



## THE INFLUENCE OF INFORMATION SYSTEMS ON STUDENT SATISFACTION: A STUDY OF PERCEIVED EASE OF USE AND PERCEIVED USEFULNESS

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ARTICLE INFO	ABSTRACT
<p>DOI: 10.52932/jfm.vi2.479</p> <p><i>Received:</i> January 09, 2024</p> <p><i>Accepted:</i> February 29, 2024</p> <p><i>Published:</i> March 25, 2024</p> <p><b>Keywords:</b> System quality; Information quality; Perceived ease of use; Perceived usefulness; Online learning; Satisfaction.</p>	<p>Digital transformation in education has created opportunities for teaching methods to evolve through the application of new technology. The purpose of the study was to identify the factors that influence the satisfaction of university students with online learning. A survey was conducted on 609 students in Ho Chi Minh City, and the collected data was analyzed using the Partial Least Square Regression model. The study found that both system quality and information quality are crucial in determining the perceived ease of use and perceived usefulness of online learning systems. The results also revealed that perceived ease of use and usefulness positively impact students' overall satisfaction with online learning. The study recommends that educational institutions take these factors into account when designing online courses to meet learning objectives and ensure that students are satisfied with their learning experience.</p>

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## 1. Introduction

Online learning is a significant trend substantially pushed by the epidemic, adopted by millions of students and teachers worldwide. According to research by Pearson, 88% of students globally believe online learning will be a permanent feature of education in the future (Pearson, 2020). The consideration of innovation into up close and personal instructing has drawn in gigantic consideration and has given different examination roads throughout the long term.

End-users' satisfaction is a critical aspect of evaluating the success of any system (Kim & Lee, 2014). However, determining the factors that contribute to satisfaction can be challenging due to their complex interrelationships. Today, online learning is viewed as the best and most well-known method of guidance embraced by educational establishments due to its clear learnability in giving versatile, helpful, and persistent learning (Rasheed et al., 2020). In the education situation faced with the Covid-19 pandemic, learning innovation has been the best arrangement in most created nations, prompting keeping up with and guaranteeing learning coherence. Students who cannot enroll in traditional programs due to outside factors benefit from having more freedom over when and how they complete course learning activities (e.g., pandemic, effortless team collaboration, easy access to materials content, work responsibilities, family obligations, and on-time mutual discussions). However, because of its flexibility, system quality, and the online medium, students must possess various skills, including knowledge of how to use technology and innovative attitudes that influence students' perceived ease of use (PEU) and perceived usefulness (PU), the main factors affecting their satisfaction.

The benefits of online learning can be enjoyed to a greater extent in developed countries

due to their advanced physical infrastructure and the reduction of geographical barriers. In contrast, developing countries have struggled to adopt online learning systems fully, resulting in incomplete utilization and unsatisfactory outcomes. It is essential to understand the factors hindering the adoption of these systems in developing countries (Salloum et al., 2019).

The main objective of this paper is twofold. Firstly, to conduct an empirical investigation into the impact of external factors, which have yielded significant results in the literature, on online learning satisfaction among students, using DeLone & McLean's (1992) IS success model, with factors such as information quality and system quality. Secondly, to determine the most frequent belief factors (PU and PEU) by applying Davis (1989) Technology Acceptance Model (TAM).

## 2. Theoretical framework

### *Technology acceptance model*

The Technology Acceptance Model (TAM), first introduced by Davis in 1989, has become a popular tool for researchers studying the impact of PEU and PU on the acceptance of technology-mediated devices in educational settings (Kumar et al., 2022). By gauging students' attitudes towards online learning, educational institutions can develop effective strategies for introducing new learning systems. A recent systematic review by Al-Qaysi et al. (2020) concluded that TAM is particularly valuable when it comes to adopting educational technology, surpassing other theoretical models in its usefulness.

