

The Impact of Emergency Remote Teaching and Learning (ERTL) during COVID-19 Pandemic on Students

***Bangoura Sekou Oumar**

International Islamic University Malaysia
sbangoura077@gmail.com

Salifu Abdul Aziz

International Islamic University Malaysia
abdulaziz30.saa@gmail.com

Saadah Wok

International Islamic University Malaysia
wsaadah@iium.edu.my

*Corresponding author

ABSTRACT

The COVID-19 pandemic has spread across the globe with unprecedented repercussions, affecting various facets of human life, including education. In response to the Malaysian government's directive on strict adherence to protocols such as the Movement Control Order (MCO) and social distancing, the higher education sector has enforced the Emergency Remote Teaching and Learning (ERTL) system to replace face-to-face (physical) classes. The swift transition from face-to-face instruction to remote learning is not devoid of challenges. Hence, a new education pathway is called for. As such, this study focuses on the impact of ERTL during the COVID-19 pandemic on International Islamic University Malaysia (IIUM) students. The objectives of the study are (a) to determine students' level of knowledge, perception, attitude, and behavior towards ERTL and (b) to ascertain the predictors of behavior towards ERTL. This study employed a quantitative research design with a survey method. An online questionnaire was used as the research instrument for data collection using the networking sampling procedure. A total of 125 students participated in the study. The findings revealed that IIUM students have a basic knowledge of ERTL, they perceive ERTL to be necessary in terms of its usefulness, and they exhibit a positive attitude and behavior towards it. Knowledge of ERTL and also perception and attitude towards ERTL are the predictors of behavior in ERTL.

Keywords: *COVID-19 pandemic, emergency remote teaching and learning (ERTL), online learning, remote instruction, technology acceptance model*

INTRODUCTION

Against the backdrop of the COVID-19 outbreak, various policy initiatives have been launched by governments and tertiary institutions across the world to continue the teaching activities while assisting in containing the virus. However, there are ambiguities and disagreements about what to teach, how to teach, the workload of lecturers and students, the teaching environment, and the implications on education equity. Large-scale public efforts to use

technology in support of remote learning, distance education, and online learning during the COVID-19 pandemic are developing and growing quickly. The literature highlights some shortcomings, such as inadequate online teaching infrastructure, inexperienced lecturers, information gap, and a complex environment at home (Ali, 2020). Notwithstanding these challenges, the prevailing situation requires temporary measures that will ensure that students' learning is not affected. For example, China has initiated a Suspending Classes Without Stopping Learning policy to ensure that learning is not compromised at any time during the COVID-19 pandemic lockdown (Zhang et al., 2020). This is one of the many policies that China has put in place to ensure that students' learning is least affected during national lockdowns and school closures.

The ongoing COVID-19 crisis has been and will continue to be both a massive challenge and a learning experience for the global education community. Practically no one saw or wanted to believe something like this coming. As a result, every country in the world, all the schools, teachers, and especially parents have been extremely unprepared, creating tools on the go (Tuominen & Lasse, 2020). The abrupt transition from face-to-face classes to emergency remote teaching and learning (ERTL) poses a great deal of challenges to both instructors and students.

As the ERTL system is an alternative for the face-to-face (physical) classes, the International Islamic University (IIUM) has adopted remote learning as a temporary emergency measure in ensuring the continuity of education and onward restoration of academic activities amid the COVID-19 pandemic (Centre for Postgraduate Studies & Research Management Centre, IIUM, 2020; p. 2).

The relevance of this study can be seen in the following areas. First, this study is expected to provide useful information to the management of IIUM, particularly the Performance Audit and Quality Assurance Section (PAQAS), in their effort to strengthen the existing structures to permit effective remote instruction without any hindrance.

Second, this study is expected to serve as a guide or reference for students or other researchers in conducting a similar study. Finally, the findings of this study will help instructors and students alike in adjusting to the realities of the current situation in ensuring the continuity and progress of education and academic activities.

Consequent to the first-time identification of COVID-19 in December 2019, the World Health Organization (WHO) declared COVID-19 as a global pandemic in March 2020 and warned about its highly contagious nature (WHO, 2020). As a precaution to slow down its spread, countries all around the world followed strict protocols such as complete or partial lockdowns, social distancing regulations, and curfews. To reduce the chances of humans infecting each other with COVID-19, places where humans interact closely were shut down, including educational institutions. As a result of the measures taken worldwide, more than 1.5 billion enrolled students of all ages experienced interruptions of education, which is nearly 90% of the global student population (UNESCO, 2020a; 2020b; UNICEF, 2020). Though interruptions of education had occurred previously in many local instances (e.g., in cases of war, civil unrest, famine or strikes), it is "being experienced more acutely and affectingly by educators, students and parents" at a global scale for the first time (Williamson, Eynon, & Potter, 2020, p. 107). Consequently, to ensure the continuity of education, emergency remote education has been put in practice in varying delivery modes.

