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# A Behavioural Intention to Use E-learning in Mathematics Courses

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**Abstract**
The world crisis caused by pandemic COVID-19 has led to a huge transition in the education system, which has changed from a face-to-face delivery mode to e-learning. As the global health crisis hit, students made an urgent shift and had to use e-learning as their primary learning platform. It is a major challenge as not all students are well prepared to handle e-learning, especially when it involves critical courses such as mathematics. For that reason, this study was conducted to evaluate the perception and intention of diploma students to learn mathematics courses through e-learning. The Technology Acceptance Model (TAM) was used in this study as it tested the perceived usefulness, perceived ease of use, and attitude towards e-learning to predict the respondents' intention to use e-learning for mathematics courses. The findings indicate that perceived usefulness and attitude have a significant impact on the intention to use e-learning in mathematics courses. Meanwhile, perceived ease of use was rejected as the correlation analysis showed a weak positive relationship. In the future, this finding will act as guidelines for the implementation of e-learning in the teaching and learning of mathematics courses.
**Keywords:** E-learning, Mathematics Courses, Perceived Usefulness, Perceived Ease of Use, Attitude

## Introduction

Coronavirus disease 2019 (COVID-19) is a highly contagious virus that impacts human activities across the world as it not only spreads through human contact but can also be transmitted by air droplets (Knight, 2020). Because of that, the government implemented a lockdown policy to control the infection as suggested by the World Health Organization (WHO). Based on Tesar (2020), the pandemic has caused many universities to redesign their teaching methodology. They must transition all educational activities from the traditional classroom (face-to-face) to the online environment, also known as e-learning (Syauqi et al., 2020; Joaquin et al., 2020). E-learning is intended to support learning and is delivered via digital devices (Murphy, 2020; Baig, 2011; O'neill et al., 2004). It is typically designed for individual self-study and may include spoken language, text, or visuals such as animation or video. E-learning was formerly seen as an optional or possibly attractive way to conduct tutorials, deliver lectures, and provide skills training for interested educators. In fact, most universities had already introduced e-learning before the pandemic, and it directly became the lifeline for higher education as the pandemic hit us (Murphy, 2020). However, as the transition happened unprecedentedly, it became a huge challenge for the students, especially when it involved critical courses like mathematics.

Up till now, mathematics has generally been known as a difficult subject, and students find that it requires a good foundation to be excellent in it. Students commonly encounter problems that are difficult to solve during online learning. A study by Ní Fhloinn and Fitzmaurice (2021) has highlighted three challenges that are faced by students learning mathematics through e-learning, which are in terms of communication, technology, and behaviour. Sun and Chen (2016) argued that effective online learning depends on the design of the course content, instructor readiness, efficient interaction between educators and students, and online learning communities. Online mathematics learning certainly reduces the opportunities for students to study mathematics with peers (Kalogeropoulos et al., 2021). Because of the limited interactions between students (Calder et al., 2021), there is also a lack of interaction between students and teachers (Fauzy & Nurfauziah, 2021). According to Ariawan (2022), students need the teacher's direct role in their learning and need to make students feel more comfortable and have direct guidance from the teacher as they study the material. Learning in person in a class may be preferable to learning online for students. This is also why students do not expect online mathematics learning. Based on Basa and Hudaidah (2021), most students find that e-learning is boring and answer questions carelessly. They believed that the results received by students did not truly reflect the students' best abilities due to their lack of sincerity in their responses. In this circumstance, students naturally feel that their mathematics test results do not accurately represent their true mathematical ability.

In this time of educational challenges, one way for teachers to embody excellence is to use various strategies in mathematics teaching, such as the use of technology-based resources (Nabayra & Nabayra, 2021). One of the technological approaches to e-learning is video lessons. According to Bergmann and Sams (2014), video lessons greatly help challenge students in mastering course material. It was also advanced enough to allow for more interactive activities between teachers and students. Furthermore, according to Nabayra (2020), students will understand mathematics concepts better when teachers use videos on certain topics. The students also found that the videos in mathematics learning were comprehensive, flexible, and student-friendly with the virtual social presence of the teacher and fit into the new normal of learning (Nabayra, 2022). Meanwhile, according to Ariyanti and Santoso (2020), online learning generates positive responses to mathematics courses, but at the same time, the learning outcomes gained by students are lower than before the pandemic. This is due to the fact that obstacles such as the student's home environment, non-smooth signals, limited internet data, and limited material sources make it difficult for students to absorb the topic. Therefore, to overcome these challenges, students must seek out a stable internet or wifi network, ask friends for help and do it with them, and also study in a quiet area to prevent noise. According to research by Ariawan (2022), the academic impacts of online mathematics learning during COVID-19 were the difficulty in understanding the mathematics material, students' scepticism about the genuineness of the grades received by their friends, a decline in their enthusiasm for learning, and students' perceptions that their academic abilities were subpar.