### *Information Systems (IS) Success Model*

According to the IS success model, the primary predictors of the use of IS are information quality and system quality. Using IS can significantly impact user satisfaction and how well organizations and people function

(DeLone & McLean, 2003). Several studies on the use and performance of IS in organizations have revealed that information quality and system quality are the primary factors that influence the use of IS (Kim & Lee, 2014).

Students expect to access supportive source documents and precision learning content when taking online courses. Students who receive sufficient logical information can easily absorb and remember it effectively. Therefore, students who have innovative attitudes can quickly adapt to any circumstances. The development of quality information resources and the modernity of online learning systems affect PEU. The new context has made students more easily satisfied with online learning.

*System quality (SQ)*: System quality is typically evaluated based on compatibility, reliability, and stability of hardware and software when it comes to supporting information (Ohliati & Abbas, 2019). The system quality is such that learners can easily access each function of the lecture content at anytime and anywhere during the learning process (Kim & Lee, 2014). A higher degree of system quality leads to an enhanced usability of learning applications. In other words, the better the quality of the system, the more user-friendly the learning application will be. Additionally, the ease of use of a system is a crucial factor in the overall learning experience. A successful online learning system should be evaluated based on the following characteristics: user-friendliness and effectiveness in providing helpful feedback to learners. This suggests that the quality of the system has a direct impact on its ease of use (Mahande et al., 2019).

*Information quality (IQ)*: DeLone and McLean (2003) define information quality as the accuracy and relevance of information produced by an information system. The quality of an information system can be judged by the quality of the information it produces. Therefore, it's essential to consider the quality of the

information content received from the system. DeLone and McLean's IS Success Model (2003) suggests that using an information system can help users perceive information quality, system quality, and service quality. As a result, system quality can be regarded as a predictor of PU and satisfaction (Kim & Lee, 2014).

*Perceived ease of use (PEU)*: According to Davis et al. (1989), the extent to which a person believes that using a particular system will be simple is referred to as PEU. Technological systems that are perceived as easier to use and less complex are more likely to be accepted and utilized by potential users.

The availability of easy and affordable access to information technology motivates and provides students with opportunities to explore and learn more, as stated by Jeljeli et al. (2022). Usability, which reflects the ease of interaction between humans and computers, is an important quality (Amsal et al., 2021). There is a direct and indirect relationship between system quality and ease of use, as highlighted by Wixom and Todd (2005). The ease of use of information systems impacts customers positively, as stated by previous research that found a significant positive relationship between system quality and ease of use in online marketplaces (Kumar et al., 2021). Users tend to feel more at ease and self-assured when they obtain reliable and accurate information from a system. This boosts their productivity and efficiency in using the system. As a result, if the system can steadily offer dependable and precise information, users are more inclined to view it as user-friendly and beneficial (Machdar, 2016). Based on the results obtained, several hypotheses were developed, including:

*Hypothesis H1: System quality and PEU are positively correlated.*

*Hypothesis H3: Information quality and PEU are positively correlated.*

*Perceived usefulness (PU)*: PU is the degree to which an individual believes that using a specific system will enhance their job performance. If users perceive a positive correlation between the system's use and their performance, it is considered to have high PU (Davis et al., 1989). An individual's willingness to adopt technology is affected by their perception of its usefulness (Bansah & Agyei, 2022).

According to recent studies, the quality of the system is a crucial factor in determining its success and has a significant impact on how useful it is perceived to be from the perspective of students (Alkhawaja et al., 2022).

A study conducted by Seddon in 1997 has shown that the quality of information generated by a system can greatly affect how people perceive its usefulness. In addition, the higher-quality information tends to lead to a more positive perception of usefulness. This means that the information provided must be accurate, reliable, relevant, and up-to-date. When users rely on the information produced by the system to make decisions, it is imperative that the information is of the highest quality. The better the quality of the information used, the more likely the system will be perceived as useful and trustworthy. Therefore, it is essential to prioritize the quality of the information provided by the system in order to maximize its PU (Machdar, 2016).

