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The Effectiveness of E-Learning System with Design Features as Mediating Variable

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ABSTRACT

The research aimed to examine the effect of technology acceptance, learning strategies, and cognitive assessment on the effectiveness of e-learning system with design features as mediating variable. Technology acceptance is explained by perceived usefulness (PU) and perceived ease of use (PEOU). The learning strategy is explained by deep learning and surface learning Cognitive assessment is explained by challenges and threats. The research was conducted at Hasanuddin University with total number of respondents are 295 (two hundred ninety-five) students in the accounting department. The data were processed using Structural Equation Modeling (SEM). The test result showed that through design features, PU, PEOU, deep learning had a positive effect on the effectiveness of e-learning system. Meanwhile, surface learning had a negative effect on the effectiveness of e-learning system. In addition, the result of this research indicated that challenges had no positive effect on the effectiveness of e-learning system and threats had no negative effect on the effectiveness of e-learning system. These results indicated that users will experience the benefits and convenience of e-learning system supported by a platform that has good design features. In addition, users will prefer to learn with deep learning approach so that they can improve learning effectiveness.

Keywords: Cognitive Assessment, Design Features, Effectiveness of e-Learning System, Learning Strategies, Technology Acceptance

JEL Classification: I20, D80, D83

INTRODUCTION

The use of information systems in the digital era is increasing, such as in the economic, social, health, education, and other fields. Education is one field that has experienced significant development. At first, the field of education only used conventional learning. Conventional learning requires students to submit assignments in the form of papers and are required to do a presentation slide. Conventional learning systems are considered monotonous and do not keep up with the times. Then, the learning system develops into blended learning as a combined learning method between Conventional learning and online learning. The use of information systems in education is an alternative for the learning system to be carried out effectively and efficiently. The use of this information system is known as e-learning systems. The use of e-learning system has recently increased in most countries. This is due to a huge phenomenon where the entire world is infected by Covid-19 virus. The Covid-19 virus is a virus that spreads easily through interactions between humans and especially if a person has a cold and cough, so that interactions between humans should be limited. This situation led the governments to issue a regulation requiring everyone to carry out activities inside home, including working and studying from home.

The use of e-learning system is an effective and efficient way to support government regulation. It is not limited as long as it is connected to an internet connection. E-learning is a system that utilizes the internet through various media, including online media, social media, video conference, and mobile learning. One of the ways that universities can do to deal with the Covid-19 pandemic is by providing and supporting digital learning (Veletsianos et al., 2021). The university as an institution need students as individuals and the students need institution as providers of digital learning. Universities as internal users and students as external users need each other to achieve effective digital learning. Internal and external components need of each other to achieve the vision and mission of the university (Polii et al., 2020).

Hasanuddin University is one of the state universities that are required to change the learning system using e-learning system. One of them is in the accounting department trying to improve the learning system. Accounting is an applied science and the art of recording carried out continuously according to a certain system, managing and analyzing these records so that a financial report can be prepared as the responsibility of the leadership of a company or institution for its performance. Therefore, the learning system needs to be equipped with many exercises and more complex tasks such as case studies to support skills in accounting. This is a challenge for accounting lecturers and students who have been required to use e-learning system. E-learning system is not always popular among accounting lecturers and students. Some of them experience technical difficulties and are unfamiliar with the system. This is because the implementation of e-learning system has not been maximized. Its implementation basically requires a joint commitment from all components followed by socialization and motivation provision through giving advice, guidance for lecturers, staff, and students (Lintong et al., 2021).

Technology acceptance is explained by perceived usefulness (PU) and perceived ease of use (PEOU). These two variables are the factors that most determine the technology acceptance by users. The technology acceptance model is one theory to explain individual acceptance (G. T. Pontoh, 2011). The learning strategy is explained by deep learning and surface learning. These two variables represent the approach used in the process of finding the required information. The process of finding information with e-learning system needs to be supported by a platform that has a similar design features. Although students have different learning strategies, lecturers are expected to have

innovation in providing learning. This has the potential to increase students' enthusiasm for learning (Tjadi et al., 2021). Cognitive assessment is explained by challenges and threats. Both of these variables represent the emotions felt by individuals in the process of finding the required information. The process of finding information with e-learning system needs to be supported by a platform that has a similar design features. According to the theory which states that during the process of finding information, individuals cannot be separated from the emotional aspects they think about (Khulthau, 1991).