For that reason, the TAM model was created primarily to forecast user acceptance of new technology. The basic TAM has evaluated two specific beliefs: perceived usefulness (PU) and perceived ease of use (PEU) (Lai, 2017). These two beliefs have a significant impact on attitudes toward technology use (Masrom, 2007). Based on Mamattah (2016) and Lai (2017), perceived usefulness is the level of students' belief that using e-learning will improve their learning and performance, while perceived ease of use is the level at which students expect e-learning to be simple to use and require little effort. The TAM model has been widely applied in various studies, especially those that involve e-learning. In the study by Alharbi et al. (2014), the Technology Acceptance Model (TAM) has been proposed and modified to predict the behaviour of people using learning management systems (LMS) in public institutions, particularly those in Saudi Arabia. Research by Hossein (2015) suggested an integrated TAM and applied the DeLone and McLean models to forecast how user e-learning systems would actually be used in Iran. Specifically, in mathematics education, Mailizar et al. (2021) used prior experience with ICT as an additional variable to the original TAM to assess the behavioural intention of instructors towards using e-learning in the teaching of mathematics. Similar to Marbán and Mulenga (2019), they studied and evaluated prospective primary teachers' teaching methods and attitudes about the use of technology in mathematics education.

It was stated that students have trouble expressing their problems through e-learning. That indirectly affects their understanding of the material provided. Besides, many students do not possess the necessary technology, such as laptops and internet access, for online learning. The last one is students’ engagement. This also becomes an issue as students do not have the required good discipline for online learning and do not actively participate in the class. Students must put more effort into their learning process during COVID 19, as online learning requires students to be more independent, especially for naturally challenging courses such as mathematics. Thus, it is important to evaluate a student's behaviour towards the use of technology in mathematics courses. Consequently, this study will focus on evaluating diploma students' intentions to learn mathematics courses through e-learning. This study will apply the Technology Acceptance Model (TAM), which was introduced by Fred Davis in 1985, to predict respondents' acceptance of technologies by testing perceived usefulness, perceived ease of use, and attitude. In the future, the findings can act as guidelines for the implementation of e-learning in the teaching and learning of mathematics courses. For instance, it can help universities provide a better virtual learning environment for students who enrol in mathematics courses such as calculus, which are widely offered for students across faculties.

**Conceptual Framework and Hypotheses Development**
With the evolution of the use of personal computers, the importance of research on technology acceptance also increases. The Technology Acceptance Model was introduced to predict the factors influencing users’ decisions on how and when they will adopt technology.

For that reason, the conceptual framework of this research is to find the relationship that might exist between perceived usefulness, perceived ease of use, attitude, and the intention to use e-learning. Davis (1989) defined two variables, which are perceived usefulness and perceived ease of use, and then identified another variable, which is attitude, in 1993. Theoretically, TAM has been used for decades in assessing users' intention to use as it has strong predictive power and it became the first theory explaining why individuals use information systems (Goodhue, 2007). Thus, this study has come up with the conceptual framework and listed the possible hypotheses as presented in Figure 1.