Information quality is a crucial element when using e-learning systems. It relates to how relevant the information is to learning and how well it facilitates understanding. The quality of information has a significant impact on usability, and it is positively related to PU when using an e-learning system. According to Ohliati & Abbas (2019), the information quality presented is directly linked to the perceived benefit of e-learning. Therefore, improving the information quality becomes a critical factor in students' decision to adopt e-learning and their willingness to participate in these systems.

*Hypothesis H2: System quality and PU are positively correlated.*

*Hypothesis H4: Information quality and PU are positively correlated.*

*Satisfaction (SA)*: Based on Kotler et al.'s (2021) definition, satisfaction refers to the level of contentment that an individual experiences as a result of comparing their expectations with the actual outcomes derived from a product or service. In the context of learning, students tend to have more positive experiences with communication tools when they find them to be convenient and satisfactory. This, in turn, leads to greater acceptance of online learning and a higher likelihood of continuing to learn through this method (Dung & Thuy, 2020).

Students who have an innovative attitude towards online learning methods are more likely to perceive flexibility in flexible learning. Those who are willing to try new methods, approaches, and take risks are more likely to find technology useful (Drennan & Kennedy, 2010). The perception of the usefulness of online learning tools will affect adopting new learning methods, leading to student satisfaction (Mahande et al., 2019). From a practical perspective regarding online learning, providing students with easy access to PEU, and easily accessible information can stimulate positive emotions and encourage learners to participate in the course with interest. Therefore, it is hypothesized that:

*Hypothesis H5: PU has a positive influence on satisfaction.*

*Hypothesis H6: PEU has a positive impact on satisfaction.*

### 3. Methods of the Research

The study applied mixed qualitative and quantitative methods and was conducted in two phases: the pilot study and the primary survey. The first stage used qualitative methods, which were conducted through in-depth

interviews with five education experts from Ho Chi Minh City universities and a group discussion of 16 students to investigate the content validity and acceptability of questions. Both in-depth interviews and group discussions were conducted through the Microsoft Teams application. This stage aimed to review whether the research questions were appropriate or not before executing the primary survey. In the second phase, the quantitative method was undertaken to assess the measurement model and structural model. The survey was implemented by using an online survey through email and Facebook.

We utilized 18 scale items, adapted from previous studies, along with two scale items produced from qualitative research, to measure the constructs. The items were rated on a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree”. We collected data through an online survey in Vietnam. We received 723 questionnaires, but we excluded low-quality surveys and used only 609 acceptable responses for data analysis. To determine an adequate and suitable sample size for structural equation models, we employed an online calculator for a priori sample sizes (Soper, 2019). After examining the statistical power levels, desired probability, anticipated effect size, number of latent constructs, and number of observed items, we concluded that 223 responses are needed as the smallest sample size to detect the effect, and 148 responses are needed as the smallest sample size for model structure. Therefore, our sample of 609 responses is considered sufficient for underlying condition models and statistically robust for detecting any significant effects.

#### 4. Research Results

Out of the 609 collected samples, 301 are public schools, and 308 are private schools in Ho Chi Minh City. The number of students participating in the survey in year 1 was 131 (21.5%), year 2 was 145 (23.9%), year 3 was 203

(33.3%) and year 4 was 130 (21.3 %). The majors that the students are studying are economics, design, engineering, information technology, law, English language, marketing, and a few others. In addition, the software commonly used for online learning are MS. Team, Google Meet, Zoom, BigBlueButton, Elearning, VooV, and Blackboard, respectively.

