



# The Influence of ICT and E-Learning on Students' Satisfaction

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## ABSTRACT

Students' satisfaction is a prominent criterion in evaluating the institution's performance. There is a limited study to examine the influence of ICT and e-learning on student's satisfaction in Politeknik Malaysia. For this purpose, this study aims to determine the influence of ICT and e-learning on student satisfaction in the context of Politeknik Malaysia. A quantitative study was employed, and a survey was conducted with a total of 321 students who responded to the questionnaires. The result of Pearson correlation analysis and multiple regression analysis revealed that ICT and e-learning significantly and positively correlated and influenced student satisfaction. In addition, the strongest and most positive relationship on student satisfaction was ICT, followed by e-learning. Therefore, the improvement of these two variables is critically important due to increase student satisfaction especially ICT. These findings are important as recommendations to the management to progressively enhance the ICT facilities and e-learning services in ensuring the achievement of the institution's performance.

## 1. Introduction

Due to the COVID 19 pandemic, the government has issued various policies to suppress the transmission of the COVID 19 virus (Prasetya, Harjanto, & Setiyawan, 2020). Therefore, the government implemented the physical distancing policy to prevent the transmission of the COVID 19 virus, consequently causing changes in learning patterns from face-to-face to distance learning (Prasetya, Harjanto, & Setiyawan, 2020). Some important platforms for distance education learning are information and communication technology (ICT) and e-learning (Mohamed, Noorashid, & Razak, 2021; Bhat & Bashir, 2017). ICT can be defined as the computer technology that constantly creates and disseminates information (Mohamed et al., 2021). Meanwhile, e-learning involves delivering information by using telecommunication technology to educate and train students (Zaheer et al., 2015). In other words, e-learning is a learning activity utilising the internet in its implementation; teachers and students interact through learning media to achieve the learning objectives contained in the curriculum (Prasetya, Harjanto, & Setiyawan, 2020).

The impact of information technology on human life is enormous, and its role in education cannot be underestimated (Khan et al., 2021). Because of the COVID 19 pandemic, the contribution of information technology has gained momentum due to the closure of educational institutions, raising challenges for students' learning (Khan et al., 2021). Hence, studies on the information technology system are important, and the evaluation of the system is essential to ensure the system's success, which impacts the students (Prasetya, Harjanto, & Setiyawan, 2020). Hence, the e-learning quality assessment must be carried out to examine the effectiveness of distance learning (Prasetya, Harjanto, & Setiyawan, 2020). Several factors contribute to student satisfaction, including teacher, course, system design, technology, and environmental aspects (Chen & Bagakas, 2003; Arbaugh, 2002; Piccoli, Ahmad, & Ives, 2001). However, in terms of ICT and e-learning, lack of quick of feedback, technical problems, and ambiguous course instructions lead to student frustration and dissatisfaction. Hence, evaluating the system is important to enhance the current ICT and e-learning system to satisfy the students and increase their knowledge.

In the polytechnic education system context, the evaluation of ICT and e-learning towards student satisfaction is still limited. A study by Kumaran and Sulaiman (2021) at Politeknik Tuanku Sultanah Bahiyah only focused on Civil Engineering students, not the whole Politeknik students, and other programmes. Furthermore, they also suggested that future research should examine the effectiveness of ICT from the student perspective. Besides, their study analysed the data based on mean and standard deviation only.

Therefore, it created a gap for this current study to examine the effectiveness of ICT on student perspective and analyse the data using inferential statistics. Furthermore, the study by Mokhtar et al. (2020) focused on the e-learning system based on perceived usefulness, course quality, and system quality but excluded ICT. In addition, the study also suggested including other variables besides these three. Therefore, this study aims to investigate the influence of ICT and e-learning on student satisfaction. Specifically, the objectives are (a) to examine the influence of ICT on student satisfaction and (b) to examine the influence of e-learning on student satisfaction in the Politeknik Tuanku Syed Sirajuddin (PTSS) context. This study will benefit the top management, lecturers, and institutions to improve their current ICT and e-learning system to achieve higher student satisfaction in the future.

