Learning from a distance during a pandemic outbreak: factors affecting students' acceptance of distance learning during school closures due to COVID-19

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Abstract

Distance learning has become the only solution for learning in the current Covid-19 pandemic outbreak. A more straightforward form of distance learning with the utilization of telepresence and cloud-based productivity tools was apparent in many institutions. The present study investigated this phenomenon and ask, "What factors affect students' acceptance of distance learning during school closures due to COVID-19?". An extended Unified Theory of Acceptance and Use of Technology was employed to answer the research question, with 156 students participating in the study. The result revealed that Effort Expectancy (EE) has the biggest effect on students' acceptance of distance learning during school closures ($\beta=0.372$, $p<0.001$). Additionally, the extended variable of Social Presence (SP) was also showing great effects on students' acceptance ($\beta=0.296$, $p<0.001$). However, one of the UTAUT constructs, Facilitating Conditions, was found to have no effect on students' acceptance. Practical implications for schools and distance learning program managers were discussed to provide insight on improving a distance learning program. This study contributes to the body of knowledge on learning technologies as well as on how society, especially in the educational sector, should continue despite the current pandemic crisis.

KEYWORDS: Distance Learning, Covid-19, SEM, Social Presence, Zoom.

1. Introduction

There are almost 20 million recorded cases of Covid-19 as of 11 August 2020 (World Health Organization, 2020). The social restrictions and health protocols to mitigate the spread of the virus has affected all walks of life, including education. Although many governments have started to reopen their country in some areas to avoid an economic crisis (Cushman & Wakefield, 2020), school reopening is yet to reach a consensus: on 3 August 2020, more than 1 billion students (or 60.5% of total enrolled learners) are still affected by school

closures (UNESCO, 2020). Since the start of nationwide lockdowns in many countries in March, for six months, teachers and students globally have been using 'quick fixes' in order to keep the educational process continues (Teräs et al., 2020). These 'quick fixes' encompass a broad set of tools and strategies for delivering education amid a pandemic. However, the main strategy recommended by the World Health Organization (WHO) to slow the spread of Covid-19, and has been used in almost every country, is distance learning (Dietrich et al., 2020; World Health Organization, 2020).

Distance learning is the process of teaching and learning at a distance. Involvement between instructors and learners in a timely manner is also an essential aspect of distance learning (Tsai & Machado, 2002). In achieving successful distance learning, a proper medium for transferring the instruction and feedback is needed. In the era when the Internet is not yet available economically to the masses, traditional distance learning was commonly used as the main medium. In a traditional distance learning, textbook replaces direct instructions, and students can go to a local study center if extra support is needed (Beyth-Marom et al., 2003). However, as the Internet became increasingly accessible, distance learning mediums are now more reliant on Information and Communications Technology (ICT) (Andrews & Tynan, 2012)

In today's distance learning situation, some technologies are commonly utilized. These technologies are very ranging in complexity (Sandars et al., 2020). Some teachers have used a messaging service such as WhatsApp to deliver their learning materials, while others have used technologies as sophisticated as game-based education using Minecraft (Bos et al., 2014; Gon & Rawekar, 2017).

In the current Covid-19 pandemic situation, many institutions utilized a simpler online learning approach, which is videoconferencing: when people in two or more distant locations can communicate in real-time using live audio and video (Anastasiades et al., 2010). Various cloud-based productivity tools such as Google Drive, Gmail, and Google Docs were also used on top of video conferencing (Basilaia et al., 2020; Huang et al., 2020). The trend of using videoconferencing with cloud-based productivity tools as a supporting tool during Covid-19 related school closures is apparent in many institutions around the world; making distance learning during school closures unique and not all findings from past studies investigating distance learning can be directly applied to the current distance learning (Bui et al., 2020; Chawla, 2020; Churiyah et al., 2020; Dietrich et al., 2020; Kondratova, 2020; Tiwari, 2020; Varalakshmi & Arunachalam, 2020).

Although students' attitude towards distance learning and its effectiveness compared to traditional face-to-face learning still varies from research to research, it is

the only viable solution in the current situation (Allen et al., 2004; Hannay & Newvine, 2006; Stonebraker & Hazeltine, 2004). Thus, due to these facts: 1. Distance learning during Covid-19 is unique; 2. It is the only viable solution to education during school closures; and 3. While distance learning has started in most countries in March, students still prefer conventional face-to-face learning; this research is interested in how to increase our understanding of distance learning during school closures due to Covid-19 (Adnan & Anwar, 2020; Amir et al., 2020).

