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FACTORS INFLUENCING PRE-SERVICE TEACHERS' CONFIDENCE IN TEACHING DURING THE COVID-19 PANDEMIC

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ABSTRACT

Purpose – Pre-service teachers, who are practising teachers are exposed to numerous technical skills at university. Studies on the use of technology on pre-service teachers' self-confidence are still in their infancy, despite the abundance of studies addressing pre-service teachers' intention to utilise technology in online learning. Therefore, this study seeks to investigate pre-service teachers' use of technology and their confidence in handling online classes effectively.

Methodology – A survey was conducted on 93 teachers at two randomly selected universities in Malaysia during the early stages

of the COVID-19 pandemic (March-May 2020) through online data collection. A five-point Likert scale-adapted questionnaire on pre-service teachers' perceptions of technology use, effort, and confidence was administered to the respondents. The questionnaire was validated by three experts and data were analysed empirically using structural equation modelling-partial least-squares analysis.

Findings – According to the study's findings, pre-service teachers held that technology was a great tool for online instruction and that peer contact helped them broaden their understanding about teaching. Despite this, there was no significant correlation between the use of technology and pre-service teachers' self-confidence. Nevertheless, the effort factor was found to mediate between pre-service teachers' confidence and technology.

Significance – The results of this study provide important findings; that pre-service teachers could train their minds to put forth specific effort, such as increasing their interpersonal experience to support and enhance their online teaching. This in turn could help pre-service teachers in preparing to embark on technology-related activities to enable them to work with students more frequently and to support and enhance online education.

Keywords: Applying technology, confidence in teaching practicum, effort of teaching and learning.

INTRODUCTION

Technology emerges as a cognitive tool in teaching and learning. The importance of technology has been acknowledged by most educational institutions around the world, that it has a positive impact on students' learning (Khan et al., 2021). The Malaysia Education Blueprint (2013–2025) emphasises the need of budgeting for ICT in teaching and learning (Ministry of Education, 2012) and RM6 billion has been allocated for this purpose. The role of technology in education has become more prominent during the COVID-19 pandemic as all students and educators, even pre-service instructors, rely on it (Omar et al., 2021). It was reported that during the COVID-19 pandemic, pre-service teachers demonstrated positive attitude in online interactive platforms in their service-learning (Omar et al., 2021). Technology

usage is increasing in tandem with the development of 21st-century capabilities. As a result, universities with pre-service teacher education obligations are concerned with mentoring them. They are also concentrating on students' ability and confidence in using technology to cope with a growing society and working life. Since students must continually adapt and gain new skills and competencies (Van Laar et al., 2020), hence technology is essential in developing 21st-century skills.

The same situation happens in schools where students are also encouraged to develop 21st-century skills. Thus students are also hoping for guidance from their teachers. Therefore, pre-service teachers, who are practising teachers should be ready and confident in applying technology in class. Pre-service teachers should be able to navigate across time and space in any given opportunity to construct their professional knowledge during their initial teacher education (Gutierrez & Kostogriz, 2020) especially in applying technology in the classroom; what they acquire through their initial teacher education curriculum will ensure that they are able to work effectively and successfully in schools (Tang et al., 2016). The practice of applying technology in teaching is a good start in their responsibilities in teaching for the development of 21st-century skills among school students. Pre-service teachers seek help for their professional learning starting from their first year in the program (Toom et al., 2017), in which learning skills and collaboration dispositions form the core areas of the teaching profession (Valtonen et al., 2021). Even though pre-service teachers have been exposed to technological skills in university by taking courses or other forms of knowledge, it has been reported that their intention and confidence of using technology in teaching indicated uncertainty. Thus, universities are preparing pre-service teachers to assume prime responsibility to equip themselves with 21st-century skills.