Emergency Remote Teaching and Learning (ERTL) has become a viable option or a necessary tool in ensuring the continuity of education, particularly for institutions that were not running an online system prior to the COVID-19 pandemic. However, the swift migration

from face-to-face instruction to remote learning presents several challenges and disparity among students in terms of access to required devices, Internet, and familiarity with platforms for synchronous sessions. Due to the pandemic, the higher education sector needs a total rethinking of its way of teaching and learning (Jaafar, 2020). At IIUM, ERTL commenced from June 15 until August 28, 2020. To this effect, it has become necessary to conduct a study on the impact of ERTL during the COVID-19 pandemic on IIUM students.

The objectives of this study are to determine students' level of knowledge, perception, attitude, and behavior towards ERTL; and to ascertain the predictors of behavior on ERTL.

LITERATURE REVIEW

Overview of Emergency Remote Teaching and Learning (ERTL)

Emergency remote teaching learning (ERT) is a temporary shift from the conventional classroom (physical) instruction to remote (distant) learning as a result of the pandemic crisis. There is a dichotomy between emergency remote teaching and learning (ERTL) and online learning in the sense that online learning is well planned and structured and was already in existence prior to the COVID-19 pandemic.

According to Hodges, Moore, Lockee, Trust, and Bond (2020), ERT entails the use of complete remote teaching solutions for instruction or education that would otherwise be conveyed face-to-face or as blended or hybrid courses that will eventually resume its original mode at the end of the crisis. The main aim is not to re-create a robust education ecosystem in response to the prevailing situation but rather to provide temporary access to instruction and instructional support in a manner that is quick to set up and is reliably available during an emergency or crisis. Therefore, it requires students to have the knowledge and understanding of the system used.

Emergency Remote Teaching and Learning versus Online Learning

The focus of this study is on emergency remote teaching and learning (ERTL) which has been informed by the ongoing COVID-19 Pandemic. Emergency remote teaching and learning involves a swift temporal transition from physical or face-to-face instruction to remote or distant instruction due to crisis, without prior equipment and logistics to facilitate the migration (Hodges, Moore, Lockee, Trust, & Bond, 2020). For instance, in the case of International Islamic University Malaysia, there was a temporal break of academic activities for the necessary arrangements to be put in place for the commencement of ERTL.

In contrast to the ERTL, online learning has existed for decades and are based on careful instructional design and planning, using a systematic model for its design and development (Branch & Dousay, 2015). The design process and the careful consideration of different design decisions have an impact on the quality of the instruction, which in most cases is missing from the swift transition to remote instruction. There is no need for improvisation on the part of universities that are conducting their classes online prior to the COVID-19 pandemic, and it will not be fair to use ERTL and online learning interchangeably.

Student Knowledge of ERTL

Undoubtedly, students in this new age of information technology possess some basic knowledge of Information and Communication Technologies (ICT). Students of today are identified by attributes such as "digital natives" (Prensky, 2001), "millennials" (Howe & Strauss, 2000), "net generation" (Tapscott, 1998), and "digital generation" (Ali, 2018, as cited in Ali, 2020). They belong to the 21st century new age of information technology. Students

tend to have a strong bonding with ICT (Ali, 2018). All over the world, today's children are exposed to technological devices such as mobile phones and tablets from a very tender age (Shava, Chinyamurindi & Somdyala, 2016). The majority of students or 99.8% have access to mobile phones, and they use it for their personal and social interactions (Jesse, 2015). Looking at the rate at which technology is integrated with the education system, it can be assumed that students display a high degree of acceptance and receptiveness towards ERTL (Willms & Corbett, 2003). However, the World Bank (2020a) expressed the sentiment that by merely pointing students and teachers to large online repositories without appropriate guidance would not auger well during the COVID-19 pandemic lockdown.

It can be inferred that the majority of students are technologically inclined and are more likely to exhibit positive behavior towards ERTL based on their level of knowledge and familiarity with the equipment of remote learning.

Student Perception of ERTL

Generally, students have a good perception of remote education. Oteng-Ababio (2011) found that students hold a positive perception of remote education, given its usefulness and flexibility. The perception of remote learning is generally favorable among students (Fahad, 2009). It appears that students' perception of remote learning remains positive so long as there are sufficient equipment and logistics to facilitate the remote instruction. Awadalla et al., (2020) found that medical students perceived e-learning during the COVID-19 pandemic as a burden, especially among students in developing countries. Two-thirds of the students perceived remote learning as a viable option for learning amidst the COVID-19 pandemic. Hence, students with a positive perception of ERTL will potentially show positive behavior towards ERTL as it remains a viable alternative for learning at a time of crisis.

