Factors Affecting e-Learning Acceptance among Students: The Moderating Effect of Self-efficacy

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***Abstract*—This paper aims to investigate e-learning acceptance in Malaysian higher education institutions and the moderating effect of self-efficacy. This study is crucial as online and distance learning have grown in all education sectors due to the COVID-19 pandemic. A valid sample of 414 survey responses from active students currently enrolled in undergraduate and postgraduate levels in Malaysian higher education institutions was collected for data analysis. Structural Equation Modelling (SEM) was employed in the data analysis. Results indicate that all four exogenous variables (performance expectancy, social influence, perceived enjoyment, and self-efficacy) significantly affect students' acceptance towards e-learning. However, only performance expectancy and social influence are moderated by self-efficacy towards acceptance of e-learning, as self-efficacy does significantly strengthen the relationship of performance expectancy and social influence towards e-learning acceptance. The findings may serve as a reference point for future studies in response to changing the learning method preferences and technological advancements.**

***Index Terms*—E-learning, self-efficacy, student acceptance, Malaysian higher education, UTAUT.**

I. Introduction

In traditional learning methods (classroom setting), learning typically happens under an instructor's supervision with face-to-face contact and in a live, synchronous environment [1]. Apart from this method of teaching and learning, there are also other approaches that promote student-directed learning. However, over the past decade, internet technology and the implementation of efficient computer software education have quickly been integrated into tertiary education [2], and these advances in technology have changed how individuals conduct activities in their everyday lives, including in the workplace. Therefore, it is critical that university students engage in technology during their studies to ensure that they have the technical skills needed by the industry or workplace. One of the ways is via e-learning [3].

E-learning is one of the learning methods that have gained traction in higher education institutions, where teachers and students have access to a wide variety of learning choices [4]. Additionally, the impact of the COVID-19 pandemic has led most of the higher education institutions in Malaysia, either public or private, to incorporate e-learning method into the learning process, as declared by the Ministry of Higher Education [5]. The effectiveness of asynchronous and synchronous network models can overcome time and space limitations between learners and instructors [6] while also assisting in any efforts to minimise the infection rate of COVID-19 locally [4].

The crucial difference between e-learning and traditional classroom learning is the approach, and the former offers an instructional methodology that allows learners to learn individually at their own time and place. In addition, because e-learning is home-based, the course design can thus be customised based on individual needs and preferences [7]. Even though e-learning offers multiple advantages to learners such as increased access to information, alternative mediums for connecting, and assistance with problem-solving, this learning environment is difficult for learners to achieve face-to-face connectivity, which is something they must overcome [2]. Therefore, individual initiative and preparation are crucial to ensure that information is distributed accordingly by the e-learning process.

Students' self-efficacy also potentially plays a role in their acceptance of the e-learning method. Self-efficacy is linked to an individual's trust in their abilities to plan and carry out the steps to achieve a goal [8]. Students who have a high level of self-efficacy in technology perceive e-learning as an efficient teaching and learning tool. However, on the flip side is those who have lower levels of self-efficacy when it comes to technology, as they believe that the e-learning process will make learning difficult for them, thus resulting in poor acceptance of the method. A study into self-efficacy is critical because it could encourage students to properly comprehend and use e-learning as a teaching and learning tool. It is also important to note that a student's self-efficacy dictates whether they are willing to use e-learning or not [9].

As e-learning in Malaysia is comparatively new, paying attention to factors that affect students' acceptance is crucial. The continued usage of e-learning is primarily because of the expected performance, self-efficacy, social influence, as well as other kinds of influences [9]. Due to the COVID-19

Manuscript received June 18, 2021; revised August 23, 2021.

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doi: 10.18178/ijiet.2022.12.2.1594

outbreak and a new normal of life, e-learning has now become an important learning method in education [4]. Therefore, it is important that this research examines the variables associated with e-learning acceptance and determines how self-efficacy may impact the relationship from the students' perspectives. This study is also critical to fill the gap in the higher education context, especially in Malaysia and South East Asia, as the students currently do not have other options to choose their preferred learning method due to the COVID-19 pandemic. Unified theory of acceptance and use of technology (UTAUT) model was used as the basis of this study, as it corresponds with the current contexts, which are technology acceptance and use of technology.

