clear, detailed, relevant, easy to obtain, timely, up to date and according to user needs. Liu and Arnett (2000) stated that the best quality information will increase the user's perceived usefulness and increase the use of information systems. According to Falola et al. (2022) also adds that user acceptance or rejection of a system is caused by quality provided by a system.

Service Quality.

Peter et al. (2008) stated that service quality is the quality of the support system from the information systems department and information technology officers. Service quality can be measured at the end of the production process, data processing suppliers, and at the end of the service relationship between serving staff and system users Service quality is something that cannot be separated from a system, services can be provided to users who use e-learning. Quality service will make users feel comfortable using it learning. By comfortably using e-learning, users will be more interested in using it and of course it will have an impact on the user's psychology. Zeithaml et al., (1990) formulated a model that underlines important provisions that need to be complied with by service providers in improving service qualit. Devaraj et al., (2002) views SERQUAL as consisting of four dimensions, namely: empathy,

reliability, responsiveness, and assurance. While the other dimensions are price, time, ease of use, and usefullness. Service quality proposed by Salloum et al. (2019); Salas et al. (2022) that is based on a comparison between what should be offered and what is provided. Companies that have a high level of service quality in particular develop two very important information systems to improve service capabilities. The first is an information system that collects service performance information for management purposes and employee motivation. Second, an information system that disseminates information that is valued by customers. According to Saad et al. (2021); Salloum et al. (2019) service quality is more important than other applications, because current system users are customers rather than employees or internal users of the organization. Because poor support will lead to lost customers and even lost sales.

User Satisfaction.

Usage is the level and way in which users take advantage of the capabilities of an information system, sub-indicators have been described that become instruments in measuring usage. System usage is the level of system use by staff, both frequency, nature of use, feasibility of use, purpose of use and additional benefits from system utilization. Due to the nature of use, the intensity of use cannot be used as an indicator of the success of the system, but actual use is used as a dimension to measure the success of the information system. According to Purwanto (2021); Purwanto et al. (2021); Saad et al. (2021); Salloum et al. (2019); Salas et al. (2022) satisfaction is a consideration of a product or service that provides a pleasant level of fulfillment of user desires at the lower or upper level. This definition places an emphasis on consumers rather than customers because even if customers pay for a product or service, they are unlikely to use or serve it directly. Satisfaction with a product or service/service requires the experience and use of a product/service for each individual. User satisfaction has a very central role in the development of information systems. The research results presented by Saad et al. (2021); Salloum et al. (2019); Salas et al. (2022) found that user understanding is an effective variable and determines user satisfaction, system success and system quality. Use of the three variable terminologies (user satisfaction, system success, and system quality) is often ambiguous. Often user satisfaction is considered the same as system quality, or else user satisfaction is used to measure quality

system. According to Salloum et al. (2019); Salas et al. (2022) stated that using user satisfaction to measure system quality would actually lead to subjective judgments about the notion of system quality. User satisfaction is more concerned with the user's view of the information system, but not on the aspect of system engineering quality concerned. In other words, user satisfaction measures the perception of what is provided by the information system rather than providing information about capabilities functional information system concerned. Success The user satisfaction dimension represents the user's level of satisfaction when using IS. It is considered as one of the most important steps of a successful IS. Information system user satisfaction can be assessed using the following criteria: adequacy, effectiveness, efficiency, overall satisfaction; enjoyment, information satisfaction, system satisfaction

Method

This research uses quantitative methods. The instrument used in the quantitative method is an online questionnaire through social media given to students. The research object was students using the e-learning system, a total of 670 university students in Indonesia, who were determined by the simple random sampling method. The questionnaire was designed in the form of questions using a Likert scale of 1 to 7. After the distribution of the instrument was carried out, then an analysis of the t data was obtained using structural equation modeling (SEM) with the SmartPLS 3.0 software tool to determine validity, reliability and hypothesis testing.