Student Attitude towards ERTL

Students generally have a positive attitude towards remote learning. Yang (2006) conducted a quantitative study using a structured questionnaire at the University of Taiwan, School of Nursing to explore students' attitude towards web-based distance learning. The author revealed that students had a positive attitude towards remote learning because of the feasibility of the system and it being a new way of learning. Kirkwood (2003) found a positive attitude towards online learning technology among the nursing students of the Open University in the United Kingdom, implying that student's attitudes strongly favor online learning. In Bangladesh, Biswa et al., (2020) discovered that university students exhibited a positive attitude towards remote learning, indicating students' positive attitude towards remote learning.

Contrary to the above findings, some studies revealed students' negative attitude towards online learning. However, their negative attitude was traced to low-level computer skills, technological anxiety, and computer hardware problems, as well as poor study skills, low motivation, and an inability to work independently (Smith et al., 2000; Govindasamy, 2001; Rosenberg, 2001; Ullah, Khan, & Khan, 2017).

Student Behavior towards ERTL

Students' behavior towards ERTL is intertwined with their attitude and is influenced by other external factors such as facilities, smartphones, and Internet accessibility. Students' positive attitude towards remote learning is related to their positive behavior. The study by Lee, Cheung, and Chen (2005) on university students' adoption behavior towards an Internet-based learning medium (ILM), using the technology acceptance model (TAM), found that

perceived usefulness and enjoyment had an impact on both students' attitude and their intention to use ILM. The different factors and drivers that could influence students' behavior to the usage of mobile technology for learning are determined by their moderate willingness to adopt the usage of mobile technology for learning purposes (Briz-Ponce et al., 2017). Furthermore, a web-based course assessment at Universiti Malaysia Sarawak showed that six in ten students exhibited a positive behavior towards the web-based course (Hong, Lai, & Holton, 2003). Biswa et al., (2020) also found positive student behavior in remote learning. Recently, during the COVID-19 pandemic, Mohammed et al. (2020) found that students exhibited a positive attitude and behavior towards ERTL. Hence, it appears that there is a positive relationship between students' attitude and their behavior towards ERTL.

Theoretical Framework

In this new age of information technology, several theories have been employed to explain the adoption and usage of technology. This study used the technology acceptance model (TAM) in exploring the impact of ERTL during the COVID-19 pandemic on students.

TAM is one of the renowned models on technology acceptance and use. Introduced by Davis in 1986, TAM has proven its worth theoretically in explaining and predicting user behavior on information technology (Legris, Ingham, & Colletette, 2003). TAM is viewed as an essential complement to the theory of reasoned action (TRA), developed by Ajzen and Fishbein (1980). Davis (1986) and Davis, Bagozzir, and Warshaw (1989) proposed TAM, by adapting TRA, to explain why a user accepts or rejects information technology (Park, 2009). TAM provides a basis with which one traces how external variables influence belief, attitude, and intention to use. The two cognitive beliefs posited in TAM are perceived usefulness and perceived ease of use. According to TAM, one's actual use of a technology system is influenced directly or indirectly by one's behavioral intentions, attitude, perceived usefulness of the system, and perceived ease of the system (Park, 2009).

According to Davis (1986), perceived usefulness (PU) refers to the degree to which a person believes that using a particular system would enhance his or her job performance, whereas perceived ease of use (PEOU) refers to the degree to which a person believes that using a particular system would be free of effort. However, in this study, both concepts are combined to form perception.

TAM appears to be able to account for 40 percent to 50 percent of user acceptance. TAM has evolved over time. TAM2 extended the original model to explain perceived usefulness and usage intentions including social influence (subjective norm, voluntariness, and image), cognitive instrumental processes (job relevance, output quality, and result demonstrability), and experience. The new model was tested in both voluntary and mandatory settings. The results strongly supported TAM2 and explained 60 percent of user adoption using this updated version of TAM (Venkatesh & Davis, 2000, as cited in Park, 2009, p. 151).

Some studies sought to evaluate TAM model in terms of its effectiveness in explaining technology acceptance and use. For instance, Selim (2003) in his website acceptance model (CWAM) examined the relationships among perceived usefulness, perceived ease of use and intention to use with university students using the structural equation modeling techniques of the LISREL program. He found perceived usefulness and ease of use to be good determinants of the acceptance and use in his study.

Pituch and Lee (2006) added system and learner characteristics as external variables that were hypothesized to impact perceived usefulness, perceived ease of use, and use of an e-learning system. After conducting a structural equation modeling technique with LISREL, they

concluded that system characteristics were important determinants to perceived usefulness, perceived ease of use, and use of an e-learning system, and that the theoretical model based on TAM was well supported (Park, 2009, p. 152).