It is also undeniable that pre-service teachers take charge of inculcating new skills, such as computational skills, by putting extra effort in instruction, such as assigning responsibility to students and encouraging students' independent problem-solving (Karakoyun, & Lindberg, 2020; Tucker-Raymond et al., 2021). In a study conducted by Anwaruddin (2016), it was found that integrating information and communication technologies into English language teachers' professional development activities is crucial as this would lead to

an improvement in their pedagogical knowledge. Moreover, Dinçer, (2018) also underlined pre-service teachers' need to gain pedagogical and content knowledge via university courses, along with adequate improvements in using ICT in teaching before embarking on their profession. Thus, it is recommended that this knowledge should be integrated into the initial teacher education curriculum with more attention paid to improving access to ICT including in schools. Integration of theory and practice should be made explicit in university courses and field experience (Mena et al., 2017). Only pre-service teachers with strong motivation or positive disposition should be involved in the implementation of 21st-century skills to succeed in their career (Moreira-Fontán et al., 2019; Valtonen et al., 2021). Hence, it is crucial to explore how pre-service teachers conduct the implementation of technology in their teaching practicum. Specifically, this study aims to investigate the pre-service teachers' confidence in practicum practices based on their technological knowledge and effort.

LITERATURE REVIEW

Changes in Teaching

To meet today's literacy requirements, pre-service teachers are required to have in-depth pedagogical familiarity with technology integration, combined with virtual experiences and conducting effective online instructions (Tate, 2020) so that targeted groups will not find it stressful in managing challenging situations. It therefore becomes crucial for new teachers to integrate technology in their teaching right away when they get to the field. Pre-service teachers in this century are deemed to be maximising various technology materials and resources for their teaching purposes, not just for their own personal use. Huang et al. (2020) viewed experienced university teachers as having the same traits of digital natives just like their students. Burić and Moe (2020) added that it is related to the level of enthusiasm which will result in enthusiastic teachers bringing work-related well-being to fulfil most of their tasks at work. Thus, it is expected for pre-service teachers to be infused with technology resources to ensure teaching and learning can be maximized in this century.

Incorporating technology in today's classrooms by pre-service teachers is highly recommended as it will be more beneficial to

learners in learning any subject. This is because it assists in elevating the level of motivation of learners. Kirovska-Simjanoska (2021) in their work also indicated that digital technology in ESP classrooms received positive feedback from students and benefitted language learning. Teachers can make use of various resources to prepare materials from a range of information to suit their contexts. This situation where technology is highly utilized for educational purposes is termed as educational technology (Lin & Yang, 2011). Educational technology is highly recommended to be maximized by pre-service teachers as it allows for creating and managing ICT facilities and enables students to access information. Thus, the use of technology in today's classrooms benefits students in learning any subject.

Employing Technology in Teaching and Learning

Effective communication using technology during the COVID-19 pandemic is essential. With the use of technology, it is possible to expose school students to more opportunities in interacting virtually not just with their pre-service teachers, but also with their classmates and in turn increases pre-service teachers' confidence level and decreases students' anxiety in communicating especially when they set foot in the world of work. Suresh et al. (2018) asserted that technologies that are available assist teachers' in delivering lessons as students will benefit the most from using them. Teachers have control in aspects of content for instance, science terminologies and processes, time needed and the processes that are required to cater to their students' needs and objectives of learning. Mavuru and Ramnarain (2020) described the language of learning and teaching to be a factor which impedes learners and teachers alike to understand and explain science terminologies and processes.

Besides language, the teachers' effort is in determining appropriate tools since technological advancements provide multiple choices in the usage of teaching tools. There are various kinds of teaching tools that teachers can choose to deliver in their online learning that can be made appropriate to their students' diverse needs and abilities; serving the purpose of conducting synchronous virtual classrooms, asynchronous support, and communication, and to have virtual collaboration and teaching aids. Some of the most common video conferencing tools like Google Meet, Apple FaceTime, Microsoft Teams, Skype, and Zoom (UNESCO, 2021) can offer pre-service teachers and school

students the opportunity to communicate effectively while delivering the most appropriate content catering to groups of students according to their levels.