The research hypothesis is:

H1: System quality has a positive and significant effect on online learning user satisfaction
H2: Information quality has a positive and significant effect on online learning user satisfaction
H2: Service quality has a positive and significant effect on online learning user satisfaction

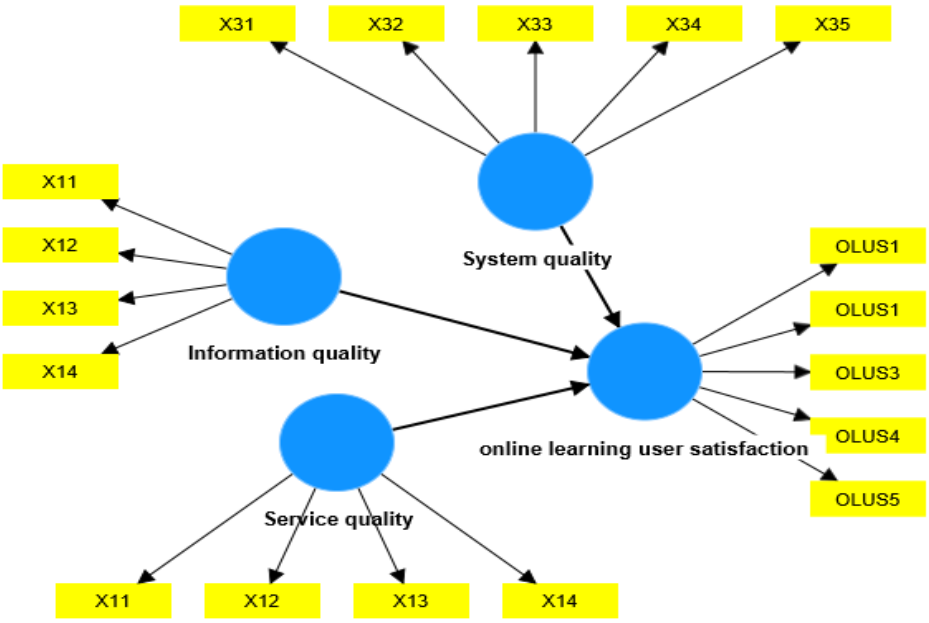

Fig 1. *Research Framework*

Result and Discussion

Convergent Validity

To test the convergent validity, the outer loading value is used loading factor. An indicator is declared to meet convergent validity in the good category if the outer loading value is > 0.7. The following is the outer loading value of each indicator on the research variables.