Conceptual Framework

Based on the literature review and the TAM model, the conceptual framework of the study is presented in Figure 1.

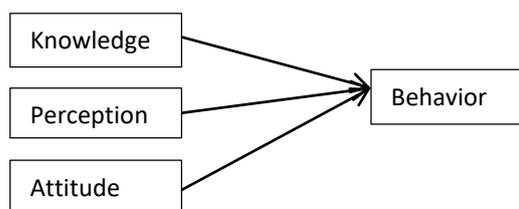


Figure 1: Conceptual framework for ERTL behavior (usage) with knowledge, perception, and attitude

Hypotheses

Based on the reviewed literature and the conceptual framework, the following hypotheses were formulated:

H1: There is a positive relationship between knowledge and behavior towards ERTL.

H2: There is a positive relationship between perception and behavior towards ERTL.

H3: There is a positive relationship between attitude and behavior towards ERTL.

METHODOLOGY

Research Design

This study employed a quantitative design with a survey method, using a self-administrated questionnaire as the research instrument for data collection. The data collection took place throughout July 1–11, 2020.

Population and Sampling Procedure

The target population of this study consisted of both Malaysian and international students of IIUM, Gombak campus. According to the official website of IIUM, 2020, there are approximately 15,625 undergraduate students and 3,200 postgraduate students, totaling about 18,800 students, at the university.

A pen and pencil questionnaire was distributed to the students of IIUM, Gombak campus, while an online survey questionnaire was distributed through WhatsApp groups of students through the networking sampling procedure technique. Only 125 students in total participated in the study.

Research Instrument and Measurement

The questionnaire consisted of seven sections covering the demographic characteristic of the respondents, student knowledge of ERTL, student perception of ERTL, student attitude towards ERTL, student behavior towards ERTL, barriers to ERTL, and communication channels in using ERTL.

Student knowledge of ERTL consisted of 10 items and was measured on a 5-point Likert scale, where 1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly agree*, 4 = *agree*, and 5 = *strongly*

agree. An example of the items is “I have the basic knowledge and understanding of IT.” **Student perception** of ERTL consisted of 10 items and measured on a 5-point Likert scale, where 1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly agree*, 4 = *agree*, and 5 = *strongly agree*. An example of the items is “I think that ERTL makes me more interactive when participating in an open class for discussion.” **Student attitude** towards ERTL consisted of 10 items and measured on a 5-point Likert scale, where 1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly agree*, 4 = *agree*, and 5 = *strongly agree*. An example of the items is “I feel comfortable using ERTL.” **Student behavior** towards ERTL consisted of 10 items and measured on a 5-point Likert scale, where 1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly agree*, 4 = *agree*, and 5 = *strongly agree*. An example of the items is “I have a high level of self-confidence in using the ERTL system.”

Validity and Reliability

The questionnaire was reviewed and approved by an expert in the field of measurement. An internal reliability test was conducted using Cronbach’s alpha. Table 1 shows the results that confirmed the internal cohesiveness and consistency of the variable items, where perception scored the highest ($\alpha = .926$) and is followed by knowledge ($\alpha = .911$), then behavior ($\alpha = .906$), and finally attitude with $\alpha = .895$. All items are reliable, and no items were deleted.

Table 1: Reliability test of variables for constructs

No.	Variable (N = 125)	No. of Items	Cronbach’s α
1	Knowledge	10	.911
2	Perception	10	.926
3	Attitude	10	.895
4	Behavior	10	.906

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software for both descriptive and inferential statistics. The descriptive statistics used are frequency, percentage, mean, and standard deviation. The inferential statistics used for the study are one-sample *t*-test, correlation, and simple multiple regression analysis.

FINDINGS AND DISCUSSION

Demographic Statistics of the Respondents

The study analyzed a sample of 125 respondents from the target population. Table 2 shows that there were more male respondents (70.4%) than female respondents (29.6%). Slightly more than half of the number of respondents (57.6%) was within the age group of 21–25 years old, and followed by those in the 26–30 years old age group (20.0%). Meanwhile, 11.2% of the respondents were below 20 years of age, and the remaining 11.2% were 31 years old and above. The proportion of international (54.4%) to Malaysian (45.6%) students is about the same. In addition, one-quarter of the respondents (25.6%) came from the Kulliyah of education (KOE), while the remaining responses were obtained from KIRKHS (24.8%), KENMS (22.4%), KICT (9.6%), and AIKOL (8.8%). Furthermore, only 4.8% was from KOED and 4.0% from KAED. In terms of their level of education, half the number of respondents was pursuing a bachelor’s degree (56.8%), while the rest were doing their master’s degree (29.6%) and

doctoral degree (8.8%), and only 4.8% respondents were at the foundation level prior to joining the degree program.