Challenges in the use of Technology in the Classroom

There are many challenges faced by teachers in the use of technology in the classroom that affects their integration of technology in the classroom. Farjon et al. (2019) classified the biggest reason for this failure is the abundance of technology. This is because teachers will find it difficult to choose the most suitable technology to be integrated into their lessons. In addition, Lange and Costley (2020) noted that the success of online classes will depend on the role of the instructor. The instructor plays a key role in the delivery of online lectures, which involves balancing the pace, quality, and integrating technology into their lessons based on the suitability of contexts. It is noticeable that if they fail to play their roles effectively, these will be the factors that lead to the lack of technology integration.

However, the biggest contributors to the success of technology integration are the pre-service teachers' attitude and beliefs. Guillén-Gámez and Mayorga-Fernández (2020) noted that these are highly impacted by pre-service teachers' level of technology acceptance on their integration of technology which shows that these teachers have a medium total attitudinal level. As more advanced technology could be derived every single day, teachers who are prone to accept and adapt to the latest technology to be integrated into their lessons will most likely benefit from it. Baran et al. (2019) posited that factors such as performance expectancy, effort expectancy, and social influence could determine pre-service teachers' intention of using technology. It was observed that teachers who had a clear intention of using technology performed better by putting in more effort with the push factor to maximize technology in their learning especially from their fellow colleagues and students. Beyond the social and technology acceptance factors, Richardson et al. (2020) conducted a survey and concluded that teachers' mindsets and motivational attitudes also affect their teaching behaviour especially in integrating technology into their lessons. On a final note, there are various challenges hindering teachers in integrating technology into their lessons with students being the largest contributor of their own attitudes and beliefs.

Ineffective Technology Training Programs for Pre-Service Teachers

Teacher training programs prepared for pre-service teachers aim to help increase their competency levels in using technology effectively. The main objective of these programs is to expose these teachers to the realities of the school and classroom contexts, as Dias-Lacy and Guirguis (2017) stated that teacher training programs allocate time for pre-service teachers to spend in teaching in schools. This is line with Chan's (2016) view about teacher training programs to be the platform for pre-service teachers to comprehend and articulate the subject matter, learners, learning, and teaching approaches. The knowledge and skills utilization learnt in university especially from teacher training programs contribute to the process in realising their capabilities to form their pedagogical beliefs. However, Flower et al. (2017), indicated that many pre-service teachers do not receive important content necessary for the success of students and teachers especially on how to use technology for their lessons with students. They are viewed as often feeling less prepared to deal with diversity in their classrooms due to the lack of useful skills in integrating technology into their lessons (Hassanein et al., 2021). Acknowledging the usefulness for teachers to be able to integrate technology into their lessons, the current curriculum includes a technology training component which considers how content, pedagogy, and technology dynamically constrain each other, helping teachers to utilise technology in classrooms more effectively (Nasr, 2020). Thus, teacher training programs that include the technology training component will increase their success in delivering lectures these days.

Pre-service Teachers' Confidence in Teaching

At present, pre-service teachers are facing challenges due to many educational changes attributed to the COVID-19 pandemic. Pre-service teachers are given heavier responsibilities for teaching and learning. They are not just concerned with applying their existing knowledge learned from university, but how they equip and adopt the skills to achieve learning outcomes in their practicum teaching. In practice, they need creativity to harness the advantage of using technological tools and systems. Pre-service teachers who depend much on the application and operation of technology without intention to increase students' metacognition or competency may find themselves less confident in teaching and learning.

Innovation in any way will create a chance of changing parts of education in a variety of ways. Camins (2015) highlighted that innovation will create more quality and productive learning at any level. Innovation is perceived as an opportunity for improvement in teaching and learning, but it requires effort in harnessing the power of innovation backed by experience and sound values. Proper application and fostering of technological skills help to increase the number of adopters (in this case, pre-service teachers, and students). Hence, pre-service teachers are expected to increase their technical knowledge, and this has been an important component of their training which requires them to be always prepared to use information and communication technology with extra effort. As they are leading in education, building strong confidence in teaching, and learning in a technological environment is essential. Pre-service teachers who were observed to be less confident in learning will hardly perform in online teaching thus secure less opportunities in their career. Hence, monitoring their level of confidence may assist them in their career development. Since the current situation requires the application of technology, pre-service teachers are urged to explore more on current new technological tools especially the use of ICT in their teaching and learning.