## 2. Literature Review

### 2.1 Information and Communication Technology (ICT)

Information and communication technology (ICT) controls information and facilitates connection among entities (Stephens, 2007). ICT usage has grown massively over the last century, having far-reaching effects on society and our daily lives. As a result, it is unsurprising to see increased interest, attention, and investment in ICT use in education worldwide (Yuen et al., 2003). According to Bhat and Beri (2016) ICT plays a critical role in several aspects of the teaching profession. It helps improve competency, professional motivation, accessibility, enthusiasm, professional conduct and relieve work stress by integrating these elements to develop a robust educational system. Furthermore, higher education has migrated to an online platform to reach out to students and has adopted virtual teaching to provide online courses due to ICT use (Ali, 2020; Alshehri et al., 2020). Moreover, according to Law et al. (2002), it was formerly utilised to improve the teaching and learning process across the curriculum. Still, today it is used to develop a new set of skills to prepare the future generation. It has the potential not only to assist reflective learning but also to increase students' learning capacity and retention (Achuthan et al., 2017). Recent studies have also highlighted that ICT enhances and improves students learning, ultimately leading to a beneficial impact on student satisfaction (Shehzadi et al., 2021). It has changed the education systems by altering educational practices, introducing new educational facilities, and implementing new pedagogies to improve student outcomes (Amin et al., 2021). The use of ICT in education allows for more student-centred learning environments. However, with the world rapidly shifting towards digital media and information, the role of ICT in education is becoming increasingly important, and its relevance will continue to grow (Amin, 2013).

### 2.2 E-learning

E-learning is described as studying using digital devices, such as desktop/laptop computers, smartphones, CD/DVD players, and many more, which initially appeared as a competitor to traditional face-to-face lessons (Basak et al., 2018). It can be considered a novel method to deliver educational services using electronic forms of information, improving learners' knowledge, skills, and other results (Fazlollahtabar & Muhammadzadeh, 2012). According to Hoppe et al. (2003), e-learning can be defined as learning aided by digital electronic tools and media. Besides, Rosenberg (2001) also stated that e-learning relates to the use of digital technology to give a holistic solution for expanding knowledge and competencies. It is also viewed as a technological or philosophical e-learning form that potential user see as novel (Basak et al., 2018). Therefore, the development of e-learning can be attributed to benefits, such as workforce, expenses, efficiency, and flexibility (Ozkan & Koseler, 2009). Sharma and Kitchens (2004) indicated that e-learning comprises web-based training facilities, such as interactive education systems and classrooms enabling digital engagement and technology-assisted remote learning. E-learning has become more prevalent in higher education years ago (Wu, 2016; Tsai, Shen, & Chiang, 2013). According to Ally (2005), e-learning plays a vital role in any national higher education expansion, and it provides the opportunity for enhancing countries and people to optimise their curriculum development. Previous studies indicate that e-learning successfully has the ability to improve student understanding (Amin et al., 2021; Supriadi & Sa'ud, 2017; Al-Rahmi et al., 2015). Furthermore, excellent e-learning significantly impacts student satisfaction (Shehzadi et al., 2021). It positively impacts students' ability to learn further and helps them engage better with the e-learning platform (Amin et al., 2021). According to Phutela (2019), students adopted e-learning because of its captive nature and found it is affordable and has drastically increased the rate of students learning. E-learning is therefore seen as a platform that is beneficial to student satisfaction (Bhuasiri et al., 2012).

### 2.3 Student Satisfaction

Satisfaction is described as a person's attitudes or feelings that are related with numerous factors that influence a particular condition (Bailey & Pearson, 1983). Whereas, student satisfaction is more accurately conceptualized as student perceptions evolving from the value of educational perceptions and experiences gained in educational institutes (Astin, 1993). Student satisfaction during learning positively influences student learning outcomes (Prasetya, Harjanto, & Setiyawan, 2020). In addition, student satisfaction is also important to ensure the students become highly motivated, leading to a more intense engagement with the learning materials (Bismala & Manurung, 2021). According to Silalahi (2021)'s study findings, most people are dissatisfied with the online learning approach they are currently using. However, Nortvig et al. (2018) proved a significant relationship between e-learning and student satisfaction.

These results are consistent with previous studies demonstrating that online learning positively affects student satisfaction. According to a survey by Zaheer et al. (2015) students are quite satisfied with the e-learning instruction delivered. Meanwhile, according to Dastidar (2021), students' opinions of online learning settings greatly impacted their satisfaction. However, Baber (2020) stated that classroom interaction, student motivation, course structure, instructor's knowledge, and facilitation impact students' perception of learning outcomes and student satisfaction in a study of 100 undergraduate students from South Korea and India. There was no significant difference in students' perception of learning outcomes and student satisfaction in both nations.

## 2.4 Research Framework and Research Hypotheses

The independent variables in this study include ICT and e-learning, whereas a dependent variable is student satisfaction. Figure 1 shows the study's research framework.