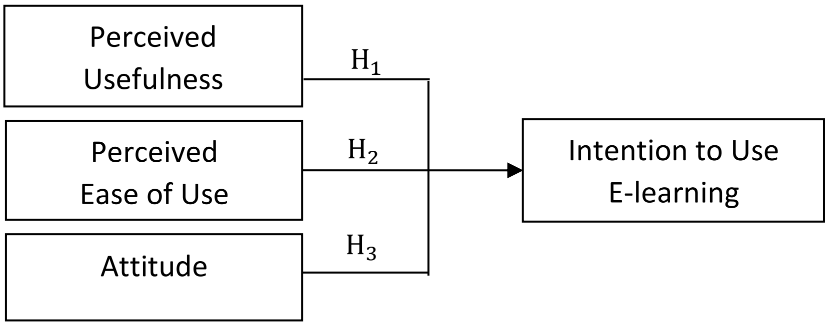


Figure 1 Technology Acceptance Model (TAM)

**$H_1$:** There is a significant relationship between perceived usefulness and intention to use e-learning.

**$H_2$**: There is a significant relationship between perceived ease of use and intention to use e-learning.

**$H_3$**: There is a significant relationship between attitude and intention to use e-learning.

**Data and Methodology**

The practise of e-learning in mathematics courses has been widely implemented due to the Movement Control Order (MCO) since 2020. Consequently, the researchers have distributed a set of questionnaires to figure out the possible factors that influence the intention of using e-learning in mathematics courses. There were 200 respondents from seven different programmes who were randomly picked among diploma students at Universiti Teknologi MARA, Perak Branch (Tapah Campus). The questionnaire was divided into five sections, and the first section was used to get detailed information on respondents, which can help understand the respondents' background. Then, followed by the second and third sections that listed questions about the perceived usefulness of e-learning and the perceived ease of use of e-learning. As suggested by Mamattah (2016), sections four and five highlight the attitude towards using e-learning and the intention to use e-learning in mathematics courses in the future. Data collected from this questionnaire was then entered into SPSS for the purpose of data analysis and interpretation.

**Results and Discussions**

*Sample Profile*

The following table presents the brief analysis of the respondents' information. It is shown that most of the respondents are female students, with 144 in frequency. All the students are from seven different programmes of study, and the majority of them are from the Diploma of Science (33%) and the Diploma in Mathematical Science (24%). Because almost all of the students own a computer or a laptop, 89% of them have fair-to-good computer skills. Besides, most of them have been using computers for about 1 to 5 years. A detailed report can be seen in the following Table 1.

Table 1
*Socio-Demographic Information of Respondents*

| Respondent's Information | | Frequency | Percent |
|---|---|---|---|
| **Gender** | Male | 56 | 28.0 |
| | Female | 144 | 72.0 |
| | **Total** | **200** | **100.0** |
| **Program of Study** | Diploma in Mathematical Science | 48 | 24.0 |
| | Diploma in Statistic | 23 | 11.5 |
| | Diploma of Science | 66 | 33.0 |
| | Diploma in Accountancy | 17 | 8.50 |
| | Diploma in Computer Science | 31 | 15.5 |
| | Diploma in Actuarial Science | 14 | 7.00 |
| | Diploma in Accounting Information System | 1 | 0.50 |
| | **Total** | **200** | **100.0** |
| **Own Computer or a Laptop** | Yes | 197 | 98.5 |
| | No | 3 | 1.5 |
| | **Total** | **200** | **100.0** |
| **Proficiency in Computer Skills** | Poor | 7 | 3.50 |
| | Fair | 83 | 41.5 |
| | Good | 95 | 47.5 |
| | Excellent | 15 | 7.50 |
| | **Total** | **200** | **100.0** |
| **Experience in Using Computer** | Less than 1 year | 8 | 4.0 |
| | 1 to 5 years | 113 | 56.5 |
| | 6 to 10 years | 39 | 19.5 |
| | More than 10 years | 40 | 20.0 |
| | **Total** | **200** | **100.0** |

Instead of that, this study also has collected respondents' opinions on three issues, which are the respondents' statements about learning mathematics through e-learning, the dilemma of employers' acceptance, and opinion on cost of e-learning. Through the statistics reported in Figure 2, 3 and 4, the transition from offline class to online class has increase students' knowledge about e-learning since more than half of the them choose all the listed activities as a part of e-learning. They also highlighted that the cost of e-learning and classroom learning are the same. Additionally, this paper find that 51% students are in dilemma and afraid that qualifications from e-learning are not well accepted by employers.