Liu (2017) affirmed that competent teachers who have positive attitude and commitment in performing their duties such as applying technology in teaching and learning, can administer beneficial activities for their students. Alelaimat et al. (2020) showed from their study that pre-service teachers had positive perceptions concerning the importance of integrating technology into classroom practice; their level of satisfaction with their preparation in using technology in teaching; and their knowledge needs about using technology in practice. Consequently, pre-service teachers' positive behaviour in integrating technology and making conscientious effort will enhance their confidence in conducting effective online classes.

Huang et al. (2020) noted that there are seven important aspects recognised as the basis of online education, which has an essential role in optimizing learning. The seven aspects are Internet infrastructure to avoid interruption especially during video-conferences; using friendly tools that help students assimilate and understand information; providing reliable, interactive, and diverse electronic resources; using social networks to build online communities for students to

reduce feelings of isolation; using various effective techniques such as debates, or discovery-based learning and experience; providing services that will help students and teachers learn about the latest policies adopted by universities and the government, and encouraging collaboration between these institutions. All these aspects will enable pre-service teachers to be able to communicate, collaborate, solve problems, enhance their creativity, and develop critical thinking. Verde and Valero (2021) noted that classes in hybrid mode allow for optimization of the use of academic resources and grant control of the capacity and social distance, as there are fewer people in the classroom, such that social distancing measures imposed by the state can be better complied with. Hence, the basis of online education needs to be acknowledged and plays an essential role in optimizing learning

Awareness on the usage of new technological tools has increased when Nations (2021) reported that electronic devices recorded a sale of more than 45.5 million units of iPads in the market as these tablets have become a household fixture with sales growth for the past three years. Using electronic devices that are equipped with a communication platform has become the norm during the pandemic as school students are required to use their laptops to view PowerPoint lectures and perform academic tasks. It is worth noting that employing new technologies with all the needed skills in accessing developed instruments, media software, information, and communications technology in supporting education practically calls for a kind of cultural change in the educational structure that is considered a positive point. König et al. (2020) indicated that when school closures began, only teachers who were technologically skilful were advantaged at teaching online. Thus, technology and new media of digital techniques yield remarkable efficiency in supporting educational institutions, cooperatives, and educational environments. The facilities allow pre-service teachers or novice teachers to adopt 21st-century skills in their teaching such as demonstrating innovative practices and differentiated learning (Lawrence et al., 2020). Thus, teachers are deemed to be given the awareness to use new technological tools for their lessons with students.

Pre-Service Teachers' Effort in Teaching

During teaching practicum, pre-service teachers experience early career life as they are in transition from university study life to become

novice teachers. During this time, they depend highly on the teaching community (Afrianto, 2017). It is encouraging to some pre-service teachers since the mere presence of positive social relationships that exist will lead to the quality of those relationships to ensure positive emotional experiences arising through their interactions with others (Allen, 2020). Pre-service teachers are encouraged to highly engage and participate in the community for practical skills development, such as being involved in academic collaboration, professional development discussion, and taking opportunities to try out their own ideas (Afrianto, 2017; Top et al., 2021). Even though they have equipped themselves with some technological knowledge via university courses, they may find it difficult to apply the skills in the real teaching environment (Farjon et al., 2019). They are practically new practitioners, and hence they rely on the learning and teaching community's support and monitoring in schools. With the guidance of the community, pre-service teachers can calibrate the approaches they use to teach in accordance with their needs. They fulfil the responsibilities of both learners and teachers while actively seeking for opportunities to improve their strategic learning behaviour (Masui & De Corte, 2005). However, increased effort from pre-service teachers is anticipated in view of COVID-19, which could result in the restructuring of pre-service norms (Hill, 2021). As a result, they develop their confidence by working hard to acquire the abilities needed for their instruction. Hence, the importance of effort in the teaching and learning of mathematics necessitates further study.