To do this, an aspect of online learning will be the focus of this study. When addressing the interaction between humans and technology, a main theme is usually investigated about: the acceptance of technologies (Hornbæk & Hertzum, 2017; Mun & Hwang, 2003). The acceptance of technology refers to a concept that is crucial to the success of an information system (Stone et al., 2007); it is described as the willingness of a user to utilize a particular technology (Teo, 2014). By understanding what affects users' acceptance of technology, stakeholders will be able to formulate the most appropriate strategy to improve the system. Therefore, the present study asks, "What factors affect students' acceptance of distance learning during school closures due to COVID-19?" A theoretical model known for its ability to answer similar problems was used to answer this question: The Unified Theory of Acceptance and Use of Technology. An additional factor, Social Presence, will also be employed to determine the students' acceptance of distance learning during school closures. The rest of the paper will be organized as follows: Literature Reviews, Methodology, Findings and Discussion, and Conclusion.

2. Literature Reviews

2.1 Distance learning technologies during school closures

During school closures due to Covid-19, a trend in distance learning technologies is apparent. A great example is the popularity surge of Zoom, a multiplatform software that is used for teleconferencing, webinars, and education. Zoom's "annualized meeting minutes" grew from a hundred billion before the pandemic outbreak to over two trillion in April (Turk, 2020). Its use for an educational purpose has mentioned in many research (Chick et al., 2020; Coe et al., 2020; Lewis et al., 2020), and a simple search on Google Trends reveals that before the pandemic (August 2019 – Early March 2020), the keyword "Zoom school" only returned an average of 3.9/100 popularity value, while during the pandemic (March 2020 – Now) it has a 100/100 popularity value (Google, 2020). This means that Zoom and other

teleconferencing platforms, supported by cloud-based collaboration technologies such as Google Drive, Gmail, and Google Docs has dominated the medium of distance learning, creating a similar technology acceptance experiences for students across the globe.

2.2 Theoretical research framework

One of the most used theoretical frameworks in answering technology acceptance is the Unified Theory of Acceptance and Use of Technology (UTAUT). This framework was formulated as an attempt towards unifying some of the most used models on technology acceptance. The models which act as the foundation of UTAUT include the Innovation Diffusion Theory, Theory of Reasoned Action, the Technology Acceptance Model, the Theory of Planned Behavior, the combined TAM/TPB, the Model of PC Utilization, the Motivational Model, and the Social Cognitive Theory. UTAUT synthesized these models and revealed four main variables that significantly influence an individual's intention to accept or adopt a technology: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions (Venkatesh et al., 2003). UTAUT has been used in many different contexts related to technology acceptance, ranging from learning technologies acceptance to autonomous car adoption (Kettles & Van Belle, 2019; Persada et al., 2019). UTAUT claimed and has proven to have the ability to explain 70% of the variance in users' intention to accept a technology (Birch & Irvine, 2009; Marchewka & Kostiwa, 2007; Venkatesh et al., 2003). Thus, considering the prominence of UTAUT in investigating technology acceptance, its broad range of applications including on learning technology, and how UTAUT's variables relate accordingly to the context of distance learning during Covid-19, the present study will use this framework to answer its research question.

The UTAUT factors and their association with the behavioral intention to use technology, along with the hypotheses this study proposed, are explained in the following (see also Figure 1):

Performance Expectancy (PE) alludes to the belief of an individual in which the use of technology can provide some benefits or result in a performance gain (Thomas et al., 2013; Venkatesh et al., 2003). In the original study, PE was shown to possess the biggest influence on Behavioral Intention (BI), amongst other variables (Khechine et al., 2014; Venkatesh et al., 2003). Its positive relationship with BI was also found in many studies investigating learning technologies (Birch & Irvine, 2009; Salloum & Shaalan, 2018; Thomas et al., 2013); this means that the performance gain expected by students when adopting new learning technologies is an essential aspect of learning technologies implementation. Thus, the first hypothesis is proposed:

H1: Performance Expectancy (PE) has a positive effect on behavioral intention to use distance learning during school closures due to Covid-19