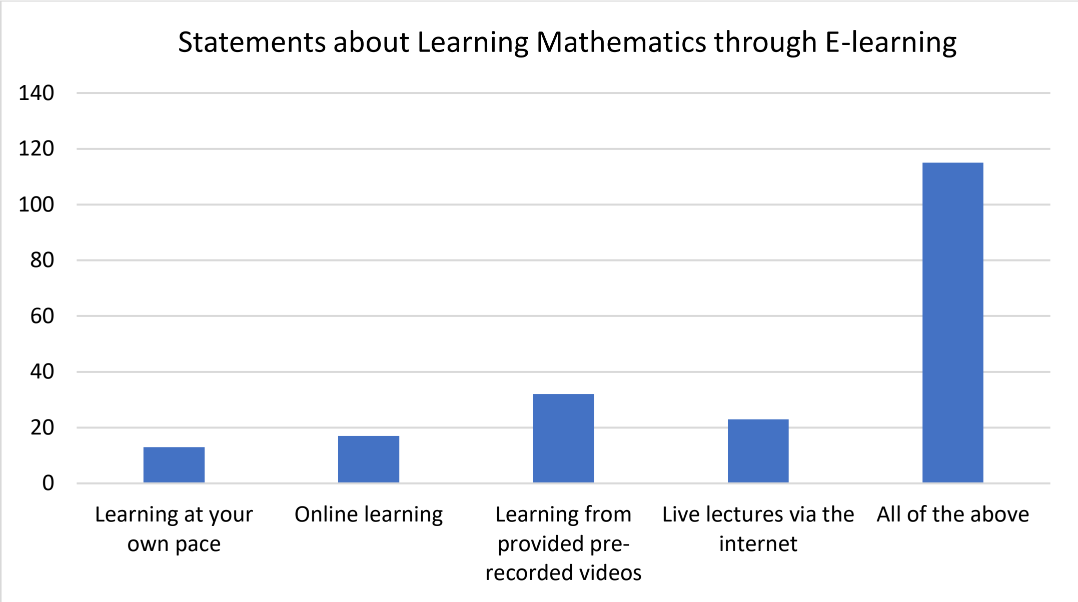


Figure 2 Respondents' Statements about Learning Mathematics through E-learning

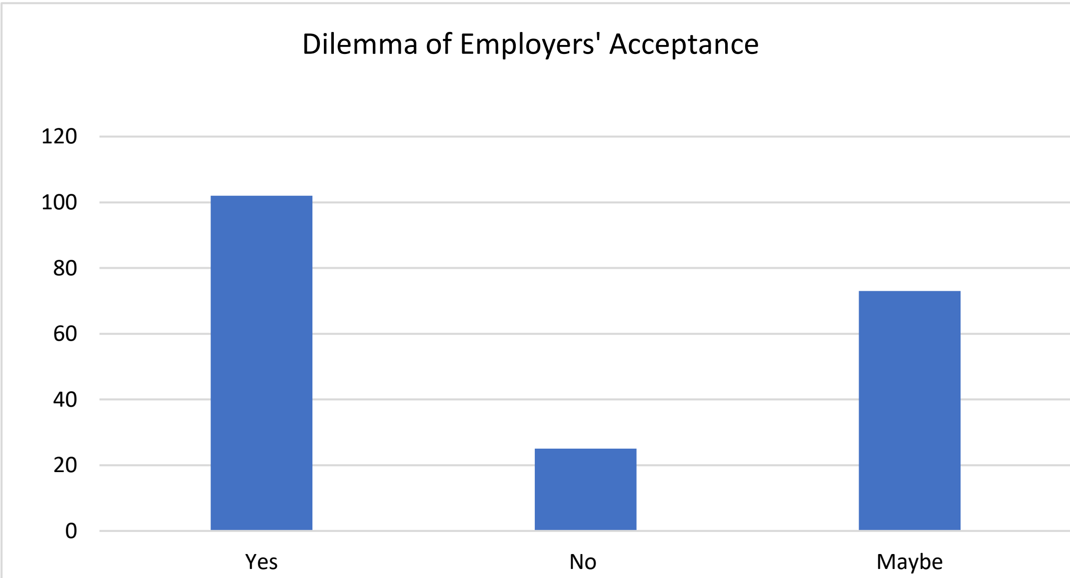


Figure 3 Respondents' Dilemma of Employers' Acceptance

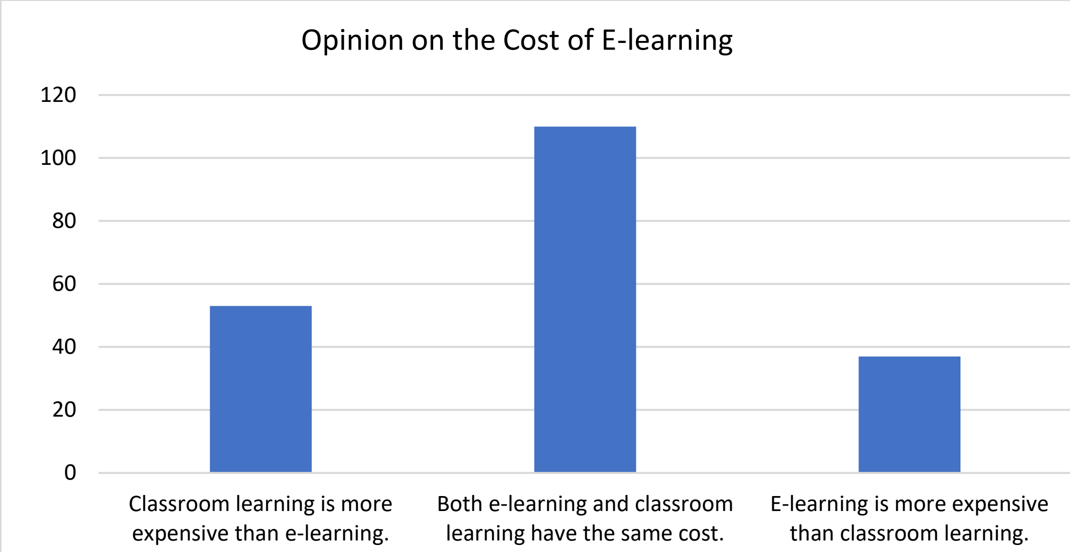


Figure 4 Respondents' Opinion on Cost of E-learning

**Reliability Analysis**

Since respondents' responses were recorded using Likert-scale questions, the next step in evaluating the result is by assessing the reliability of chosen variables. Cronbach's Alpha result was used to determine the level of reliability of the variables. Table 2 shows the results of the four variables, which are perceived usefulness, perceived ease of use, attitude, and intention to use e-learning. It was recorded that only perceived ease of use has a very good value, as the Cronbach's Alpha value is 0.860. Meanwhile, another three variables recorded slightly lower values, which were 0.786, 0.733, and 0.731. These variables will remain in this study since the variables are moderate and acceptable, as suggested by Pallant (2001).

Table 2
*Cronbach's Alpha Value of Research Variables*

| No | Variable | Number of Questions | Cronbach's Alpha |
|---|---|---|---|
| **1** | Perceived Usefulness | 5 | 0.731 |
| **2** | Perceived Ease of Use | 6 | 0.860 |
| **3** | Attitude | 8 | 0.786 |