The use of e-learning system requires a platform that is expected to have good quality design features. The platforms used in e-learning system usually vary according to user requirements. Platforms with good design will be easier to use in learning process. The results show that there are so many choices of online learning platforms that are developing in the community that lecturers can use to make learning during the Covid-19 pandemic run effectively (G. Pontoh et al., 2021).

This research adds design features as mediating variable. The platform used in e-learning system has different design features ranging from the simplest to the most complex. The use of this platform usually depends on the user's learning needs. The platform has advantages and disadvantages of its design features. Platforms have design features that are only limited to discussions and submitting assignments, such as Google meet and Google classroom. Platforms are also limited to presentations, such as Zoom meeting. Some are only used for discussions through chat features such as WhatsApp and so on. This makes users use one or more platforms in the learning process as needed. A good platform has design features that provide benefits, ease and safety in using it. It is important for users to understand the design features of a platform so that it does not become obstacles in e-learning system. The use of various platforms with different feature designs is certainly one of the problems for users. Therefore, it is important to examine the effect of design features in increasing the effectiveness of e-learning system from the perceptions of students as users.

LITERATURE REVIEW

This study uses two main theories. Technology Acceptance Model (TAM) which is derived from Theory of Reasoned Action (TRA) to explain technology acceptance. Kuhlthau theory to explain learning strategies and cognitive assessment. The results of previous studies became a framework to used the design features variable as a mediating variable on the effectiveness of the system e-learning.

Theory of Reasoned Action (TRA)

Theory of Reasoned Action which is used to study human behavior. TRA explains that a person's beliefs can influence attitudes and social norms which will change the form of desire to behave either guided or just happen in an individual's behavior (Hill et al., 1977). This theory asserts that the role of a person's "intention" in determining whether a behavior will occur. The Technology Acceptance Model is a theory developed based on TRA. TAM explains that perceived usefulness and perceived ease of use are two components to determining the reactions and perceptions of users of information system (Davis, 1989). They revealed that the TAM model is a valid theory to explain individual acceptance of information systems. Perceived usefulness is the usefulness of information systems and perceived of use is the ease of information systems. The user believes that if the information is useful and easier, the greater the interest in using it.

Theory of Kuhlthau

The individual have different learning strategies in the process of finding information. They use the strategies which are interested in according to learning characteristics the emotional aspects. Several individuals like deep learning strategies and others like surface learning strategies. Deep learning is a learning strategy that seeks comprehensive information. They are looking for information in depth until it becomes clear and looking for relevant relationships between new information and personal experiences. Surface learning is a learning strategy that searches for basic information. They are only able to learn surface and only learn important and essential facts. This is supported by theory of Kuhlthau that the information search process has stages that require strategies to achieve learning effectiveness (Khulthau, 1991).

Cognitive assessment is an assessment that arises from a person's emotions or feelings in the process of finding information. Cognitive assessment can be divided into challenge assessment and threat assessment. A challenge assessment shows the demands of the situation when the individual assumes that there is potential to gain or benefit from the demands of the situation. Meanwhile, the threat assessment shows that the demands of the situation occur when the individual estimates that the resource does not meet the situational demands. This confirms that the assessment of challenges is an emotion of joy and someone's belief in a situation while threat assessment is an emotion of stress and uncertainty in facing a situation. This is supported by theory of Kuhlthau which during the process of finding information, the individual cannot be separated from the emotional aspects that are perceived from (Khulthau, 1991).

E-learning system requires a network connection so that it can be used anywhere and anytime. The presentation of e-learning with an online platform allows lecturing information to be real-time and interactive. The effectiveness of e-learning system is the level of success of a learning system through the use of an online platform with the achievement of the desired goals. The online platform in the e-learning system is not limited because it is integrated with the internet. Accounting students to be able to study independently by accessing materials stored online. The online platform in e-learning system is expected to have design features that are easily accessible and data security is guaranteed. Students have their password to log in on the web which cannot be given to other people.