Effort Expectancy (EE) is defined as "the degree of ease associated with the use of new technology" (Venkatesh et al., 2003). This construct was built using the basis of three preexisting variables: complexity, ease of use, and perceived ease of use (Oh et al., 2009; Venkatesh et al., 2003). In this study, EE translates to how easy it is distance learning during school closures is perceived by students, and since not every student has experienced distance or technology-assisted learning, the degree of ease of a distance learning can have a considerable effect on their acceptance of distance learning. A positive relationship between EE and BI was also apparent in many previous studies investigating learning technology (Chau, 2008; Khechine et al., 2014). Thus, the second hypothesis of this study is:

H2: Effort Expectancy (EE) has a positive effect on behavioral intention to use distance learning during school closures due to Covid-19

Social Influence (SI) describes the belief of an individual on how people that are important to them support or endorse the usage of a new system (Venkatesh et al., 2003). SI is found to have a more noticeable effect on BI in earlier stages of technology adoption (Wong et al., 2013). SI was constructed using several root constructs; these constructs include Subjective Norm, Social Factors, and Image. SI affects BI because it alters the perception of an individual of potential status gain and social pressure of using a new technology (Venkatesh et al., 2003). The relationship between SI and BI has proven to be positive in the context of learning technology, such as on the application of the Moodle learning management system as well as an English e-Learning website (Raman et al., 2014; Tan, 2013a). Therefore, the next hypothesis of this study is as follow:

H3: Social Influence (SI) has a positive effect on behavioral intention to use distance learning during school closures due to Covid-19

The last construct from the UTAUT framework is Facilitating Conditions (FC). FC describes users' perception of the existence of organizational and technical infrastructure to support the implementation of new technology (Venkatesh et al., 2003). FC was conceptualized on top of three other preceding constructs: Compatibility, Perceived Behavioral Control, and, Facilitating Conditions. In this study, the organizational and technical infrastructure of FC translates to several aspects such as clear guide and instruction on conducting distance learning, internet access, devices, technical assistance, and other resources in general. In research with the topic of learning technologies, FC was often found to have a positive relationship with BI (Alshehri et al., 2019;

Raman et al., 2014; Lakhal et al., 2013). Thus, in this study, the following hypothesis was proposed:

H4: Facilitating Conditions (FC) has a positive effect on behavioral intention to use distance learning during school closures due to Covid-19
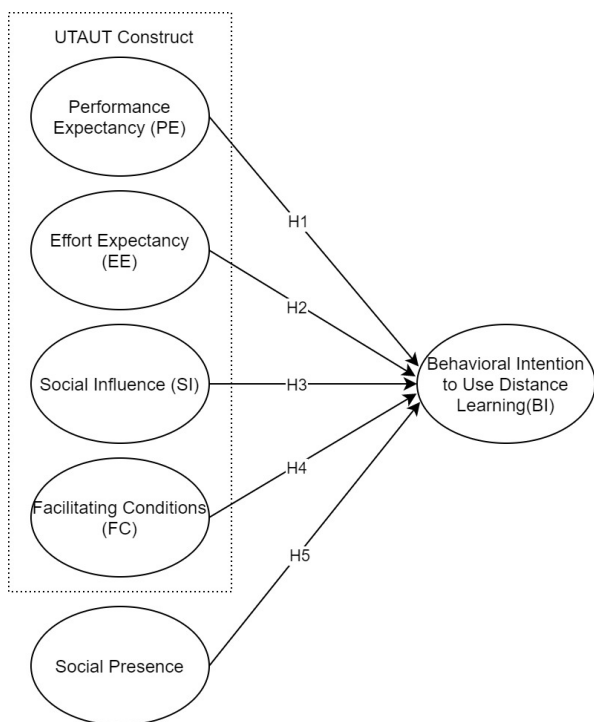

Figure 1 - Theoretical Framework.

Due to the nature of distance learning during school closures, another factor is added to extend the original UTAUT framework. In understanding technology acceptance, factor(s) that is surrounding it is also necessary to consider. Thus, acknowledging that distance learning in this pandemic outbreak can make students' learning experience differs in terms of social interaction, this present study is interested in the Social Presence (SP) construct and its effect on BI. Defined as "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships," SP in the context of technology acceptance could also be interpreted more simply as how an individual perceived another individual as a "real person" in a mediated communication (Cai et al., 2019; Nowak & Biocca, 2003). In previous studies, SP has been proven to significantly affect users' acceptance of technology, including learning technologies (Heerink et al., 2008; Mavroidis et al., 2013; Shen, 2012; Smith, 2006). SP effects on BI could also be apparent in the implementation of distance learning during school closures, which heavily focused on telepresence using

platforms such as Zoom. Therefore, the last hypothesis is as follows:

H5: Social Presence (SP) has a positive effect on behavioral intention to use distance learning during school closures due to Covid-19

3. Methodology

3.1 Research Instrument

A questionnaire survey with two sections was used in this study: demographical questions and main questions. Demographical questions ask the respondents' gender, age, education level, and regional origin. The main questions consisted of 29 items corresponding to six different constructs, and each item was measured with a five-point Likert scale that ranges from "Strongly Disagree" to "Strongly Agree." The questions for the present study was mainly based from the work of (Venkatesh et al., 2003) which is original research on UTAUT framework. Questions for Social Presence and additional references for UTAUT's construct was based from these literatures (Gunawardena and Zittle, 1997, Garrison et al., 2010, Shi, 2009, Khechine et al., 2014). Table 1 present the list of the questionnaire items and their corresponding constructs.

Question	Items
I felt comfortable conversing through the distance learning medium(s)	SP1
Distance learning is an excellent medium for social interaction	SP2
The instructor helped keep the distance learning participants on task in a way that helped me to learn	SP3
I felt comfortable participating in the distance learning discussions	SP4
I felt comfortable disagreeing with other distance learning participants while still maintaining a sense of trust	SP5
I felt that my point of view was acknowledged by other distance learning participants	SP6
Using distance learning system will improve my performance in the courses that I took	PE1
I'll find the system useful in my learning activities	PE2
Using distance learning system enables me to accomplish my learning activities more quickly	PE3
Using distance learning system improves the quality of my learning activities	PE4
Using distance learning system makes my learning activities easier	PE5
Using distance learning system enhances my effectiveness in my learning activities	PE6

Using distance learning system increases my productivity in my learning activities	PE7
If I use distance learning, I will increase my chances of getting higher marks on tests and exams	PE8
Learning to use distance learning system will be easy for me	EE1
My interaction with distance learning system will be clear and understandable	EE2
It'll be easy for me to become skillful at using distance learning	EE3
I'll find distance learning system easy to do	EE4
People who influence my behaviour think I should use distance learning	SI1
People who are important to me think I should use distance learning	SI2
The teacher of my courses has been helpful in the use of distance learning system (and its technologies)	SI3
In general, my school/campus has supported the use of distance learning	SI4
I have the resources necessary to use distance learning	FC1
I have the knowledge necessary to use distance learning	FC2
Distance learning system is compatible with other learning systems I use	FC3
A specific person is available for assistance with distance learning system difficulties	FC4
I intend to use distance learning system in future	BI1
I predict I will use distance learning system in future	BI2
I plan to use distance learning system in future	BI3

Table 1 – List of Questionnaire Items.

3.2 Data Collection and Analysis

The survey was distributed online due to Covid-19 school and university closures. The target population of this study is students who experience and are interacting with distance learning technologies. The online survey created using Google Forms was distributed openly to students who are in the target population of this study with the help of a surveyor. The online survey was distributed from 1 April to 31 May 2020. Our surveyor assisted the respondents in filling out the questionnaire and explained the study so that the respondents has sufficient understanding regarding the research and the survey. A non-probabilistic (convenient) sampling method was used to select the sample. This approach was selected since the sampling frame was not available to enable us to conduct a probabilistic approach. Furthermore, limits in resources and urgency of this topic are also key factors. However,

many argue that a non-probabilistic approach for SEM analysis can still provide valid and meaningful results (Cooper et al., 2006; Memon et al., 2017). All data was collected voluntarily, as respondents could refuse to fill the survey.

The data was analyzed using Structural Equation Modelling (SEM). Defined as "A very general statistical modeling technique, which is widely used in the behavioral sciences. It can be viewed as a combination of factor analysis and regression or path analysis" SEM was used in this study to assess the theoretical model presented in Figure 1 and test the hypotheses (Hox & Bechger, 1998). Compared to other methods, SEM has the advantage of being able to simultaneously test a structural and measurement model, which is necessary for understanding the present study's extended UTAUT framework (Head & Ziolkowski, 2012).

4. Results

4.1 Sample Characteristics

We have 156 students participating in this study. Most of the respondents come from Indonesia and are spread across 32 different Indonesian cities. Our surveyor was also able to distribute our survey to 28 foreign students from eight different countries, which include China, Japan, India, Philippines, Vietnam, Egypt, Sri Lanka, and Brunei Darussalam. Almost every respondent is a university student, except for one high school student. Table 2 details the characteristics of the sample in this research.