| **4** | Intention to Use E-learning | 3 | 0.733 |

***Correlation Analysis***

Previously, the reliability analysis showed that all of the listed variables are accepted and the consistency was verified. It is important to measure the reliability as it determines the quality of the research. Next, a correlation analysis was conducted to determine the relationship between variables (perceived usefulness, perceived ease of use, attitude) and the intention to use e-learning. Table 3 shows the details of the correlation analysis of the variables. Based on the correlation table, all variables fulfil the 90% confidence interval with a 0.000 significant value.

Table 3
*Correlations Table*

| | | Intention to Use E-learning | Perceived Usefulness | Perceived Ease of Use | Attitude |
|---|---|---|---|---|---|
| **Intention to Use E-learning** | Pearson Correlation | 1 | | | |
| | Sig. (2-tailed) | | | | |
| | N | 200 | | | |
| **Perceived Usefulness** | Pearson Correlation | 0.461** | 1 | | |
| | Sig. (2-tailed) | 0.000 | | | |
| | N | 200 | 200 | | |
| **Perceived Ease of Use** | Pearson Correlation | 0.338** | 0.571** | 1 | |
| | Sig. (2-tailed) | 0.000 | 0.000 | | |
| | N | 200 | 200 | 200 | |
| **Attitude** | Pearson Correlation | 0.650** | 0.511** | 0.392** | 1 |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | |
| | N | 200 | 200 | 200 | 200 |