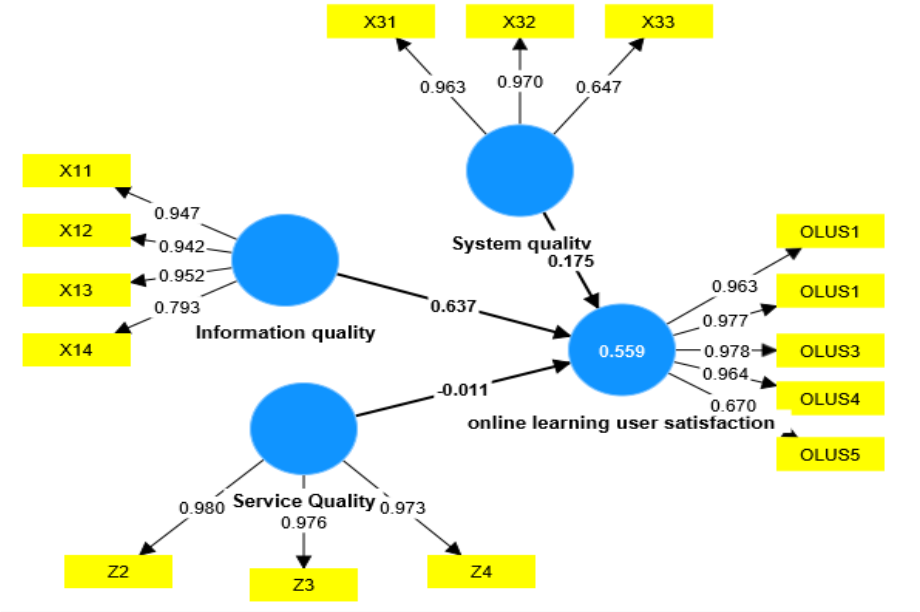

Fig 2. *Validity Testing*

The data in fig 2. shows that there are no variable indicators whose outer loading values are below 0.7, so that all indicators are declared feasible or valid for research use and can be used for further analysis. Based on the outer loading output in Figure 1, it can be seen that the results of the loading factor for all indicators for each construct meet convergent validity, because the loading factor value for each indicator is above 0.70.

Table 2. *Construct Reliability and Validity*

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
System quality	0.813	0.813	0.802	0.612
Information quality	0.809	0.849	0.823	0.643
Service Quality	0.834	0.823	0.901	0.712
Satisfaction	0.898	0.809	0.816	0.813

Based on the data presented in table 1 above, it can be seen that the composite reliability value of all research variables > 0.6. this result shows that each variable has met the composite reliability so that it can be concluded that all variables have a high level of reliability, Cronbach alpha value of each research variable > 0.7. Thus these results can indicate that each research variable has met the requirements for the Cronbach alpha value, so it can be concluded that all variables have a high level of reliability.

Hypothesis testing

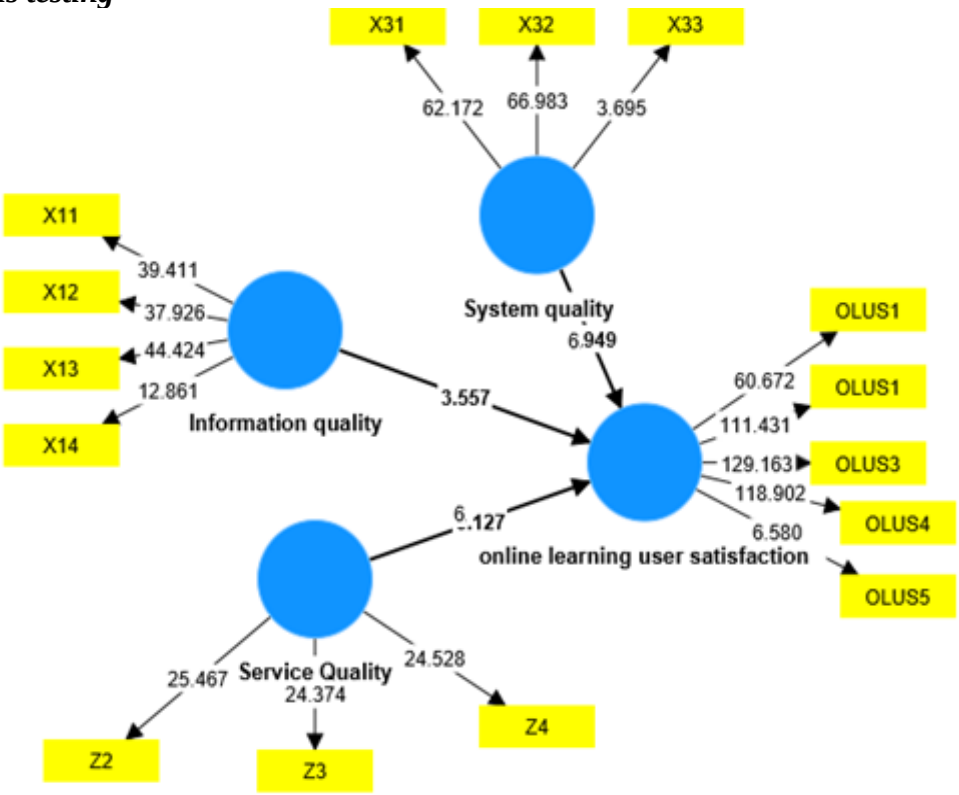

Fig 3. *Hypothesis Testing*

Based on the data processing that has been done, the results can be used to answer the hypothesis in this study. Hypothesis testing in this study was carried out by looking at the T-Statistics values and P-Values. The research hypothesis can be declared accepted if the P-Values <0.05

Table 3. *Hypothesis testing*

Hypothesis	T Statistics	P Values	Result
System quality - User satisfaction	6.949	0.001	Supported
Information quality - User satisfaction	3.557	0.000	Supported
Service quality - User satisfaction	6.127	0.000	Supported

Effect of System Quality on User Satisfaction.