The research questions are:

1) What factors influence e-learning acceptance among students?
2) Will self-efficacy strengthen the relationship between performance expectancy, social influence, and perceived enjoyment towards e-learning acceptance?

II. Review of Relevant Literature

A. Underpinning Theories

The unified theory of acceptance and use of technology (UTAUT) model has been making an important contribution to e-learning and technology in education, as it provides a credible framework for examining human views towards technology in education [10]. Furthermore, this theoretical model is derived from eight previous technology adoption models and has been commonly used in published research studies to investigate consumer acceptance of technology [11]. This study introduces two variables that have derived from UTAUT, which are: performance expectancy and social influence.

Self-efficacy has been incorporated into this study to expand the UTAUT model with a link to individual behaviour variables. It fits well with the original model of UTAUT because self-efficacy is an important facet that contributes towards motivation and can influence individual choice, goal, effort, intention, behaviour, and perseverance [12]. Generally, those with a high level of self-efficacy are more confident, secure, and trusted in performing a particular behaviour. Moreover, in terms of technology usage, self-efficacy can potentially shape individual perception, acceptance, and use [4].

B. E-Learning

E-learning is described as "a teaching and learning approach that entirely or partially applies to the instructional paradigm used, focusing on the use of electronic media and technologies as methods for maximising the availability of learning, connectivity, and engagement, which helps to embrace modern ways of understanding and developing e-learning" [13]. E-learning employs digital technologies, and this learning is accessed through a variety of computing devices, including laptops and phones [14].

Like most educational technology, several benefits, limitations, challenges, and opportunities are associated with e-learning [15]. In terms of strength, e-learning allows the learner to study independently anytime they want. It can also reduce the learner's expenses such as travelling cost. Meanwhile, e-learning leads to less face-to-face contact between the learner and instructor. It tends to disregard academic or social aspects and encourage business growth or commercialisation [16], but on the other hand, it encourages students to produce high-quality work and engage directly in the activities of graduates in society. Educational organisations gain benefit from it by increasing visibility and adding value to their programme across the globe.

C. Performance Expectancy

Performance expectancy is an individual trust and belief in the benefit and utility they can achieve when using technology and its system. [10]. Within this study, performance expectancy is a scale to which students perceive that using e-learning tools could help them increase their performance in learning. One of the key variables affecting students' behavioural intention to use e-learning in their studies is their performance expectancy [17]. A previous study reported a significant influence of performance expectation on students' acceptance of e-learning [4]. However, another study has found an insignificant relationship between performance expectancy and student intention when it comes to e-learning [18]. As highlighted by other scholar, performance expectancy is a crucial contributor to predicting the student's decision to use mobile learning system [19]. The students will consider the usefulness of e-learning when the performance of the e-learning meets their expectations [4]. Therefore, verifying the relationship between performance expectancy and e-learning acceptance is essential for this study, which has led to the hypothesis below:

H1: Performance expectancy significantly influences e-learning acceptance among students.

D. Social Influence

Social influence encompasses a person's behaviour and reaction that is influenced by others. Examples of social influence indicators include: peer influence, pressure from family, marketing, as well as other factors. It has also been defined as the essential view of others (family, superior, friends) towards using a new system [20]. While some would believe that technology in education is solely affected by technological factors, social factors could also influence e-learning acceptance among students [4]. In the current higher education scenario that has been highly impacted by the COVID-19 pandemic and favoured the adaptation of e-learning, a previous study reported that this potentially influences students' acceptance towards the e-learning [4]. Besides that, social activities can also affect the user's opinion, adoption, and output, particularly in a collectivist culture that potentially influences student acceptance of e-learning [21]. Social influence has been shown to affect an individual's intention to use technology [22]. Based on a past research, social influence has a positive relationship with students' understanding and behaviour towards their willingness to use e-learning [17]. It also affects students' acceptance and intention in using e-learning [2], [4].

Therefore, this research intends to verify the relationship between social influence and e-learning acceptance by proposing the following hypothesis:

H2: Social influence significantly affects e-learning acceptance of students.