The results indicate that there were more male students than female students staying on campus during the COVID-19 pandemic. Even though about 85% of IIUM students are Malaysians, during the study, it was found that there were almost equal numbers of Malaysian and international students. This is because international students had to stay on campus as they were not allowed to return to their country. In addition, young graduate students represented the various kulliyahs in IIUM.

Table 2: Demographic characteristics of respondents

Demographic Characteristic	Category	Frequency	Percentage
Gender	Male	88	70.4
	Female	37	29.6
	Total	160	100.0
Age (years old)	20 and below	14	11.2
	21–25	72	57.6
	26–30	25	20.0
	31 and above	14	11.2
	Total	125	100.0
Nationality	International	68	54.4
	Malaysian	57	45.6
	Total	125	100.0
Kulliyah (Faculty)	KOE	32	25.6
	IRKHS	31	24.8
	KENMS	28	22.4
	KICT	12	9.6
	AIKOL	11	8.8
	KOED	6	4.8
	KAED	5	4.0
	Total	125	100.0
Educational level	Foundation	6	4.8
	Bachelor's degree	71	56.8
	Master's degree	37	29.6
	PhD	11	8.8
	Total	125	100.0

Level of Knowledge on ERTL

The respondents' level of knowledge on ERTL is presented in Table 3. It is significantly positive with a range of mean values of 3.384–4.128. The overall mean value is 3.736 ($SD = 0.736$) and it is significant and positive ($t = 11.182$; $p = .000$). This result confirms the high level of knowledge on ERTL among IIUM students, due to several reasons. The reason that scored the highest is they have a basic knowledge and understanding of IT (82.5%). Other reasons include: ERTL enhances their independent study (76.0%), provides an opportunity for collaborative learning (74.4%), helps in enhancing qualification abilities (73.7%), helps in developing problem-solving skills (72.6%), encourages in taking an active part in learning (72.0), provides powerful resources in gaining academic excellence (71.3%), and enhances their interpersonal relationship with their lecturers (67.6%).

Thus, it can be said that the respondents had the necessary knowledge and understanding of ERTL, which helps them in studying independently as these abilities will help save their time in looking for learning materials. Since the results show that the respondents had positive knowledge regarding the usage of ERTL because all the items are positively

related, the first research objective has been achieved. The findings are in line with Jesse (2015), which affirms that students need to have the requisite knowledge of ICT to warrant online learning. The skills and competencies in the ICT enhance the search for knowledge and thus making learning more interesting. In addition, there are many sources of information available in the social media platforms to assist in learning.

Table 3: One sample *t*-test for the level of knowledge on ERTL

No.	Level of Knowledge (N = 125)	M*	SD	%	t**	df	p
1	I have a basic knowledge and understanding of IT.	4.128	0.879	82.5	14.337	124	.000
2	I know that ERTL enhances my independent study.	4.000	0.958	80.0	11.660	124	.000
3	I know that using ERTL saves a great deal of my time in finding learning resources.	3.848	0.959	76.9	9.883	124	.000
4	I know that getting access to a computer connected to the Internet is not a problem for me.	3.800	1.198	76.0	7.465	124	.000
5	I know that the online teaching method provides an opportunity for me to do collaborative learning.	3.720	1.012	74.4	7.948	124	.000
6	I know that ERTL helps me to enhance my qualification abilities.	3.688	0.978	73.7	7.858	124	.000
7	I know that ERTL is helpful for me in developing problem-solving skills.	3.632	0.996	72.6	7.093	124	.000
8	I know that ERTL encourages me to take an active part in learning.	3.600	1.128	72.0	5.943	124	.000
9	I know that ERTL provides powerful resources for me in gaining academic knowledge.	3.568	0.978	71.3	6.491	124	.000
10	I know that computer-based learning enhances the interpersonal relationship between my lecturers and me.	3.384	1.223	67.6	3.510	124	.001
Overall Mean of Knowledge (N = 125)		3.736	0.736	74.7	11.182	124	.000

*On a 5-point Likert scale, where 1 = *strongly disagree* (1–20%), 2 = *disagree* (21–40%), 3 = *slightly agree* (41–60%), 4 = *agree* (61–80%), and 5 = *strongly agree* (81–100%).