Testing the hypothesis between the relationship between system quality and user satisfaction obtained a t value > 1.96 so that system quality has a significant effect on user satisfaction. Considering that the estimated value is positive, this means that there is a direct relationship between system quality and user satisfaction, that is, the higher the quality of the e-learning system provided by the university, the higher the level of user satisfaction with the e-learning system. According to Azzi et al. (2022); Burney et al. (2022) The quality of the information system is a characteristic of the inherent information about the system itself. as perceived ease of use which is the level of how much computer technology is perceived to be relatively easy to understand and use. This shows that if users of information systems feel that using the system is easy, they do not need the effort and effort a lot of time to use it, so they will be more happy to work and feel satisfied. The higher the quality of the information system used, it is predicted that it will affect the higher the level of satisfaction of the end user of the information system. The findings of this study confirm and expand the Theory of Reasoned Action (TRA) or the theory of joint action developed by According to Al-Adwan et al. (2012); Altameemi et al. (2021); Alkhawaja et al. (2022) where someone will take advantage of an information system on the grounds that the system will generate benefits for him. This TRA explains the stages of human behavior. In the early stages, behavior (behavior) is assumed to be determined by intention (intention). In the next stage, intentions can be explained in the form of attitudes toward the behavior (attitudes toward the behavior) and subjective norms (subjective norms) in the form of beliefs about the consequences of carrying out the behavior regarding the normative expectations of the relevant person. When someone receives a system with good system quality, then in the mind of that person will feel happy and satisfied with the information system. The findings of this study also confirm and expand the opinion of Al-Maroof et al. (2021);Azzi et al. (2022); Burney et al. (2022) that good system quality and information quality, represented by the usefulness of the system output obtained, can affect the level of intended use and user satisfaction. Information system success is influenced by perceived information quality and perceived system quality is a significant predictor of user satisfaction. User satisfaction is a significant predictor of intended use and perceived individual impact.The findings of this study also confirm and expand the opinion of Al-Adwan et al. (2012); Altameemi et al. (2021) that a measure of user satisfaction with a computer system is reflected in the quality of the system owned. User satisfaction with an information system is how the user perceives the information system in real terms, not on the technical quality of the system. In the research literature as well as in practice, user satisfaction is often used as a surrogate measure of information system effectiveness.

The findings of this study also confirm and expand the opinion of Alkhawaja et al. (2022);Al-Maroof et al. (2021);Azzi et al. (2022); Burney et al. (2022) and emphasized that user satisfaction can be influenced by system quality. Confirming the research of Al-Maroof et al. (2021);Azzi et al. (2022); Burney et al. (2022) by showing the results that the quality of the system (system quality) affects user satisfaction (user satisfaction). The results of this study are also in accordance with research conducted by Altameemi et al. (2021); Alkhawaja et al. (2022) showed different results in that system quality did not significantly influence user satisfaction (user satisfaction). The research results also support the research results. According to Al-

Adwan et al. (2012); Altameemi et al. (2021); Alkhawaja et al. (2022) provides empirical evidence that the quality of information systems has a positive and significant effect on user satisfaction. The results of the study indicate that the use of the e-learning system will be satisfied if the e-learning system provided by the tertiary institution has a good quality system. This shows that users will feel satisfied if the e-learning system provides easy-to-understand guidelines, the e-learning system presents material according to learning needs, the e-learning system supports the learning process, the e-learning system is easy to operate, the e-learning system makes communication between teachers and students are more intensive, as well as ease in accessing e-learning system features. Conversely, when the e-learning system provided by tertiary institutions has a low system quality, it will affect the low level of user satisfaction.