E. Perceived Enjoyment

Perceived enjoyment is described as "the degree to which the action of using a particular function is perceived to be enjoyable by itself, excluding any system-related consequences" [23]. Students' internal emotions of joy, relaxation, and good experience often play a part in understanding how people embrace and use e-learning. If students do not like the e-learning process, they will probably not be interested again, adversely affecting their learning performance [4]. It is also supported a by previous study, which stated that student motivation and learning environment influence student performance [18]. Apart from that, perceived enjoyment of e-learning significantly influences students perceived ease of use and usefulness of e-learning, which then influences the acceptance of e-learning [12]. This is also supported by a recent study that reported that perceived enjoyment significantly influences student acceptance of e-learning [4]. Although a few studies have shown that perceived enjoyment does not affect intention to use [24], other past studies have also reported that, when students enjoy the e-learning process, it will change their attitudes positively towards e-learning. As a result, this study intends to investigate the relationship between perceived enjoyment and e-learning acceptance, thus resulting in the following hypothesis:

H3: Perceived enjoyment significantly affects students e-learning acceptance.

F. Self-efficacy

Self-efficacy describes one's ability to determine how effectively a task can be carried out to accomplish the intended goal [8]. It is also generally described as an individual's confidence in their ability to perform the actions needed to achieve the desired outcome successfully. The ability to use online learning in everyday lives requires the use of the internet, laptops, web-based instructions, and digital learning tools. Thus, people who are confident in technologies would have a good view of e-learning. On the contrary, learners with computer anxiety influences student satisfaction. When dissatisfied, their belief and trust to use technology as a medium would be directly affected [25]. Based on previous studies, students' self-efficacy has a major effect in influencing their use of e-learning [7], [26]. Although there is a partial mediating influence of self-efficacy between performance expectation and perceived enjoyment on e-learning acceptance [4]. Consequently, a study identifying self-efficacy as a moderator between performance expectancy, social influence, and perceived enjoyment on e-learning acceptance is still lacking. Thus, this study is essential to investigate the moderating effect of self-efficacy between the variables affecting e-learning, which has led to the development of the following hypotheses:

H4: Self-efficacy significantly influences e-learning acceptance among students.

H5: Self-efficacy strengthens the relationship between performance expectancy and e-learning acceptance.

H6: Self-efficacy strengthens the relationship between social influence and e-learning acceptance.

H7: Self-efficacy strengthens the relationship between perceived enjoyment and e-learning acceptance.

Framework of the research is presented in Fig. 1.

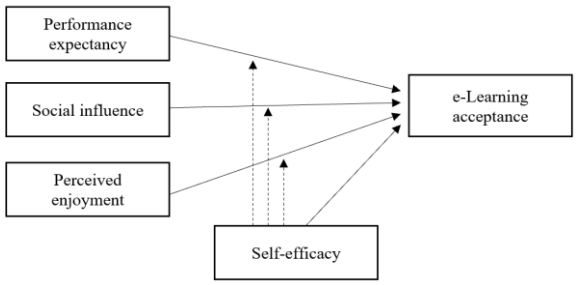

Fig. 1. Research framework.

III. Methods

This study employed a quantitative study with a causal research design. AMOS software and PROCESS [27], [28] through SPSS were used to examine the relationship. The study's target population encompassed active students currently enrolled in Malaysian higher education institutions. The data was collected using convenience sampling, whereby the link of the survey was distributed openly through social media applications and student online groups. The online survey approach is suitable in response to the current pandemic and the country's movement restriction order, which is also supported by a past study [29]. The survey questions were filtered to verify accurate respondents, and only valid responses were counted for the purpose of the data analysis. Although 557 responses were submitted, only 414 with complete responses could be used and fulfilled the study's target population criteria. The outliers were removed accordingly. The minimum sample size required by the study is 350, as the survey consists of 35 items. Because only 10 respondents are needed for each item in the survey [30], the valid responses used for the data collection is thus sufficient.

A. Respondent Profile

A majority of the respondents were female, with the 320 participants making up 77.3% of the total respondents. Meanwhile, only 94 male respondents were involved in the study (22.7%). Most of the respondents were aged between 18-21 years old, which represented 67.9% of the total respondents, followed by 22-25 years old (29.5%). Aside from that, 210 (50.7%) of the respondents were pursuing their Bachelor's degree, while 193 (46.6%) of the respondents were pursuing their diploma, and 11 (2.7%) of the respondents were doing their Masters and Doctorate degrees. The respondents were also mostly from public higher learning institutions (90.6%), while 9.4% of the respondents were from private colleges and universities.