Gender		
	Frequency	Percent
Female	79	50.6
Male	77	49.4
Education level		
	Frequency	Percent
Bachelor	149	95.6
High School	1	0.6
Master	5	3.2
PhD	1	0.6
Institution experience with distance learning?		
	Frequency	Percent
Maybe	20	12.8
No	13	8.3
Yes	123	78.8

Table 2 – Sample Characteristic.

4.2 Measurement model assessment

Before testing the hypotheses proposed in the theoretical research framework section, an assessment of the measurement model needs to be conducted. Since this study uses Structural Equation Modeling (SEM), a test of reliability, validity, and model fit is required. Table 3 presents the reliability and validity of each construct and the items used in this study. It was apparent that the internal consistency, measured by Cronbach α, of each construct, is above the recommended level of 0.7; this reflects the reliability of the data used in this study (Taber, 2018). Following the reliability test, a validity test was also conducted by assessing Factor Loadings, Composite Reliability (CR), and Average Variance Extracted (AVE); when each measure is above the recommended level: Factor Loadings ≥ 0.5, CR ≥ 0.7, and AVE ≥ 0.5 (Fornell & Larcker, 1981), the data can be considered valid. The result of this study, as shown in Table 3, revealed that all measures are showing acceptable values. Lastly, a model fit test was done to assess the fitness of the model with the data. Several measures, such as GFI, RMSEA, and CMIN/df were used with acceptable values of ≥ 0.8, ≤ 0.12, and ≤ 5. Each measures also showing acceptable values: GFI = 0.8, RMSEA = 0.12, and CMIN/df = 3.366 (Hooper et al., 2008; Hsu & Lin, 2008; Sexton et al., 2006; Seyal et al., 2002).

Construct	Cronbach α	CR	AVE	Items	Factor Loadings
PE	0.89	0.89	0.6	PE1	0.72
				PE4	0.81
				PE5	0.70
				PE6	0.79
				PE7	0.87
EE	0.82	0.78	0.5	EE1	0.71
				EE2	0.54
				EE3	0.76
				EE4	0.73
SI	0.88	0.86	0.8	SI1	0.91
				SI2	0.86
FC	0.70	0.72	0.5	FC1	0.52
				FC2	0.78
				FC3	0.72
SP	0.79	0.80	0.5	SP1	0.53
				SP4	0.88
				SP5	0.60
				SP6	0.65
BI	0.88	0.81	0.6	BI1	0.78
				BI2	0.86
				BI3	0.66

Table 3 – Reliability and Validity.

4.3 Hypothesis Testing

After the measurement model has been examined and is found to be appropriate, the research hypotheses were then tested. SEM can detail the association between variables in a structural model. Therefore, the theoretical framework proposed in this study was examined to reveal each causal relationship as proposed in our hypotheses (see Figure 1). Table 4 summarizes the result of our hypotheses, as indicated by t-value, p-value, and standardized estimates. Four of the five hypotheses are supported. Performance Expectancy (H1), Social Influence (H2), Effort Expectancy (H3), and Social Presence (H5) affects behavioral intention. One hypothesis was not supported: Facilitating Conditions did not significantly affect behavioral intention (H4). It can be summarized that all constructs except for Facilitating Conditions (FC) are a significant predictor of students' behavioral intention to use distance learning during school closures due to Covid-19. Furthermore, the structural model also shows that it can explain 50.9% of the total variance (R^2) of behavioral intention.

	Path	Estimate	S.E	C.R	p	Hypothesis
H1	PE→BI	.300	.063	4.737	*	Supported
H2	EE→BI	.372	.079	4.682	*	Supported
H3	SI→BI	.246	.072	3.397	*	Supported
H4	FC→BI	.120	.117	1.030	.303	Not Supported
H5	SP→BI	.296	.079	3.732	*	Supported

* = p < 0.001

Table 4 - Result of Hypothesis Testing.