Research Context

This research continues and develops research by (Linting & Pontoh, 2021) which design features as a mediating variable. This research further wants to see the role of design features in increasing the effectiveness of the e-learning system. Research related to technology acceptance has been widely carried out a lot. Perceived usefulness and perceived ease of use is an important factor in explaining the technology acceptance. The more useful and easier a system is, the greater the acceptance of the system. Perceived usefulness and perceived ease of use have a positive effect on the use of MOOCs (Aharony & Bar-Ilan, 2016). Perceived of usefulness can increase class effectiveness because students can learn at their own pace (Yoshida, 2016). The results show that e-learning users find it easy so that it provides benefits for users (Rahayu et al., 2017).

Individuals in the process of finding information needed use different learning strategies according to their learning abilities. Individuals who are looking for information in depth until it becomes clear and looking for relevant relationships between new information and personal experiences is a deep learning approach. Individuals who are only able to learn surface and only learn important and essential facts is a surface learning

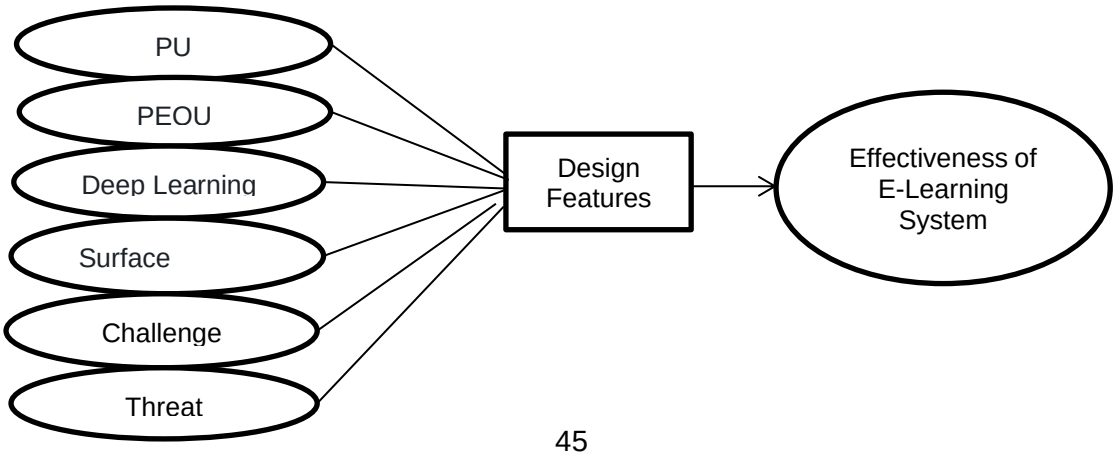
approach. Deep learning has no positive effect and surface learning has no negative effect on the use of learning system with MOOCs (Aharony & Bar-Ilan, 2016). Meanwhile, the other results found that there is an increase in the learning system using a deep learning approach and a decrease in the effectiveness of the learning system using the surface learning approach (Dolmans et al., 2016). Individuals in the process of finding information will lead to arising from the emotions or feelings toward an object. This assessment arises because of a demand for the use of the system in the process of finding the required information. Users feel that the information system is a challenge for them so that in the process of finding information, users feel positive emotions such as happiness, confidence, and enthusiasm. Meanwhile, users feel the information system is a threat to them so that in the process of finding information, users feel negative emotions such as stress, depression, and angry.

The use of e-learning system is inseparable from internet network so that it can be done anywhere and anytime. E-learning system requires support online platform that allows information to be real time and interactive. The choice of platform in e-learning system depends on the needs and abilities of users. E-learning system needs a platform that has good design features and is easy to use. (Kintu et al., 2017) finds that design features have a positive effect on the effectiveness of learning system. (Goyal & Tambe, 2015) also find that good tools will improve the quality of learning system. The results of previous research are related to the above. (Aharony & Bar-Ilan, 2016) find that challenges do not have a positive effect on the use of learning system. Meanwhile, threats harm the use of learning system. (Zilka, et al., 2018) finds that there is an increase in challenges and a decrease in the threat that users feel in learning system. (Dolmans et al., 2016) finds an increase in the learning system using a deep learning approach. The choice of platform in e-learning system depends on the needs and abilities of users. E-learning system needs a platform that has good design and is easy to use. This is in line with the results of previous studies. (Goyal & Tambe, 2015) find that users who understand online learning platforms well will be able to improve learning outcomes. (Shaharanee et al., 2016) finds that tools from Google can improve learning system. The other research result finds that design features have a positive effect on the effectiveness of learning system (Kintu et al., 2017).