B. Measurement and Instrumentation

The questionnaire was obtained from previous studies. Through an in-depth analysis of the literature to address the

research objectives, the instrument was then adapted from those that have already been well-established and fairly tested for their validity and reliability [31]-[35]. The instrument used in this study consists of: perceived enjoyment (6 items), performance expectancy (5 items), social influence (6 items), self-efficacy (11 items), and e-learning acceptance (7 items). The survey also employed the 5-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree).

IV. Results

The raw data was coded and then screened through the missing value using the minimum and maximum analysis. The normality of the data was tested, and extreme outliers were then removed before the data analysis.

A. Full Measurement Model

The confirmatory factor analysis (CFA) with the model fitness scores is presented in Table I. The CFA reported a good model fit score with a CMIN/DF score of 2.673, a CFI score of 0.951, TLI score of 0.946, and an RMSEA score of 0.064 [36]. The construct's validity shown in Table II indicates a good convergent validity, with the AVE score of all construct scores at 0.50 and above. Similarly, the reliability test of the composite reliability (CR) has also achieved good reliability, with a score of 0.60 and above.

TABLE I: Summary of Model Fitness, Reliability and Validity Analysis

Model fitness score		Construct	CR	AVE
CMIN/DF	2.673	Performance expectancy	0.922	0.703
CFI	0.951	Perceived enjoyment	0.967	0.832
TLI	0.946	Self -efficacy	0.937	0.769
RMSEA	0.064	Social influence	0.937	0.715
		e-Learning acceptance	0.965	0.798

The direct effects analysis for hypothesis testing is displayed in Table II and Fig. 2. The results revealed that performance expectancy has a positive and statistically significant effect on e-learning acceptance (β = 0.179; p = 0.002). When performance expectancy went up by 1 standard deviation, e-learning acceptance also went up by 0.179. Thus, H1 is accepted statistically.

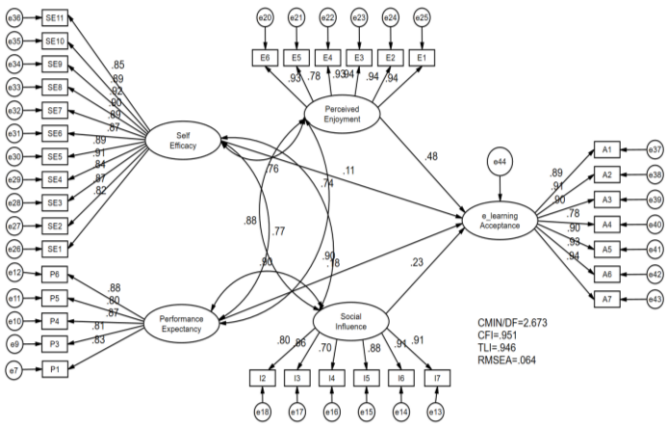

Fig. 2. The direct effects hypothesis.

H2 is also statistically supported (β = 0.484; p = 0.000). When perceived enjoyment went up by 1 standard deviation, e-learning acceptance increased by 0.484. Similarly, a significant relationship is confirmed between social influence and e-learning acceptance (β = 0.226; p = 0.000). When social influence went up by 1 standard deviation, e-learning acceptance went up by 0.226. Thus, H3 is statistically supported.

TABLE II: Result of Direct Hypothesis Testing

H	Relationship tested			S.E.	β	C.R.	P
H 1	Performance Expectancy	→	e-Learning acceptance	0.074	0.179	2.768	0.006
H 2	Perceived Enjoyment	→	e-Learning acceptance	0.453	0.484	8.871	0.001
H 3	Social Influence	→	e-Learning acceptance	0.052	0.226	4.120	0.001
H 4	Self-Efficacy	→	e-Learning acceptance	0.034	0.115	3.640	0.001

Note: S.E (standard error); β (standardized regression weight; C.R (critical ratio); P (p-value).

Lastly, the analysis showed a positive and statistically significant effect of self-efficacy on e-learning acceptance (β = 0.115; p = 0.001). When self-efficacy went up by 1 standard deviation, e-learning acceptance also went up by 0.115. Thus, H4 is statistically accepted.

B. Moderating Analysis of Self-efficacy

PROCESS analysis by Andrew F. Hayes was used in the moderation analysis, and the results are presented in Table III [28]. Based on the direct analysis, all the proposed moderation analyses could be conducted as the direct relationship of performance expectancy, perceived enjoyment, and social influence towards e-learning acceptance with a p-value of less than 0.05 (refer to Table II). Based on the simple moderation analysis in Table III, only performance expectancy and social influence are moderated by self-efficacy towards e-learning acceptance with a p-value interaction effect of less than 0.05.