** test value = 3

Level of Perception of ERTL

One sample *t*-test results for the respondents' perception of ERTL are presented in Table 4. The results indicate that, on average, the respondents reported having a high level of perception towards ERTL (71.5%) with a mean value of 3.576 (*SD* = 0.747) and *t* = 8.625 (*p* = .000). Among the reasons for the high level of perception are: ERTL provides flexibility for the students to study at their convenient time (78.4%), ERTL provides easy ways for finding information (76.1%), ERTL is user friendly (74.8%), and students can accomplish tasks easier with ERTL (72.3%). Further, ERTL enables interaction with the instructor (71.3%), provides immediate feedback (71.0%), enables studying (69.1%), increases effective learning (68.6%), improves students' performance, and makes them interact while participating in discussions (66.4%). The results translate that the students had significant and positive perceptions towards studying under the ERTL mode for different reasons; hence, the second research objective is supported. The findings correspond with the findings of Oteng-Ababio (2011) and Fahad (2009), which show that students have a positive perception of ERTL. During the COVID-19 pandemic where face-to-face teaching and learning in class is not permissible, the students still have the opportunity to use ERTL as it is a reliable alternative learning method at the time of crisis. Their positive perception enhances their learning process easily besides there are multiple social media learning platforms to incorporate into their learning devices. Thus, the positive perception is a prerequisite to appreciation of learning process.

Table 4: One sample *t*-test for the level of perception of ERTL

No.	Level of Perception (N = 125)	M*	SD	%	t**	df	p
1	I think studying through the ERTL mode provides the flexibility to study at the time convenient to me.	3.920	0.929	78.4	11.063	124	.000
2	I think it would be easy for me to find the necessary information when using an ERTL platform.	3.808	0.921	76.1	9.799	124	.000
3	I think ERTL platforms are user friendly for me.	3.744	0.897	74.8	9.272	124	.000
4	I think using the ERTL system enables me to accomplish tasks more quickly.	3.616	1.076	72.3	6.401	124	.000
5	I think ERTL tools enable me to interact with my instructor.	3.568	0.970	71.3	6.547	124	.000
6	I think I get immediate feedback when studying in ERTL.	3.552	1.011	71.0	6.100	124	.000
7	I think ERTL enables me to study.	3.456	0.995	69.1	5.119	124	.000
8	I think studying through the ERTL mode can increase my learning effectively.	3.432	0.961	68.6	5.023	124	.000
9	I think that ERTL has improved my course performance as I will not need to travel to campus.	3.352	1.151	67.0	3.417	124	.001
10	I think that ERTL makes me more interactive when participating in an open discussion.	3.320	1.118	66.4	3.198	124	.002
	Overall Mean of Perception (N = 125)	3.576	0.747	71.5	8.625	124	.000

*On a 5-point Likert scale, where 1 = *strongly disagree* (1–20%), 2 = *disagree* (21–40%), 3 = *slightly agree* (41–60%), 4 = *agree* (61–80%), and 5 = *strongly agree* (81–100%).

** test value = 3

Level of Attitude towards ERTL

Results from the one-sample *t*-test on the respondents' attitude towards ERTL are presented in Table 5. They indicate that, on average, the respondents reported having a positive level of attitude towards ERTL with a mean value of 3.608 (*SD* = 0.736) and *t* value of 9.247 (*p* = .000). In addition, item 1 "I like the idea of ERTL during the COVID-19 pandemic" reported the highest mean value (*M* = 4.136, *SD* = 0.873) where the majority of the respondents (82.7%) supported the idea of ERTL during the pandemic because it is a safer way of carrying out or continuing their studies while avoiding the exposure to the deadly infection. However, the last two items, "I believe ERTL is suitable for courses that need practical demonstrations" (62.0%) and "I feel that ERTL graduates are preferred for jobs in the IR4" (61.9%) reported relatively low results and are not significant. Thus, the findings indicate that the students did not believe that ERTL is suitable for practical courses requiring some kinds of demonstration. Further, they felt that the students who graduate under the ERTL system would be less preferred for jobs compared to those who attend physical classes.

Other attitudinal reasons include ERTL is an innovative system (79.8%), fun to use (77.2%), and cheaper than classroom learning (76.0%). Besides, the respondents appreciated using it (75.8%), felt comfortable using it (71.2%), and felt motivated to use it for studies (69.2%). The results imply that the respondents had certain preferences towards ERTL. Thus, the third research objective is supported. The findings of the study are consistent with Yang (2006) and Kirkwood (2003), which showed that students' attitude towards ERTL is positive (Biswa, et al., 2020). The positive attitude motivates the students to further like the new mode of learning system. However, their preference is further materialized provided the support

system such as the Internet facilities are available and easily accessible for them to learn individually and in group when necessary.