**. Correlation is significant at the 0.01 level (2-tailed).

Referring to the result of correlation analysis, the interpretation of Pearson's correlation values and the significance (2-tailed) values were present in Table 3a and Table 3b. It was shown that even though all variables were significantly correlated, each of them had an influence on the dependent variable at a different level. Attitude was found to have a strong positive correlation to the intention to use, followed by perceived usefulness, with a moderate positive correlation, and perceived ease of use, with a weak positive correlation. As a result, only perceived usefulness and attitude were qualified for further regression analysis with the intention to use e-learning.

Table 3a
*Interpretation of Pearson's correlation values*

| Independent Variable Name | Pearson Correlation Value | Result |
|---|---|---|
| **Perceived Usefulness** | 0.461 | Moderate positive correlation |
| **Perceived Ease of Use** | 0.338 | Weak positive correlation |
| **Attitude** | 0.650 | Strong positive correlation |

Table 3b
*Interpretation of Significance (2-tailed) values*

| Independent Variable Name | Significance (2-tailed) Values | Result (at 95% confidence level) |
|---|---|---|
| **Perceived Usefulness** | 0.000 | Acceptable |
| **Perceived Ease of Use** | 0.000 | Acceptable |
| **Attitude** | 0.000 | Acceptable |

***Regression Analysis***

This study will conduct a regression analysis on the values of a dependent variable (intention to use e-learning) and the selected independent variables (perceived usefulness, attitude). The model summary was demonstrated in Table 4 and the R-value shows a good correlation between the intention to use e-learning and the variables as it recorded a value of 0.667. The value of R-square shows that model 1 explains 44.5% of the variance in intention to use e-learning. Although this value is moderate, Itaoka (2012) has stated that an R-square of 9% is already accepted for much social science research. Additionally, the value of adjusted R-square is 0.439, which is good as it is not much different from the value of R-square.

Table 4
*Model Summary*

| Model | R | R Square | Adjusted R Square | Standard Error of the Estimate |
|---|---|---|---|---|
| **1** | 0.667[a] | 0.445 | 0.439 | 0.39452 |

Next, an ANOVA table was presented in Table 5 to determine the significance of the model in evaluating the result of the study. The p-value is based on the 95% confidence level and it should be less than 0.05. The result indicates that the result is significant as the value is 0.000. To validate the result, the value of the F-ratio is 78.943, which represents a good model.

Table 5
*ANOVA*

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| **1** | Regression | 24.574 | 2 | 12.287 | 78.943 | 0.000[b] |
| | Residual | 30.662 | 197 | 0.1560 | | |
| | Total | 55.236 | 199 | | | |

Table 6
*Coefficients*

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| **1** | Constant | -0.183 | 0.228 | | -0.803 | 0.423 |
| | Perceived Usefulness | 0.175 | 0.062 | 0.175 | 2.832 | 0.005 |
| | Attitude | 0.722 | 0.080 | 0.561 | 9.078 | 0.000 |

Table 6 shows the final result of the regression analysis. This coefficient table represents the extent of the relationship between independent variables and dependent variables. The significant value presented will ensure whether the hypothesis should be accepted or not. It is shown that both perceived usefulness and attitude have a significant relationship to the intention to use e-learning since both recorded p-value less than 0.05, which is 0.005 for perceived usefulness and 0.000 for attitude. It also suggests that with a 1% increase in perceived usefulness among respondents, the intention to use e-learning for mathematics courses will increase by 0.175. Besides, a 1% increase in attitude among students will increase the intention to use by 0.722. Thus, H1 and H3 are accepted, and H2 is rejected.

**Conclusions**

An e-learning system is not something new, but at the same time, it is also a complex system. Mad et al (2020) find that most students do not like the idea of e-learning because of the doubt in technology advancement in Malaysia. It is a big challenge to change the way one has been learning for years to a newly introduced system. Thus, the problems of adapting ways of learning mathematics to the new e-learning environment are particularly relevant. This study was carried out to find out students' intention to use e-learning in mathematics courses. The responses were collected from the students of Universiti Teknologi MARA Perak Branch (Tapah Campus) and the Technology Acceptance Model (TAM) was used to assess respondents' intention to use it.