Pre-service teachers demonstrate their commitment to their professional development by adopting a positive attitude in accepting mentoring (Bas et al., 2016). On the other hand, their deep sense of motivation emerges from their actions and effort in the adoption of 21st-century skills such as communication and collaboration. Thus, observation of their achievement in teaching does not depend solely on utilising technology, as Naibaho (2019) observed that the English Education of Fakultas Keguruan dan Ilmu Pendidikan Universitas Kristen Indonesia (EED -FKIP -UKI) graduates can also compete in the "ever-changing job market" when they are equipped with related skills in teaching in this new normal period. Although many studies have been conducted to understand pre-service teachers' technology integration, there are still some obstacles that affect pre-service teachers' use of technology in the classroom. Therefore, to address the

gap, this study intends to identify the factors that affect mathematics pre-service teachers' utilisation of technology and to determine the extent of its incorporation in Malaysian classrooms.

METHODOLOGY

This study is part of a larger study of an investigation on pre-service teachers' practicum skills and their affective aspects of confidence and effort. A survey was conducted on 93 teachers at two randomly selected universities in Malaysia during the early stages of the COVID-19 pandemic (March-May 2020) through online data collection.

Research Design

This study employed a cross-sectional survey research design to gather data related to pre-service practicum teachers' perceptions on their skills, confidence, and effort in using technology. The data was analysed based on the phenomena of pre-service teachers' practices during the specific duration allocated. The data also captured characteristics associated at specific times; hence the cross-sectional survey was appropriate for the study.

Population and Sampling

This study employed a two-stage sampling. For the first stage, two public universities in Malaysia that offer education and teaching programmes were randomly selected. The criteria of the selection included science-based practicum teachers, and that their practicums were in Peninsular Malaysia. For the second stage, the selection was based on volunteerism. In this process of sampling, a total of 93 respondents successfully participated in this study.

Instrumentation

Data for the study was collected via a questionnaire that consisted of items related to the application of technology during the pre-service teachers' practicum in the pandemic period. It was followed by items related to their effort and confidence in teaching. Respondents were required to respond to a five-point Likert scale where a score

of one indicated strong disagreement whilst a score of 5 indicated strong agreement. The items for technology were adapted from Siaw (2017), but items for effort and confidence were self-constructed. The questionnaire was validated by a panel of three experts from a university and a pilot test was conducted to establish its reliability. Whilst, the validity and reliability of the questionnaire items were confirmed through analyses of the measurement model.

The reliability of items was tested based on item loading, convergent reliability, internal consistency, and Cronbach's alpha. Appendix I shows the average variance extracted (AVE) >0.5 for all constructs indicating convergent reliability was established (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). The AVE for confidence, effort, and technology were 0.733, 0.693, and 0.621, respectively. In addition, all constructs showed composite reliability (CR) >0.7, indicating internal consistency was established (Gefen et al., 2000). The composite reliability for confidence, effort, and technology were 0.916, 0.871, and 0.920, respectively. For indicator reliability, Cronbach's alpha > 0.7 is the threshold (Nunnally, 1978). All constructs satisfied the threshold value. The Cronbach's alpha of confidence, effort, and technology were 0.878, 0.783, and 0.899, respectively (Appendix I). In this study, the items with loading less than 0.7 were identified and deleted. Hence, two items: Bii4 and Biii16 under the construct: confidence and effort, respectively were deleted.

The tables in Appendix II, Appendix III, and Appendix IV present the validity of the constructs. Three measures were utilised to confirm the discriminant validity. Three measures (Cross loading, Heterotrait-Monotrait, and Fornell-Larcker) were employed. The table in Appendix II shows the cross-loading items. All loadings consisted of items loading of more than 0.7 (after deletion of the two items mentioned). The analyses showed acceptable variance inflation factor (VIF) namely VIF < 5, which indicated that they satisfied the assumption of multicollinearity.