Table 5: One sample *t*-test for the level of attitude towards ERTL

No.	Level of Attitude (N = 125)	M*	SD	%	t**	df	p
1	I like the idea of ERTL during the COVID-19 pandemic.	4.136	0.873	82.7	14.534	124	.000
2	I feel that ERTL is an innovative concept and must be encouraged.	3.990	0.827	79.8	13.396	124	.000
3	I like the ERTL platform as it is fun to use.	3.864	0.970	77.2	9.958	124	.000
4	I feel that ERTL is less costly than classroom learning.	3.800	1.121	76.0	7.974	124	.000
5	I appreciate using ERTL.	3.792	0.994	75.8	8.906	124	.000
6	I feel comfortable using ERTL.	3.560	1.110	71.2	5.640	124	.000
7	I feel motivated to use ERTL for studies.	3.464	1.096	69.2	4.731	124	.000
8	I prefer to use ERTL in my studies.	3.280	1.195	65.6	2.619	124	.010
9	I believe that ERTL is suitable for courses that need practical demonstrations.	3.104	1.354	62.0	.858	124	.392
10	I feel that ERTL graduates are preferred for a job in the IR4.	3.096	1.145	61.9	.937	124	.351
Overall Mean of Attitude (N = 125)		3.608	0.736	72.1	9.247	124	.000

*On a 5-point Likert scale, where 1 = *strongly disagree* (1–20%), 2 = *disagree* (21–40%), 3 = *slightly agree* (41–60%), 4 = *agree* (61–80%), and 5 = *strongly agree* (81–100%).

** test value = 3

Level of Behavior towards ERTL

Table 6 presents the one-sample *t*-test results for the students' behavior towards ERTL. The results indicate that on the whole, there is a positive level of behavior (73.9%) with a mean value of 3.695 (*SD* = 0.675) and *t* = 11.505 (*p* = .000). The students rated their level of behavior towards ERTL as high because they were satisfied with its flexibility (76.3%) and interaction levels (76.1%). Also, ERTL encourages independence (75.3%), confidence while using it (75.2%), willingness to participate in ERTL activities (74.2%), self-discipline (73.2%), and encourages constant interactions with instructors during class (73.1%). However, ERTL caused more stress compared to face-to-face learning (72.1%) even though they were cognitively engaged in ERTL activities (72.0%) and had the motivation to learn to use the ERTL system (71.2%). These findings show that the students had significant and positive behavior towards studying under the ERTL mode for different reasons. Thus, the fourth research objective is supported. The results of this study confirm the findings of Briz-Ponce et al. (2017) and Hong et al. (2003) regarding students' behavior towards remote learning. Being students, they prefer to try new things especially related to modern devices and they like to explore ways and means to getting things done well and fast. The ERTL is considered new in Malaysia and this study further supported previous study by Mohammed et al. (2020). Their willingness to be involved in the new system of learning should be supported by the external factors, for instance, the Internet accessibility and conducive environment for studying and learning.

Table 6: One sample *t*-test for the level of behavior towards ERTL

No.	Level of Behavior (N = 125)	M*	SD	%	t**	df	p
1	I am satisfied with the time and place flexibility of the ERTL system.	3.816	0.986	76.3	9.244	124	.000
2	I believe in my capability to interact with the ERTL system.	3.808	0.800	76.1	11.290	124	.000
3	As a student, I enjoy working independently using ERTL.	3.768	0.959	75.3	8.945	124	.000
4	I have a high level of self-confidence in using the ERTL system.	3.760	0.919	75.2	9.243	124	.000

5	I am willing to participate in ERTL activities.	3.712	0.940	74.2	8.466	124	.000
6	In my studies, I am self-disciplined and find it easy to participate in ERTL.	3.664	1.007	73.2	7.368	124	.000
7	I like a lot of interactions with my instructors during ERTL class.	3.656	1.008	73.1	7.270	124	.000
8	I feel that ERTL has caused me more stress than face-to-face learning?	3.608	1.128	72.1	6.026	124	.000
9	I am cognitively engaged in doing ERTL activities.	3.600	0.933	72.0	7.188	124	.000
10	I have the initiative and motivation to learn and use the ERTL system.	3.560	0.928	71.2	6.746	124	.000
Overall Mean of Behavior (N = 125)		3.695	0.675	73.9	11.505	124	.000

*On a 5-point Likert scale, where 1 = *strongly disagree* (1–20%), 2 = *disagree* (21–40%), 3 = *slightly agree* (41–60%), 4 = *agree* (61–80%), and 5 = *strongly agree* (81–100%).