RESEARCH METHOD

The purpose of this study is to determine and analyze the effect of technology acceptance, learning strategies, and cognitive assessment on the effectiveness of the system e-learning with design features as a mediating variable. The acceptance of technology explained by the variables perceived of usefulness and perceived ease of use. The learning strategy explained by variables deep learning and surface learning. Cognitive assessment explained by the challenge and threat variables.

Figure 1. Conceptual Framework



Based on the picture above, the hypothesis that can be proposed are PU has a positive effect on the effectiveness of e-learning system through design features (H1); PEOU has a positive effect on the effectiveness of e-learning system through design features (H2); Deep learning has a positive effect on the effectiveness of e-learning system through design features (H3); Surface learning has a negative effect on the effectiveness of e-learning system through design features (H4); Challenges has a positive effect on the effectiveness of e-learning system through design features (H5); and Threats has a negative effect on the effectiveness of e-learning system through the design features (H6).

This research was a hypothesis testing research (*hypotheses testing*). There were six hypotheses tested for their effect through mediating variable. The research was conducted using students in the accounting department of Hasanuddin University. The instrument used in this research was a questionnaire that was measured and rated on a 5 (five) point Likert scale (1(one) = strongly disagree; 5 (five) = strongly agree). The sampling technique was a non-probability sampling type with a purposive sampling method. The research sample used accounting students who were still active in online lectures from 2017 class to 2020 class who had filled in and returned the questionnaire. Data was collected using a questionnaire in the form of Google form which was then distributed to the WhatsApp group. Data analysis technique was Structure Equation Modeling. SEM is a multivariate analysis that can analyze the relationship between several variables in the study. The relationship between several variables was analyzed using AMOS version 20 software. Testing the mediating variables used the Sobel Test. The Sobel test showed a mediating effect. The Sobel test was carried out based on the comparison of the t value with the t table value. If the t value is greater than 1.96 (the standard absolute z value), there is a mediation effect.

RESULTS

The research data used were primary data obtained through a questionnaire instrument. The questionnaire was distributed in Google form link which was distributed through WhatsApp group batch. Two hundred and ninety-five respondents returned the questionnaires were completely filled in and then statistically researched and analyzed to obtain the results of hypothesis testing. Based on the respondent data, information was obtained about the respondent's profile regarding class, gender, and the platform used in e-learning system. The following is a description of the profile of the respondents according to the data filled in the questionnaires that were distributed.

Table 1. Description of Respondents Class

No	Class	Total	Percentage
1	2017	37	13%
2	2018	66	22%
3	2019	56	19%
4	2020	136	46%
Total		**295**	**100%**

Based on table 1, it can be seen that from the total respondents, 46% of them were nominated by respondents from the 2020 class, 22% from the 2018 class, 19% from the 2019 class, while 13% from the 2017 class.

Figure 2. Gender of Respondent

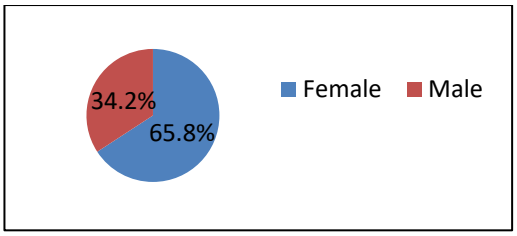
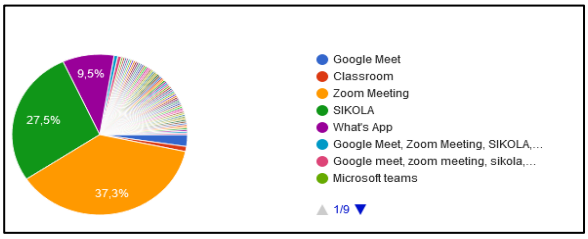


Figure 3. Platform Used by Respondent



Based on figure 2, it can be seen that the respondents were dominated by female respondents as much as 65.8%, the rest were male respondents as much as 34.2%. Based on figure 3, it can be seen that the platforms used by respondents were nominated by *Zoom Meeting* as much as 37.3%, *Sikola* as much as 27.5%, *What'sApp* as much as 9.5%, while the rest was a combination of various platforms as much as 25.7%.