The findings indicate that the majority of the constructs exhibit reliability and convergent validity. The results presented in Table 1 suggest that our study has satisfactory levels of reliability, convergent validity, and discriminant validity. Observed variables are evaluated based on their standardized outer loading. Those with an outer loading of 0.7 or greater are acceptable, while those with a value less than 0.7 should be ignored. In this study, 0.7 was considered acceptable (Sarstedt et al., 2021). As per Table 1, we rejected the outer loading value of PU1= 0.396. To evaluate discriminant validity, the Fornell-Larcker criteria were employed by the authors. As shown in Table 2, all variables demonstrate discriminant validity when the square root of the Average Variance Extracted (AVE) of each construct is greater than the correlation of the construct with any other construct in the model (Henseler et al., 2016).

The results of the measurement model indicate that the constructs’ reliability and validity are satisfactory. We are continuing to test the proposed structural model. To test the structural relationships, the conceptualized causal paths were estimated. The results are presented in Table 3, where six hypotheses were supported, indicating that the proposed model is valid.

The outcomes of the study reveal that system quality factors have a significant impact on PEU and PU. The acceptance of Hypothesis H1 ( $\beta=0.232$ ;  $p=0.000$ ) and H2 ( $\beta=0.406$ ;  $p=0.000$ ) lends support to previous research findings, such as those of Davis et al. (1989), Mahande

et al. (2019), Bansah and Agyei (2022), and Alkhawaja et al. (2022). Online learning has become an integral component of education in today's world. It's a well-known fact that having the right tools can make a significant difference. Students who use learning applications with an interface that is easy to navigate, comprehensive features, and consistent fast speeds tend to find them more useful and user-friendly.

The impact of information quality factors on PEU and PU is noteworthy. The results of the hypothesis testing support H3 ( $\beta=0.46$ ;  $p=0.000$ ) and H4 ( $\beta=0.386$ ;  $p=0.000$ ). These findings are consistent with prior research conducted by Machdar (2016), Ohliati & Abbas (2019), Amsal et al. (2021), Kumar et al. (2021), and Jeljeli et al. (2022). PEU and PU are both critical elements in determining the effectiveness of online learning software. By presenting clear and concise lesson information, students can easily understand and absorb the material,

improving their learning ability. Furthermore, if students perceive the software as user-friendly and useful, they are likelier to continue using it and reap the benefits of online learning. Interaction factors, such as user interface design and the availability of support resources, can significantly impact the PEU and PU of the software. Therefore, it is important for online learning platforms to prioritize these factors to enhance their software's overall effectiveness.

According to the research, the PU and dPEU play a significant role in determining satisfaction. Based on the findings, Hypothesis H5 ( $\beta=0.387$ ;  $p=0.000$ ) and H6 ( $\beta=0.371$ ;  $p=0.000$ ) were accepted. This outcome aligns with the results of previous studies conducted by Dung & Thuy (2020), Drennan & Kennedy (2010), and Mahande et al. (2019). It is expected that with increased positive learning experiences, students' satisfaction levels will improve.

**Table 1.** Reliability and validity of constructs ability and validity of constructs

Constructs	Scale items	Factor loadings	Cronbach's Alpha	rho_A	CR	AVE
		>0.7	0.6-0.9		0.6-0.9	>0.5
Information quality (IQ)	IQ1	0.771	0.757	0.759	0.845	0.578
	IQ2	0.749				
	IQ3	0.755				
	IQ4	0.802				
Perceived ease of use (PEU)	PEU1	0.771	0.615	0.613	0.796	0.565
	PEU2	0.708				
	PEU3	0.789				
Perceived usefulness (PU)	PU1	0.396	0.763	0.766	0.864	0.68
	PU2	0.881				
	PU3	0.817				
	PU4	0.79				
Satisfaction (SA)	SA1	0.769	0.762	0.769	0.848	0.583
	SA2	0.8				
	SA3	0.783				
	SA4	0.728				
System quality (SQ)	SQ1	0.818	0.745	0.746	0.855	0.663
	SQ2	0.797				
	SQ3	0.826				