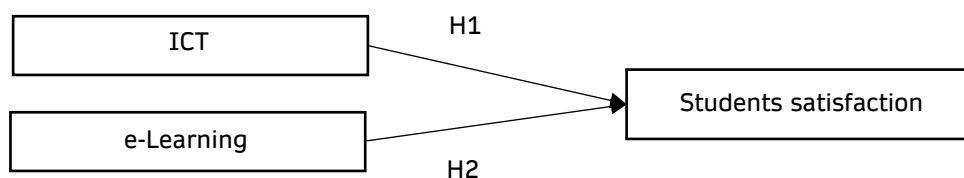


Figure 1: Research framework

## 3. Research Methodology

This study employed a quantitative research design with a single cross-sectional approach. The target population included PTSS students from the Departments of Tourism and Hospitality (JPH), Commerce (JP), Electrical Engineering (JKE), Information Technology and Communication (JTMK), Design and Visual Communication (JRKV), and Mechanical Engineering (JKM).

Based on the PTSS Student Affairs Unit data, the total number of students' population for Session 1:2021/2022 is 3925. Based on the Raosoft software, if the sample size is 3925, the smallest sample size required is 350 respondents. The stratified random sampling was used in this study. Thus, the minimum number of questionnaires disseminated to each department included 104 respondents for Tourism and Hospitality, 61 respondents for Commerce, 46 respondents for Electrical Engineering, 45 respondents for Information Technology and Communication, 58 respondents for Design and Visual Communication, and 36 respondents for Mechanical Engineering.

The questionnaire design in this research was obtained from prior literature and segmented into four sections. Section A was on ICT, adapted from Bhat and Bashir (2018) with 15 items. Section B was on e-learning, adapted from Udo et al. (2011) with four items, while Section C was on student satisfaction, adapted from Headar et al. (2013) with eight items. Finally, Section D contained five items on respondents' demographic profiles. All items were measured using a five-point Likert scale, with 1 representing strongly disagree and 5 representing strongly agree.

Brislin's (1970) back-translation approach was used because the questionnaire was originally written in English. The English version was translated into the Malay language by two translators. The Malay language version was then translated into English by two additional translators to ensure consistency and the accuracy of the questionnaire. This study engaged three experts to validate all the items concerning questionnaire validity. Cronbach's alpha coefficient was employed to determine the reliability, and the coefficient results revealed that all items were valid. The Cronbach's alpha coefficient results are shown in Table 1.

Variables	Cronbach's alpha coefficient value
ICT	0.959
E-Learning	0.882
Student Satisfaction	0.968

Table 1: Cronbach's alpha coefficient value

This study employed a survey approach to collect data, and indeed the researchers disseminated the survey questionnaires using the Google Form. A cover letter indicating that the survey is voluntary and that all information obtained would be kept private was attached to the questionnaires. The Statistical Package for Social Sciences (SPSS) version 22 was also used to analyse the data in this study. The Pearson correlation analysis and multiple regression analysis were utilised to address the study's objectives.

## 4. Results

### 4.1 Demographic Profile

Only 321 out of 350 respondents answered the questionnaires, yielding a 95% response rate. The results showed that more female students (62.8%) answered the questionnaires compared to male students (37.2%). The respondents were aged between 18-19 years old (33.2%), followed by 20-21 years old (53.5%), the highest in answering the questionnaires, and 22-23 years old (12.1%). Meanwhile, the lowest consisted of those aged 24 years old and above (1.2%).

The respondents consisted of Malay (86.7%), Chinese (3.0%), Indian (8.2%), Siamese (1.2%), and other races (0.9%). In terms of the semester, Semester 4 (32%) was the highest group responding to the survey, followed by Semester 2 (20.5%), Semester 3 (17.8%), Semester 5 (14.2%), and Semester 1 (11.8%). The lowest was Semester 6 (3.6%). Finally, JPH students (25.1 %) were the most likely to respond to the questionnaire, followed by JP students (18.4 %), JRKV students (16.9 %), and JKE and JTMK students (13.9 %). JKM students had the lowest average (11.8 %). Table 1 provides the respondents' demographic profile.