The interaction plot involving the moderating effect of self-efficacy on performance expectancy and e-learning acceptance can be seen in Fig. 3. The analysis confirms the moderating effect of self-efficacy on the tested variable with a p-value of 0.004. Based on the moderating analysis, it can be concluded that low, moderate, and high self-efficacy do strengthen the relationship between performance expectancy and e-learning acceptance significantly. Moreover, the higher the performance expectation and e-learning acceptance, the higher self-efficacy influences the relationship. Indeed, a high self-efficacy shows the most significant increasing effect towards e-learning acceptance. In this regard, students' self-efficacy increases e-learning acceptance through performance expectation.

Besides that, the interaction plot involving the moderating effect of self-efficacy on social influence and e-learning acceptance can be seen in Fig. 4. The analysis confirms the moderating effect of self-efficacy on the tested variable with a p-value of 0.005. Based on the moderating analysis, it can be concluded that low, moderate, and high self-efficacy do strengthen the relationship between social influence and e-learning acceptance significantly. It can be said that, the higher the social influence and e-learning acceptance, the

higher self-efficacy influences the relationship. A high self-efficacy shows the most significant increasing effect of social influence towards e-learning acceptance. In this regard, this study can conclude that students' self-efficacy increases e-learning acceptance from a social influence perspective.

TABLE III: SUMMARY OF MODERATING ANALYSIS OF SELF-EFFICACY

H	Interaction	Coeff	T	P	LLCI	ULCI
H5	Performance expectation	0.007	2.886	0.004	0.002	0.012
H6	Social influence	0.006	2.817	0.005	0.002	0.010
H7	Perceived enjoyment	0.004	1.915	0.056	0.000	0.008

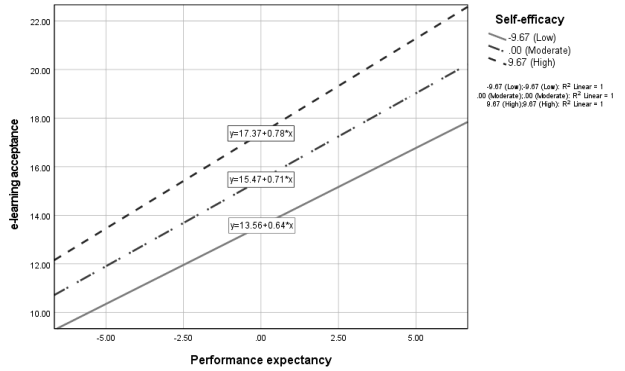

Fig. 3. Interacting plot of self-efficacy on performance expectancy and e-Learning acceptance.

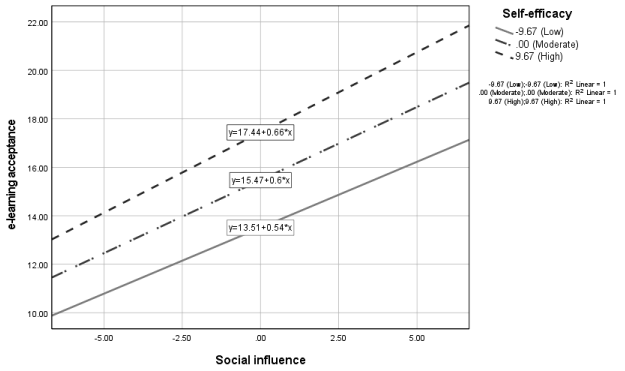

Fig. 4. Interacting plot of self-efficacy on social influence and e-Learning acceptance.

V. DISCUSSION

Based on the findings, all four independent variables (performance expectancy, social influence, perceived enjoyment, and self-efficacy) have been discovered to be significantly related to students' acceptance of e-learning. Besides that, only performance expectancy and social influence are moderated by self-efficacy towards e-learning acceptance.

The findings revealed that performance expectancy has a significant impact on students' acceptance of e-learning. This finding is consistent with previous studies that reported that performance expectancy substantially impacts students' acceptance of e-learning [4]. Apart from that, performance expectancy has a massive impact on a student's willingness to use e-learning [17]. In fact, students with a positive impression of the effectiveness of e-learning are more interested in using it [37]. Thus, if the outcome of e-learning meets the student's perceived performance, it is then considered useful.