From the result, it was shown that respondents had favourable opinions about e-learning because more than half of them selected all the above activities as e-learning components. Besides, the students also find that e-learning does not affect their learning costs since both methods cause them to spend the same amount of money. However, they do have concerns about the employers' acceptance, which is similar to Mad et al (2020), who found 59 percent of the respondents afraid that they will face discrimination during the employment selection process caused by offline teaching and learning. On the other hand, students' perceived usefulness and attitude toward e-learning had a significant impact on the intention to use e-learning for mathematics courses. Attitude contributes the most, as a 1% increase in attitude among students will increase the intention to use by 0.722, while a 1% increase in perceived usefulness will increase the intention to use by 0.175. The finding for attitude was consistent with previous studies by Hanif et al (2018) that suggest a student's attitude is a strong factor of behavioural intention. Additionally, they also found that perceived usefulness has a significant effect on behavioural intention.

On the other hand, it is important to recognise the study's limits and engage with them. First, there was just one university in Malaysia among the participants in this study. It might affect how generally applicable the results are. Additionally, in terms of gender, the majority of the study's participants were female students (72%), while male students made up only 28%. This study shows that when the aforementioned teaching strategy is used, female students perceive autonomy and involvement more favourably than male students. This reinforces the idea that gender can influence student participation when the e-learning method is implemented in the teaching of mathematics courses (Yersi et al., 2021). The usage of e-learning during the pandemic may be influenced by additional external variables as well. Therefore, future research on the implementation of e-learning should take additional external factors into account. Instead of that, the findings indicate that the institution can improve its e-learning facilities to support the teaching and learning of mathematics courses through e-learning. For instance, enhancing its internet facilities, developing a better version of the virtual platform, and supporting the development of electronic materials that improve the teaching-learning process without neglecting the need for real interaction between the student and the teacher. Eventually, it showed that e-learning approaches were well accepted by the students and helped them understand mathematics courses better.

**References**

Alharbi, S., & Drew, S. (2014). Using the technology acceptance model in understanding academics'

behavioural intention to use learning management systems. *International Journal of Advanced Computer Science and Applications*, *5*(1).

Ariawan, I. P. W. (2022). The academic impact of online mathematics learning during COVID-19 for junior high school students. *Jurnal Elemen*, *8*(1), 131-143.

Ariyanti, G., & Santoso, F. G. I. (2020). The effects of online mathematics learning in the Covid-19 pandemic period: A case study of senior High School students at Madiun City, Indonesia. *Mathematics Teaching-Research Journal*, *12*(3), 4-11.

Basa, Z. A., & Hudaidah, H. (2021). Perkembangan Pembelajaran Daring Terhadap Minat Belajar Matematika Siswa SMP Pada Masa Pandemi COVID-19. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(3), 943-950.

Ali, B. M. (2011). A critical study of effectiveness of online learning on students' achievement. *Baig, MA (2011).* Research Papers a Critical Study of Effectiveness of Online Learning on Students' achievement. *I-Manager's Journal of Educational Technology*, *7*(4), 28-34.

Bergmann, J., & Sams, A. (2014). *Flipped learning: Gateway to student engagement*. International Society for Technology in Education.

Calder, N., Jafri, M., & Guo, L. (2021). Mathematics education students' experiences during lockdown: Managing collaboration in elearning. *Education Sciences*, *11*(4), 191.

Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* (Doctoral dissertation, Massachusetts Institute of Technology).

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Fauzy, A., & Nurfauziah, P. (2021). Kesulitan pembelajaran daring matematika pada masa pandemi COVID-19 di SMP Muslimin Cililin. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5*(1), 551-561.

Goodhue, D. L. (2007). Comment on Benbasat and Barki's" Quo Vadis TAM" article. *Journal of the Association for Information Systems*, *8*(4), 15.

Hanif, A., Jamal, F. Q., & Imran, M. (2018). Extending the technology acceptance model for use of e-learning systems by digital learners. *Ieee Access*, *6*, 73395-73404.

Itaoka, K. (2012). Regression and interpretation low R-squared. *In Proceedings of the presentation at Social Research Network 3rd Meeting, Noosa. Mizuho Information and Research Institute, Inc*.