Model fit testing was done by using absolute fit measurement criteria, incremental fit measured, and parsimonious fit Measured index measurement. A model is said to be good if it meets the cut-off value of the goodness of fit index (Ghozali 2017, 93). Modification of the model needs if the model shows a value that does not fit to get a better model. Model modification carried out in this study was based on Arbuckle's theory which discussed how to modify the model by looking at the largest value of modification indices (MI) and then drawing the correlation line. After modifying the model, the proposed modelwas accepted because it met the goodness of fit test value as in table 2.

Table 2. Result of Modification Indices (MI)

Goodness of Fit Indeks	***Cut-off Value***	***Analysis***	***Value***
Chi-Square	More less	942.001	Fit
Significant Probability	> 0,05	0,072	Fit
CMIN/DF	< 2,00	1.070	Fit
RMSEA	< 0,08	0,01	Fit
GFI	> 0,90	0,89	Marginal
AGFI	> 0,90	0,84	Marginal
TLI	> 0,90	0,91	Fit
CFI	> 0,90	0,93	Fit
PNFI	0,60-0,90	0,68	Fit

The indirect effect hypothesis testing was analyzed by using the Sobel test to determine the effect of the mediating variable, namely design features. The Sobel test was carried out based on the comparison of the t value with the standard absolute z value with a level of α of 5%. If the t value is greater than 1.96 (the standard absolute z value with α level is 5%), then there is a mediation effect. The calculation of the t value was calculated using the following formula.

Table 3. Result of Hypothesis Test

Hypothesis	**t table**	**t value**	**Description**
H1	1,96	12.01	Accepted
H2	1,96	41.56	Accepted
H3	1,96	76.38	Accepted
H4	1,96	58.83	Accepted

H5	1,96	-1.09	Rejected
H6	1,96	-1.57	Rejected

DISCUSSION

The test results show that perceived usefulness has a positive effect on effectiveness of the e-learning system through design features. This shows that design features can be a mediating variable to test the effect of perceived usefulness on the effectiveness of e-learning system. The better design features of a platform are, the more useful the system e-learning system is. The result is in line with the Technology Acceptance Model which confirms that the more useful a system is, the higher the effectiveness of the system. The e-learning system requires the support of a platform that has quality design features so that it can increase the effectiveness of e-learning system. Good design features can make users feel the benefits of e-learning system. The results are consistent with the results of previous studies. (Goyal & Tambe, 2015) found that the design features of the tools used were very good for increasing the effectiveness of the learning system. (Shaharanee et al., 2016) also found that tools from Google classroom can improve the learning system. (Kintu et al., 2017) found that design features have a positive effect on the effectiveness of the learning system.

The test results show that perceived ease of use has a positive effect on effectiveness of the e-learning system through design features. This shows that design features can be a mediating variable to test the effect of perceived ease of use on the effectiveness of e-learning systems. The better the design features of a platform are easy to use by users. This result is in line with the Technology Acceptance Model which states that the more useful a system is the higher the effectiveness of the system (Davis, 1989). The e-learning system requires the support of a platform that has quality design features so that it can increase the effectiveness of e-learning system. Good design features are easy to use by users. The results are consistent with the results of previous studies. (Goyal & Tambe, 2015) found that the design features of the tools used were very good for increasing the effectiveness of the learning system. (Shaharanee et al., 2016) also found that tools from Google classroom can improve the learning system. (Kintu et al., 2017) found that design features have a positive effect on the effectiveness of the learning system.

The test results show that deep learning has a positive effect on effectiveness of the e-learning system through design features. This shows that design features can be a mediating variable to test the effect of deep learning on the effectiveness of e-learning systems. The better the design features are, the easier it is to find information with deep learning. The result of this study supports the theory of Kuhlthau (1993) which explains that the information-finding pattern starts from something that is not clear to the stage of clarity of the information it is looking for. The e-learning system requires the support of a platform that has quality design features so that it can increase the effectiveness of the e-learning system. Good design features will help users implement deep learning. This shows that deep learning can improve e-learning system. (Dolmans et al., 2016) showed that there is an improvement in the learning system using a deep learning approach. (Hermida 2015, chap.1) also found that deep learning increases the effectiveness of learning. (Goyal & Tambe, 2015) found that good design features can increase the effectiveness of the learning system. (Kintu et al., 2017) found that design features have a positive effect on the effectiveness of the learning system.