Next, social influence has also been found to be significant with e-learning acceptance. Students' intention to use e-learning is significantly influenced by social influence and facilitating conditions [38]. Social influence affects a user's opinion, adoption, and efficiency, especially in a collectivist culture [21]. Those who have more substantial influence from the people around them such as family and peers are more willing to use e-learning in their study.

Perceived enjoyment has been shown to be significant towards e-learning acceptance, which is in agreement with other studies that stated that perceived enjoyment is one of the most important predictors in students' intention towards the e-learning system [39]. This result aligns with the study conducted in Malaysia [4]. However, the finding contradicts the study by [40], which showed that perceived enjoyment is not a significant factor in students' engagement with the e-learning method. Indeed, perceived enjoyment does not affect individual behaviour and indirectly influences attitude [41]. Thus, this explains the discrepancies.

Finally, the findings from the moderating analysis shows that the association between performance expectancy and social influence with e-learning acceptance could be moderated by self-efficacy. The probability of students with performance expectancy and social influence accepting e-learning in their daily lives will be stronger if there is a high level of self-efficacy. This is thus supported, as the study has found that self-efficacy directly influences students' acceptance towards e-learning. On the other hand, self-efficacy is not found to moderate perceived enjoyment and e-learning acceptance. Hence, the association between perceived enjoyment and e-learning acceptance would not be affected even if the students have high self-efficacy.

VI. CONCLUSION

Based on the findings, the acceptance of e-learning among students is influenced by performance expectancy, social influence, perceived enjoyment, and self-efficacy. Therefore, to assist the shift towards e-learning, especially during the difficult period of the COVID-19 pandemic, institutions and lecturers are critically important to develop an interactive and interesting mode of e-learning by considering students' self-efficacy and access to the internet, as well as other required facilities. Besides that, a positive virtual class environment can also assist the students' acceptance towards e-learning, as social influence has been proven to be significant towards e-learning acceptance. Institutions and lecturers need to assess student readiness towards e-learning, as it could influence self-efficacy and continuously motivate the students, which could then significantly influence student satisfaction [42], [43]. This approach is important, especially in Malaysia and other developing countries. The COVID-19 pandemic has left higher learning institutions and students with no other choice as e-learning becomes the only response to the closure of institutions due to the movement control order and government regulations. Thus, lecturers and institutions can assess students' readiness towards e-learning when planning academic lessons to ensure a good understanding for the students. Among the practical approaches that can be undertaken are personalised surveys,

continuous performance monitoring, and identifying the difficulties and barriers faced by the students. The information obtained can assist the lecturers and institutions in planning how the class should be conducted and how assessments should be carried out to ensure all students have equal access to the teaching and learning process and the information required no matter where they are located. It will in some way portray the lecturers' concerns and motivation, which are important factors that influence student satisfaction and loyalty [4]. By doing this, students' self-efficacy will be higher and subsequently influence performance expectancy and perceived social influence towards e-learning acceptance, resulting in a good learning process.

VII. Limitations and Future Studies

There are some limitations to be noted in this study. Firstly, it has only used convenience sampling to collect the data due to the benefits such as easy access and low cost. Indeed, due to the movement control order (MCO) imposed by regulated body to tackle the COVID-19, online survey through convenience sampling was the most suitable. However, this sampling has a probability highly vulnerable to selection bias. For future research, it is suggested to use probability sampling in data collection in order to reduce sampling error and increase the value of study outcomes. Besides that, this study was carried out in Malaysia, and only students from higher education have been included in the study. Thus, the findings have a limited generalisable result. Future researchers can conduct the study on higher learning institutions in other countries to expand the generalisability of the findings. Furthermore, the study has only involved four independent variables: performance expectancy, social influence, perceived enjoyment, and self-efficacy towards e-learning acceptance. As only four exogenous variables have been used in this research, it is recommended that potential research studies consider other variables that could influence students' adoption of e-learning.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Muhammad Safuan led this study; Masliana and Faizatul Akmal wrote the paper; Siti Nur Nadhirah, Ismayaza and Masliana collected data; Muhammad Safuan analyzed the data; Muhammad Safuan and Ismayaza review and improved the article; all authors had approved the final version.

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