**Notes:** CR = composite reliability, AVE = average variance extracted.

**Table 2.** Discriminant validity

	IQ	PEU	PU	SA	SQ
IQ	0.76				
PEU	0.604	0.752			
PU	0.637	0.559	0.825		
SA	0.625	0.594	0.587	0.764	
SQ	0.62	0.518	0.645	0.574	0.814

**Table 3.** Summary of hypothesis tests

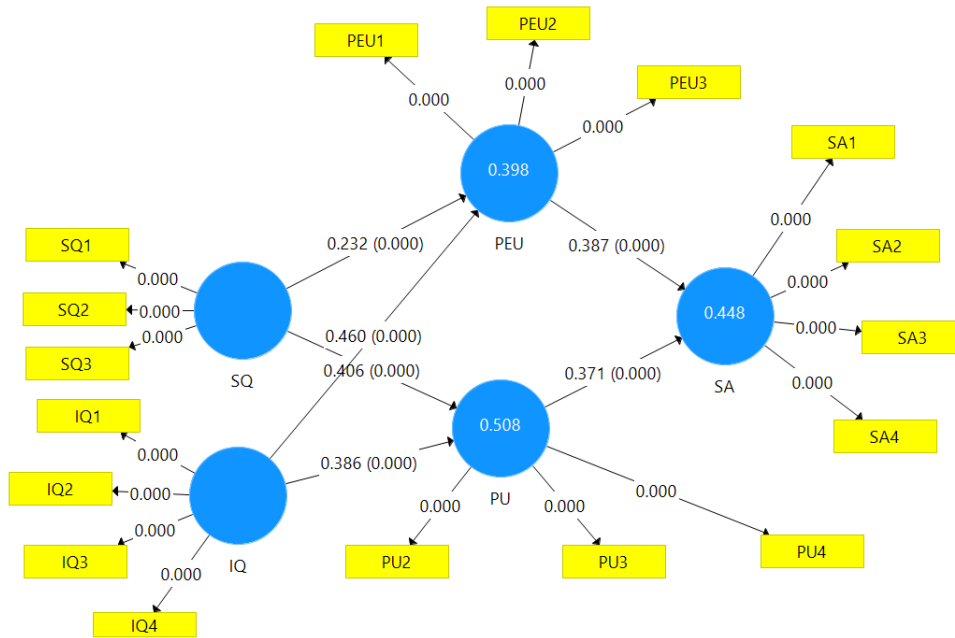
Hypothesis	Estimate	T Value	P Values	Support
H1: SQ -> PEU	0.232	5.166	0.000	Accepted
H2: SQ -> PU	0.406	10.217	0.000	Accepted
H3: IQ -> PEU	0.46	9.308	0.000	Accepted
H4: IQ -> PU	0.386	9.368	0.000	Accepted
H5: PEU -> SA	0.387	9.818	0.000	Accepted
H6: PU -> SA	0.371	9.6	0.000	Accepted

According to Chin (1998), an R2 value of more than 0.67 is considered high, while values between 0.33 and 0.67 are moderate, and values between 0.19 and 0.33 are weak. Based on Table

4, the R2 values for PEU, PU, and satisfaction were between 0.33 and 0.67, which means that the predictive power of these constructs is considered moderate.

**Table 4.** R square

Constructs	R square	Results
PEU	0.398	moderate
PU	0.508	moderate
SA	0.448	moderate



**Figure 1.** Testing PLS-SEM for factors affecting student’s satisfaction

According to Henseler et al. (2016), the SRMR (standardized root mean square residual) index was used to verify the model’s fit, and the research results with the SRMR coefficient value = 0.044 (< 0.082) suggest that the model fits. Other indicators, such as coefficient d ULS = 0.302 < 95% and coefficient d\_G = 0.125 < 95%, also meet requirements.