The test results show that surface learning has a negative effect on effectiveness of the e-learning system through design features. This shows that design features can be a mediating variable to test the effect of surface learning on the effectiveness of the e-

learning system. The better the design features are, the easier it is to find information using surface learning. The Kuhlthau (1993) theory explains that the information-finding pattern starts from something that is not clear to the level of clarity of the information it is looking for. Searching for information using surface learning does not increase the effectiveness of the e-learning system. (Dolmans et al., 2016) show that there is a decrease in the effectiveness of the learning system using the surface learning approach. (Hermida 2015, chap.1) also found that surface learning decreased the effectiveness of learning. (Goyal & Tambe, 2015) who found that good design features can increase the effectiveness of the learning system. (Kintu et al., 2017) who found that design features have a positive effect on the effectiveness of the learning system.

The test results show that challenges have no positive effect on effectiveness of e-learning system through design features. This shows that design features cannot be a mediating variable to test the effect of challenges on the effectiveness of e-learning system. This result is not in line with theory of kuhlthau which studies the information-finding process which emphasizes the emotional aspects. The better the design features are, the more enthusiastic the users will be in finding the information needed so that it can increase the effectiveness of e-learning system. The result is inconsistent with the results of previous studies. (Goyal & Tambe, 2015) found that good design features can increase the effectiveness of the learning system and (Kintu et al., 2017) found that design features have a positive effect on the effectiveness of the learning system.

The test results show that threats have no negative effect on the effectiveness of e-learning system through design features. This shows that design features cannot be a mediating variable to test the effect of threats on the effectiveness of e-learning system. This result is not in line with theory of kuhlthau which studying the information-finding process which emphasizes the emotional aspect. The better the design features are, the smaller the feeling of threat is. The obstacles faced by users in the process of finding information are getting smaller so that feelings of pressure, anxiety, and stress can be minimized. This can increase the effectiveness of the learning system. The results are inconsistent with the results of previous studies. (Goyal & Tambe, 2015) found that good design features can increase the effectiveness of the learning system. (Kintu et al., 2017) found that design features have a positive effect on the effectiveness of the learning system.

CONCLUSION

Higher education institutions are required to prepare accounting graduates who are ready for industrial revolution 4.0. Accounting students are expected to have the ability to interpret and convey information, identify data, to answer questions, and the ability to use appropriate data analysis techniques using information system. One of the roles of universities in preparing competent graduates with information systems is to use e-learning system, especially during the Covid-19 pandemic.

The use of e-learning systems in accounting courses is important to do. The results showed that accounting students felt the benefits of the e-learning system. Accounting graduates are expected to be more competent in the use of information systems, especially in producing financial information. Therefore, universities need to consistently improve e-learning systems to equip and train graduates to be more familiar with information systems.

The e-learning system requires the support of a platform that has good quality design features so that it can increase the effectiveness of e-learning system. Quality design

features are able to provide benefits, easy to use, and safe to use. The result showed that good design features make users feel the benefits and convenience of the e-learning system more. In addition, good design features make users find information deeply so that the information obtained is clear and does not produce biased information. Users feel confident when use information systems with easy design features. design features need to be designed according to the learning needs of users. The lack of experience using the learning system makes users feel uninspired in finding information. it is important to provide training consistently and the users have a positive attitude in using information systems.

LIMITATION

This research was conducted during the Covid-19 pandemic so that the questionnaire was distributed in the form of Google drive which led to the possibility that respondents did not respond quickly and did not fill out the research questionnaire. The e-learning system cannot be used for practicum and laboratory courses so the results of this study cannot be generalized to all accounting courses. This study only involved one university, which is Hasanuddin University, so its scope was limited.

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DECLARATION OF CONFLICTING INTERESTS

Accounting lecturers should consistently and sustainably use e-learning system platform according to user needs. By focusing on using one platform, training can be carried out and users feel familiar and experienced in using e-learning system platform. Therefore, universities are expected to be able to design an e-learning system platform that suits the learning needs of accounting students who have design features different from other majors. In addition, universities are expected to consistently conduct evaluations of the platform in order to obtain improvement materials for the e- learning system. Universities need to make efforts to introduce the e-learning system used through training and ensure that the platform used has simple tools so that it is easy for users to understand and learn.

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