The Influence of Information Quality on User Satisfaction

Testing the hypothesis between the relationships of information quality to user satisfaction obtained a t value > 1.96 so that the quality of information has a significant effect on user satisfaction. Considering that the estimated value is positive, this means that there is a direct relationship between the quality of information and user satisfaction, that is, the higher the quality of information provided by the e-learning system, the better it will lead to a higher level of user satisfaction with the e-learning system. Information quality is the output quality in the form of information generated by the information system used. According to Al-Adwan et al. (2012); Altameemi et al. (2021); Alkhawaja et al. (2022);Al-Maroof et al. (2021);Azzi et al. (2022); Burney et al. (2022) Information system users of course hope that by using the system they will get the information they need. The characteristics of the information produced by a particular information system may be different from information from other information systems. Information systems that are capable of producing timely, accurate, as needed and relevant information as well as meeting other criteria and measures of information quality will affect user satisfaction. The findings of this study also confirm and expand the Theory of Planned Behavior (TPB), which is a development from TRA. According to Saad et al. (2021); Salloum et al. (2019); Salas et al. (2022) developed a construct that did not yet exist in TRA. The construct is perceived behavioral control (perceived behavioral control). This construct is used to control the deficiencies and limitations of the lack of resources used to perform behavior. The limitations of a human being in providing or inputting information will be supported by the quality of the information obtained, so that users feel satisfied.

The findings of this study also confirm and expand the opinion of Peng et al. (2022); Purwanto (2021), which emphasizes that user satisfaction with computer systems is reflected by the quality of the information they have. User satisfaction with an information system is how the user views the information system in real terms, not on the technical quality of the system. These results also support the research of of Peng et al. (2021);providing empirical evidence that information quality has a positive and significant effect on user satisfaction. The higher the quality of information produced by an information system, it is predicted that it will affect the higher end user satisfaction of the information system. The findings of this study also confirm and expand the results of research conducted by Purwanto (2021); Salas et al. (2022) which shows that the quality of information systems has a positive effect on user satisfaction. If information system users believe that the quality of the system and the quality of the information generated from the system used is good, they will be satisfied use the system. The findings of this study also confirm and extend the theory from Saad et al. (2021); Salloum et al. (2019); Salas et al. (2022) that user satisfaction with web users is the influence of information quality and system quality. The success of a system can be measured by user satisfaction in using the system, perhaps in terms of the quality of the system and the information it produces. System quality has three dimensions, namely access, usability, and

navigation. Information quality is influential because information is very important so it must have understandability, reliability, and usefulness dimensions. The findings of this study also confirm and extend the research of Salas et al. (2022) study was specifically conducted to look at aspects of Web site information quality, such as content and layout. Research results have found a significant relationship between constructs and user satisfaction. Meanwhile, research does not support research conducted by Peng et al. (2021); Peng et al. (2022) measures information quality and user satisfaction from two IS (information system) organizations. The findings of this study also confirm and extend the research of Saad et al. (2021); Salloum et al. (2019); Salas et al. (2022) who conducted research to examine the relationship between e-learning systems, self-efficacy, and student learning outcomes. The research focused on the effects of e-learning system management on user satisfaction and the relationship between user satisfaction and e-learning outcomes. User satisfaction is an important predictor of e-learning outcomes. On the other hand, system quality, information quality, and independent learning behavior have a significant direct impact on student satisfaction. The results of the study indicate that users of e-learning systems will feel satisfied when the information provided by tertiary institutions is of good quality and useful for their users. A user will feel satisfied using the e-learning system if the e-learning system provides clarity about the lecture material, the e-learning system provides details about the lecture material, the e-learning system provides timeliness in presenting information, and the e-learning system provides accurate assessments. Conversely, when the quality of the information provided gets worse/lower, the lower the satisfaction of users of the e-learning system in tertiary institutions.