5. Discussion and Conclusions

5.1 Key findings and practical implications

This study asks what factors that influence students' acceptance of distance learning during school closures due to COVID-19. A UTAUT model, extended with an additional variable that relates strongly to the object of the study (Social Presence), was used to answer this study's research question. Several key findings were found in this study. In H1, consistent with previous studies on distance learning technologies acceptance, we found that Performance Expectancy has a significant effect on Behavioral Intention (β=0.30, p<0.001) (Lakhal et al., 2013; Wang et al., 2010). The result of H1 means that students consider the expected outcomes and the usefulness of a distance learning program before accepting it. Therefore, in the current school closures, a distance learning program manager should weigh in students' opinions on what they perceive as a useful distance learning program. Promoting the benefits of distance learning can also be

done to reinforce the Performance Expectancy perceived by students. In H2, it was found that Effort Expectancy significantly affects Behavioral Intention (β=0.372, p<0.001), which is also consistent with findings of a previous study in related topics (Sultana, 2020; Tan, 2013a). Therefore, since most of the distance learning programs in this current Covid-19 outbreak are dominated by telepresence technologies and cloud-based productivity tools, a distance learning program manager should choose the most user-friendly technologies and platforms. A clear guide and instructions should also be given to students, so there are no hurdles in accessing the distance learning program and, in turn, increasing their acceptance of the program. From the result of H3, it is revealed that Social Influence has a significant positive effect on Behavioral Intention, which is also consistent with previous findings on similar studies (β=0.246, p<0.001) (Lakhal et al., 2013; Wang et al., 2010). That is to say, a student's inclination to accept a distance learning program is also determined by how their social environment thinks about the program; when their social environment endorses a distance learning program, a student will be more inclined to accepts it. Thus, schools and distance learning program manager could involve teachers and top students to promote the distance learning program, and in turn, making students more accepting of the program. However, in H4, a nonsignificant relationship was found between Facilitating Conditions and Behavioral Intention (β=0.120, p=0.303). Although this finding contradicts our hypothesis, a possible reason for this is how students nowadays could already have access to appropriate devices and necessary resources needed for distance learning, and thus, making Facilitating Conditions as a less insignificant factor in predicting students' acceptance. The findings from this study also provide evidence that Social Presence (H5), a variable that is introduced in this study to complement UTAUT's factors, affects Behavioral Intention significantly (β=0.296, p<0.001). This finding means that the sense of 'realness' of the instructors and other students in a distance learning program plays a significant role in the students' acceptance of the program. Thus, it is recommended for distance learning program manager to consider the use of telepresence platforms which has a more social features such as Microsoft Teams' Collaborate and third-party application extensions such as Kahoot! that can increase the Social Presence felt by students, and consequently, increase the students' acceptance.

5.2 Implications for research

A core outcome from this study is the development and validation of a conceptual research model that could be used to understand the factors that influence the acceptance of distance learning during school closures.

Furthermore, this study expands the literature on distance learning acceptance by investigating a specific situation (a pandemic outbreak), which alters the nature of the distance learning itself. This study also contributes to the body of knowledge on UTAUT; we extend the model by adding Social Presence as an additional influencing factor of technology acceptance. The extended UTAUT, as conceptualized in this study, can serve as a foundation for further studies investigating distance learning in a socially distant situation. However, there is a limitation: this study only focuses on one aspect of the whole distance learning experience. Other aspects such as asynchronous learning, Learning Management System (LMS) such as Moodle, and mobile learning should also be investigated further in terms of their role in distance learning during and after Covid-19 school closures since their role can also be vital (Amendola & Miceli, 2016; Cinque & Pensieri, 2009).

5.3 Conclusion

The present study has successfully identified the antecedents of students' acceptance of distance learning during school closures due to Covid-19. It was revealed that UTAUT extended with Social Presence is able to explain the influencing factors of students' acceptance. Notably, it was found that Effort Expectancy has the strongest influence on students' acceptance. Thus, schools and distance learning administer should prioritize the ease of use and user-friendliness of a distance learning program. In addition, Social Presence, which is introduced alongside the UTAUT model, also shows a significant effect on students' acceptance. This implies that the social aspect of a distance learning program plays an important role in students' acceptance, and distance learning program managers should consider this aspect of distance learning. The findings in this study should be considered by schools and distance learning program managers to create a more attractive program and are embraced by students. However, this study has some limitations. Firstly, although our respondents vary in nationality, a larger and more diverse sample can be more favorable to improve the scope and applicability of this study. Secondly, the sample of this study is dominated by university students, which may have different behavior compared to pre-college students. Future research could improve this study by addressing the above limitations and asks different research questions with the same topic; additional variables or different statistical approaches can be used to improve the present study.

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