**5. Conclusion**

**5.1. Conclusion**

When students perceive the online learning system to be user-friendly and easy to use, their satisfaction with its usefulness increases, supporting the original hypotheses of TAM. Students’ satisfaction would increase if they felt the online learning system benefited them. The study demonstrated how user satisfaction with online learning was determined by two IS Success Model core variables: information quality and system quality. The results showed that the IS Success Model (IQ, SQ) variables had been shown to have direct effects on the TAM (PU and PEU) variables. The IS Success model

variable indirectly influenced users’ satisfaction through the PU and PEU TAM factors.

There is no doubt that the result of the study argues that using online learning for teaching and learning has situated students’ satisfaction during the Covid-19 pandemic at the universities in Ho Chi Minh City. The advancement of technology and information quality has brought about significant changes in the education system, primarily through the increased use of online learning methods. This transformation has been accelerated by the Covid-19 pandemic, which has prompted the adoption of health protocols to minimize direct interaction between the parties involved in the teaching and learning process. Therefore, there is a need to apply the online learning method, particularly for higher education providers such as universities.

It is important to acknowledge that direct interaction between learners and instructors is a key factor in the success of a learning system. This means that universities must develop online learning systems that can facilitate



optimal interaction and take into account the characteristics of students as system users. This study examines whether a university's online learning system is effective and meets users' expectations. The study focuses on satisfaction with the system and information quality to ensure efficient teaching and learning. It also looks at how PEU and usefulness impact satisfaction. The data processing results show that six hypotheses are acceptable, which is consistent with previous studies. The research supports the theory of the Technology Acceptance Model (TAM), Information System (IS), and Success Model.

### **5.2. Managerial implication**

The study demonstrated significant levels of Information quality related to PEU and PU, with positive effects observed. In an online learning environment, students typically prioritize learning content that is tailored to their individual needs over official course materials provided by instructors. To ensure that the content meets the students' needs, administrators and online learning organizations should conduct surveys and analyze each student's learning experience. Based on the survey results, lecturers can provide relevant course materials for students to reference. Moreover, students appreciate when the online learning system provides more comprehensive information than traditional face-to-face methods. Therefore, lecturers should encourage students to exchange ideas and proactively search for materials that can help them better understand the subject matter. Additionally, lecturers should summarize basic concepts and continually update course materials to ensure students can easily access relevant information for each lesson.

The findings also revealed that system quality is positively and significantly effective on PU and PEU. Thus, students appreciate the beautiful design and reasonable content layout

of online learning software. The good system quality ensures stable and continuous online learning activities, which students highly value. Security is also crucial, and manufacturers should set up information controls to minimize privacy risks. Designers need to improve system stability to create a positive learning experience for students.

Managerial implications improving the PEU (0.387). Students are satisfied with PEU rather than PU. Thus, when students start the course, universities need documents and video instructions on how to access, operate, and use the functions in the previous service system. In addition, higher education training should be interested in reducing the system's complexity to interact, such as arranging displayed information logically and efficiently, reducing the display of unnecessary images in the system, and simply assigning submissions. The information displayed on Online learning systems should be easy to access.

Managers should take note of the importance of improving the PEU, which has a higher impact factor of 0.387 compared to PU. Students prioritize ease of use over usefulness, thus it is important for universities to provide clear and concise instructions via documents and videos on how to access and use the functions of the online learning system. Furthermore, higher education institutions should focus on reducing the system's complexity by arranging the displayed information logically and efficiently, minimizing the display of unnecessary images, and simplifying the submission process. The information displayed on the online learning system should also be easily accessible to ensure a positive user experience for students.

It is important to note that this study has certain limitations that need to be addressed. Specifically, there is a need to thoroughly evaluate the factors that impact the quality of education, such as information and

communication quality, and how the perceived experience of students affects their satisfaction. This includes factors such as convenience, enjoyment, and perceived costs. Additionally, the research model can be generalized for

innovative approaches to education in flexible situations, including but not limited to similar situations like the Covid-19 pandemic, distance learning, and online courses.

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