Joaquin, J. J. B., Biana, H. T., & Dacela, M. A. (2020). The Philippine higher education sector in the time of COVID-19. In *Frontiers in Education* (p. 208). Frontiers.

Kalogeropoulos, P., Roche, A., Russo, J., Vats, S., & Russo, T. (2021). Learning Mathematics from Home during COVID-19: Insights from Two Inquiry-Focussed Primary Schools. *Eurasia Journal of Mathematics, Science and Technology Education*, *17*(5).

Knight, T. E. (2020). Severe acute respiratory syndrome coronavirus 2 and coronavirus disease 2019: a clinical overview and primer. *Biopreservation and Biobanking*, *18*(6), 492-502.

Lai, P. C. (2017). The literature review of technology adoption models and theories for the novelty technology. *JISTEM-Journal of Information Systems and Technology Management*, *14*, 21-38.

Mad, S., Omar, N. A., Sarudin, E. S., & Aziz, N. H. (2020). Perception and intention to use e-learning from students' point of view-an evidence from Malaysia local university. *Journal of Computing Research and Innovation (JCRINN)*, *5*(2), 11-20.

Mailizar, M., Almanthari, A., & Maulina, S. (2021). Examining teachers' behavioral intention to use E-learning in teaching of mathematics: an extended TAM model. *Contemporary Educational Technology*, *13*(2), ep298.

Mamattah, R. S. (2016). Students' Perceptions of E-Learning.

Marban, J. M., & Mulenga, E. M. (2019). Pre-Service Primary Teachers' Teaching Styles and Attitudes towards the Use of Technology in Mathematics Classrooms. *International Electronic Journal of Mathematics Education*, *14*(2), 253-263.

Masrom, M. (2007). Technology acceptance model and e-learning. *Technology*, *21*(24), 81.

Mohammadi, H. (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers in human behavior*, *45*, 359-374.

Murphy, M. P. (2020). COVID-19 and emergency eLearning: Consequences of the securitization of higher education for post-pandemic pedagogy. *Contemporary Security Policy*, *41*(3), 492-505.

Nabayra, J. N. (2020). Video-based e-module for mathematics in nature and students' learning experiences in a flipped classroom. *Journal of Science and Mathematics Education in Southeast Asia*, *43*.

Nabayra, J. (2022). Mathematics Learning in the New Normal Through Teacher-Created Videos: The Freshmen University Students' Experience. *International Journal of Arts and Humanities Studies*, *2*(1), 22-27.

Nabayra, J., & Nabayra, L. J. M. (2021). Exploring How Culture of Excellence is Personified by Mathematics Teachers in the Public Schools. *International Journal of Arts and Humanities Studies*, *1*(1), 88-94.

Ní Fhloinn, E., & Fitzmaurice, O. (2021). Challenges and opportunities: Experiences of mathematics lecturers engaged in emergency remote teaching during the COVID-19 pandemic. *Mathematics*, *9*(18), 2303.

O'neill, K., Singh, G., & O'donoghue, J. (2004). Implementing elearning programmes for higher education: A review of the literature. *Journal of Information Technology Education: Research*, *3*(1), 313-323.

Pallant, J. (2001). SPSS Survival Manual: A Step-by-Step Guide to Data Analysis Using SPSS. *BEHAVIOUR CHANGE*, *18*(1), 58-62.

Sun, A., & Chen, X. (2016). Online education and its effective practice: A research review. *Journal of Information Technology Education*, *15*.

Syauqi, K., Munadi, S., & Triyono, M. B. (2020). Students' Perceptions toward Vocational Education on Online Learning during the COVID-19 Pandemic. *International Journal of Evaluation and Research in Education*, *9*(4), 881-886.

Tesar, M. (2020). Towards a post-Covid-19 'new normality?': Physical and social distancing, the move to online and higher education. *Policy Futures in Education*, *18*(5), 556-559.

Yersi, L. H. R., Antonio, J. M., Jose, A. M. M., & Jesus, L. B. (2021). The e-Learning Method for Teaching Mathematical Content in the COVID-19 Era. *Turkish Journal of Computer and Mathematics Education, 12(6),* 2045-2057.