Table 2: The Respondents' Demographic Profile

Particular		Frequency	Percent
<b>Gender</b>	Male	123	37.2
	Female	208	62.8
<b>Age</b>	18 – 19 years old	110	33.2
	20 – 21 years old	177	53.5
	22 - 23 years old	40	12.1
	24 years old and above	4	1.2
<b>Race</b>	Malay	287	86.7
	Chinese	10	3.0
	Indian	27	8.2
	Siamese	4	1.2
	Other	3	.9
<b>Semester</b>	Semester 1	39	11.8
	Semester 2	68	20.5
	Semester 3	59	17.8
	Semester 4	106	32.0
	Semester 5	47	14.2
	Semester 6	12	3.6
<b>Department</b>	JPH	83	25.1
	JP	61	18.4
	JKE	46	13.9
	JKM	39	11.8
	JTMK	46	13.9
	JRKV	56	16.9
<b>Total</b>		<b>321</b>	<b>100%</b>

#### 4.2 Pearson Correlation Analysis

The Pearson correlation analysis showed the relationship between ICT and e-learning and student satisfaction. The results showed a significant relationship between ICT and student satisfaction ( $r = 0.773$ ,  $p < 0.001$ ) and significant relationship between e-learning and student satisfaction ( $r = 0.756$ ,  $p < 0.001$ ). Based on the findings, the strongest and most positive relationship on student satisfaction was ICT, followed by e-learning. Table 2 shows the Pearson correlation analysis for the variables.

Table 3: Pearson Correlation Analysis

Variables	Mean	Std. dev.	ICT	e-learning
ICT	3.824	0.716		
e-learning	3.800	0.753	0.797**	
Students' satisfaction	3.650	0.837	0.773**	0.756**

\*\*Correlation is significant at the 0.01 level (1-tailed)

#### 4.3 Multiple Regression Analysis

The influence of ICT and e-learning on student satisfaction was investigated using multiple regression analysis. The results indicated that  $R^2 = 0.652$ , meaning ICT and e-learning explained 65.2% of the variance in student satisfaction with  $F = 304.255$ ,  $p < 0.000$ . Other factors explained the remaining 34.8%. In this case, ICT and e-learning significantly and positively influence the prediction of student satisfaction. Specifically, ICT and e-learning influence student satisfaction with the beta values of  $\beta = 0.468$  and  $\beta = 0.383$ , respectively. Hence, Hypothesis 1 and Hypothesis 2 are supported, indicating that ICT and e-learning significantly and positively influence Polytechnic student satisfaction. Based on the results, ICT has the greatest influence on student satisfaction, followed by e-learning. The study's multiple regression analysis findings are shown in Table 3.

Table 4: The Multiple Regression Analysis

Model	B	SE B	Beta	T	Sig.
ICT	0.547	0.063	0.468	8.647	0.000
e-Learning	0.426	0.060	0.383	7.076	0.000

Note: R<sup>2</sup>= 0.652, p<0.000

## 5. Discussion

This study examines the influence of ICT and e-learning on student satisfaction. Based on the analysis above, the results show that ICT significantly influences student satisfaction. These results are consistent with Shehzadi et al. (2021), finding that ICT significantly and positively influences student satisfaction. Similar findings were also found in Amin et al. (2021)'s study, finding a positive relationship exists between ICT and student satisfaction. It is probably because the ICT promotes a conducive teaching and learning environment, improves the students' academic performance, and brings positive changes in the classroom. Moreover, students also feel that ICT enables teaching to be better than traditional teaching methods, and it is convenient to share assignments, lecture notes, and study materials through ICT.

Meanwhile, concerning e-learning, the results also indicate that e-learning significantly and positively influences student satisfaction. It is consistent with Mohamed et al. (2021), demonstrating that e-learning positively impacts student satisfaction. Similarly, Zaheer et al. (2016) also found that students are highly satisfied with e-learning education. It may be due to the e-learning content provided to the students having clear instruction making them feel satisfied. Secondly, the overall improvement in the quality of teaching obtained by students is from less good to better. Besides that, it is also because the instructional on the website is up to date and works well. Hence, these elements play a critical part in contributing to student satisfaction.

## 6. Conclusion

This study reveals that ICT and e-learning impact student satisfaction in the Politeknik Tuanku Syed Sirajuddin context. As a result, improving these two factors, particularly ICT and e-learning, will achieve higher student satisfaction. Therefore, this study aids lecturers, management, and institutions to improve the quality of ICT and e-learning systems. This study hopes to enlighten lecturers, management, and institutions to enhance the teaching and learning process by developing effective lessons within the system to increase student satisfaction. However, there are a few limitations encountered in this study. Firstly, this study only focuses on PTSS students, whereby there are other 35 polytechnics in Malaysia. Hence, the data gathered can only be generalised to PTSS students, not the entire Polytechnics in Malaysia. Secondly, this study focuses on two variables, but the results show that other variables influence student satisfaction. Therefore, studies on other variables are critically important to improve student satisfaction holistically.

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