** test value = 3

Hypothesis Testing (Correlation)

A bivariate correlation analysis was performed to measure the relationship between the variables (Table 8). The results indicate that all the tested variables emerged strongly positive and statistically significant. The general strength of the relationship between all the variables ranges from strong to very strong after the variables were tested with behavior. There was a significant strong positive relationship between knowledge and behavior ($r = .734, p = .000$). The relationship between perception and behavior of using ERTL among IIUM students was also positive and strongly significant ($r = .777, p = .000$). Similarly, the relationship between the attitude towards using ERTL and behavior was also strong and statistically significant ($r = .751, p = .000$). Therefore, all the hypotheses, namely, H1: There is a positive relationship between knowledge and behavior; H2: There is a positive relationship between perception and behavior; and H3: There is a positive relationship between attitude and behavior towards ERTL, are supported. In addition, the rest of the covariates were significantly related to each other. The results indicate that knowledge had a strong positive and significant relationship with perception ($r = .779, p = .000$) and attitude ($r = .630, p = .000$) and perception also had a strong positive relationship with attitude ($r = .732, p = .000$).

Since all the hypotheses (H1, H2, and H3) are supported by the study, it can be generalized that having knowledge of using ERTL with a positive perception and attitude will result in an increase in students' behavior towards the system. In other words, the more students know of how to use the ERTL system, the more they will have a positive perception, attitude, and positive behavior towards it.

Table 8: Bivariate correlation between knowledge, perception, and attitude on behavior

Variable (N = 125)	Behavior	Knowledge	Perception	Attitude
Behavior	1			
Knowledge	$r = .734,$ $p = .000$	1		
Perception	$r = .777,$ $p = .000$	$r = .779,$ $p = .000$	1	
Attitude	$r = .751,$ $p = .000$	$r = .630,$ $p = .000$	$r = .732,$ $p = .000$	1

Simple multiple regression analysis was performed to determine the predictors of behavior towards ERTL among knowledge, perception, and attitude. The results are presented in Table 9. The regression analysis findings support the correlation results where

all variables, namely knowledge, perception, and attitude are positive and significantly related to behavior towards ERTL. The predictors of behavior towards ERTL are attitude ($\beta = .357$, $t = 4.874$, $p = .000$), followed by perception ($\beta = .304$, $t = 3.346$, $p = .001$), and finally knowledge ($\beta = .272$, $t = 3.417$, $p = .000$). The results further support the hypotheses of the study, where all factors explained 69.7% of the variance when all the factors were included in the equation for the prediction of behavior towards ERTL. It can be summarized that behavior towards ERTL, $(y) = .598 + .272 \text{ knowledge} + .304 \text{ perception} + .357 \text{ attitude}$. It can indicate that having a positive attitude plays an important part in contributing to the success of the ERTL, followed by positive perception and finally high knowledge in ERTL do help a lot in maintaining the usage of it in practical situation within the COVID-19 pandemic situation that is affecting not only Malaysia but also other countries as well. This is important so that no student is left behind just because of his/her inability to suit to the new method of teaching and learning. Adaptable to any ERTL fast is called for.

Table 9: Regression analysis for behavior with knowledge, perception, and attitude

Model	Variable	Unstd. Coeff.		Std. Coeff.	t	p
		B	Std. Error	Beta		
1	Constant	.598	.188		3.179	.002
	Knowledge	.250	.073	.272	3.417	.001
	Perception	.274	.082	.304	3.346	.001
	Attitude	.328	.067	.357	4.874	.000
<i>F = 95.899, df = 3,121, p = .000; R = .839, R² = .704, R² Adj. = .697</i>						

CONCLUSION

This study was conducted to assess the impact of Emergency Remote Teaching and Learning (ERTL) during the COVID-19 pandemic on IIUM students. The results of the data generated from a total of 125 students show that IIUM students had a basic knowledge of ERTL; they perceived ERTL to be necessary in terms of its usefulness; and they exhibited a positive attitude and behavior towards it during the COVID-19 pandemic. Therefore, ERTL is the best method to employ during such a critical situation where face-to-face group meetings are not allowed and social distancing practices are encouraged so that teaching and learning can be carried out as usual but in different a mode and situation. Since ERTL is a new method for students to accommodate, the Technology Acceptance Model is supported due to the high level of knowledge, perception, attitude, and behavior towards ERTL among the students of IIUM. Hence, ERTL is accepted as the mode of teaching and learning during crisis and risky situations such as the COVID-19 pandemic, which is affecting not only Malaysia but also the whole world.

The only limitation of this research is the time period for the data collection process. The lack of time affected the research, as a few weeks is insufficient for gathering quality data and requires performing a very succinct analytical procedure for the betterment of the results.

This study recommends that the emergency remote teaching and learning (ERTL) system should be supported and enhanced to incorporate students' need for practical demonstrations and laboratory use, especially among engineering students as well as other practical courses taught at IIUM. In addition, a qualitative study is recommended to gain an in-depth insight into the experiences of students in using ERTL. Media richness theory (Daft & Lengel, 1986) and knowledge gap theory (Tichenor, Donohue & Olien, 1970) can be used to test ERTL in future research.

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