Effect of Service Quality on User Satisfaction.

Testing the hypothesis between the relationship between service quality and user satisfaction. Considering that the estimated value is positive, this means that there is a unidirectional relationship between service quality and usage, that is, the higher the quality of service provided by the e-learning system, the higher the level of e-system usage. e-learning. The findings of this study confirm and extend research conducted by Wang (2007) examining e-government success and showed a significant positive relationship between service quality and system use. The positive relationship between the two studies can occur because the research is carried out in the system environment as a support for the services provided. The findings of this study confirm and extend the theory from Stojan et al. (2022); Szopiński et al. (2022); Tao et al. (2022) which states that service quality is a comparison between qualities service perceived by users with the quality that should be provided by the information department. He stated that service quality depends on differences between expected and perceived service. If service expectations are higher than what is felt, it can be said that the service is not satisfactory. If expectations are lower than perceived, it can be said that service quality is at a satisfactory level. The results of research by Sudargini et al. (2021); Stojan et al. (2022) there is a strong relationship. The results of the study indicate that users will use the e-learning system provided when the process of downloading lecture material takes place quickly, the online learning outcomes assessment is equivalent to conventional lectures, and the management unit is easy to contact when users encounter problems accessing the e-learning system. Conversely, when the quality of service is lower, the level of usage will also be lower.

Many experts argue about e-learning according to their respective perspectives. Hammouri et al. (2018); Mohammadi et al. (2021); Mwila et al. (2021);Pallavi et al. (2022) stated that e-learning is an innovative learning approach that is attractive, flexible, student-centered, interactive, and of course accessible anytime, anywhere and by anyone. Meanwhile, according to Falola et al. (2022); Mwila et al. (2021);Pallavi et al. (2022) stated that e-learning is an online information delivery program for education, training, or knowledge management

purposes. From this description it can be said that e-learning is a learning process that is carried out with the help of electronic devices that provide opportunities for students to learn more openly, flexibly and independently through discussions, giving assignments and others. Utilization of e-learning in the learning process is expected to increase the effectiveness and efficiency of education. According to Mwila et al. (2021);Pallavi et al. (2022) effective in terms of providing material by educators that can be accessed by students anytime and anywhere. Then it is efficient in terms of carrying out assignments, quizzes and daily exams which are carried out online. Students no longer work on assignments, quizzes and daily exams in hardcopy but in softcopy. In addition, students also have the opportunity to obtain information from anywhere and at any time in following the development of science.

Conclusion

The better the perception of the quality of the system will further increase the satisfaction of users of the e-learning system. These findings confirm previous studies which state that system quality has a significant effect on user satisfaction. The measure of user satisfaction on a computer system is reflected by the quality of the system owned. The better the perception of the quality of information will further increase the satisfaction of users of the e-learning system. These findings confirm previous studies which stated that the quality of information has a significant effect on user satisfaction. Information quality is a key dimension concerning the end user satisfaction instrument. The better use of the e-learning system will further increase user satisfaction with the e-learning system. These findings confirm research studies previously stated that use has a significant effect on user satisfaction. Even though there is a significant relationship, the average respondent's answers for the four indicators still tend to be poor so efforts are still needed to increase their use, especially in terms of: always using the e-learning system in lectures (daily use), using the e-learning system because of clear guidelines (navigation patterns), increasing the frequency of visits to the e-learning system (number of site visits), and taking quizzes with the e-learning system (number of transactions). Suggestions for universities as providers of e-learning systems to further improve system quality, information quality, and service quality. By increasing system quality, information quality, and service quality, it is hoped that this will have an impact on user satisfaction. Suggestions for further research, in this study only involved a single student perspective. It is recommended that future research use the perspectives of organizations/institutions (e-learning system management units) and subject lecturers.

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