Heterotrait-Monotrait (HTMT) was referred to ensure that the constructs were considered distinct from each other since the values did not include 1(<1). The table in Appendix III shows that HTMT satisfied the discriminant reliability threshold. The Heterotrait-Monotrait (HTMT) indicated that the constructs were considered

distinct from each other as the values did not include 1(<1). The table in Appendix IV shows that the Fornell-Larcker values of each construct was greater than its correlation with any other construct. It indicated that the items in the construct were significantly different from others. The Fornell and Larcker criterion for confidence, effort, and technology were 0.856, 0.832, and 0.788, respectively. The diagonals represent the square root of the latent variables and indicate the highest in any column or row.

Data Analysis

After data was gathered from the respondents, the data was analysed using SmartPLS to answer the research questions, using both descriptive and inferential statistics.

RESULTS

The analyses of this study were run with 500 resamples with a confidence interval of 95 percent. A confidence interval difference from zero indicates a significant relationship hypothesis (H1, H2, H3); testing results are summarized in Table 1. The following are the hypotheses:

H1: H_0 There is no relationship between technology and confidence.
H_1: There is a significant relationship between technology and confidence.
H2: H_0 There is no relationship between technology and effort.
H_1: There is a significant relationship between technology and effort.
H3: H_0 There is no relationship between effort and confidence.
H_1: There is a significant relationship between effort and confidence.

The results (Table 1) showed that there was no significant relationship between technology and confidence with $t=1.095$, $p > .05$. Thus, hypothesis 1 was not rejected. There was a significant relationship between technology and effort with $t=3.521$, $p < .05$. Thus, hypothesis 2 was rejected. There was a significant relationship between effort and confidence with $t=7.148$, $p < .05$. Thus, hypothesis 3 was rejected.

Table 1

Results of Hypotheses Testing

	Original sample (β)	Sample mean	Standard deviation	t-statistic	p-values	25%	95%	Decision H_0
H3: Effort->confidence	0.604	0.611	0.084	7.148	0.000	0.444	0.764	Reject H_0
H1: Technology->confidence	0.118	0.124	0.108	1.095	0.274	-0.077	0.325	NOT Reject H_0
H2: Technology->effort	0.359	0.379	0.102	3.521	0.000	0.181	0.563	Reject H_0

The following results answer for hypothesis 4 and hypothesis 5.

H4: H_0 The structural model for confidence does not reflect the paths hypothesized in the research.
H_1 The structural model for confidence reflects the paths hypothesized in the research.

H5: H_0 The structural model for effort does not reflect the paths hypothesized in the research.
H_1 The structural model for effort reflects the paths hypothesized in the research.

The hypotheses, H4 and H5 were assessed based on the R^2, Q^2, and significance of paths. The goodness of model was established by the strength of each structural path determined by the R^2 value for the dependent variable (Briones Penalver et al., 2018); the value for R^2 should be equal to or more than 0.1 (Falk & Miller, 1992). The results in Table 2 showed that all R^2 values were more than 0.1. For the first model with confidence as the dependent variable, it showed that the $R^2 = 0.430$. This indicated that 43 percent changes in confidence could be attributed to the independent variables (technology and effort). For the second model with effort as the dependent variable, it showed that $R^2 = 0.129$. This indicated that 12.9 percent of changes in effort could be attributed to the independent variable (technology). Since both models showed $R^2 > 0.1$, the predictive capability was established. Further Q^2 established the predictive relevance of the endogenous constructs. (Q^2 above zero shows that the model has predictive relevance.) The results showed that there was significance in the prediction of the constructs (as shown in Table 2) since both

models (model 1 and model 2) showed $Q^2 > 0$. Furthermore, the model fit was assessed using SRMR. The value of SRMR was 0.086, this was below the required value of 0.10, indicating acceptable model fit (Hair et al., 2017).

Table 2

R^2 for the Models

	R^2	R^2 adjusted	Q^2 (=1-SSE/SSO)
Confidence	0.430	0.417	0.305
Effort	0.129	0.119	0.082

SRMR = 0.086

Mediation Analysis

Mediation analysis was performed to assess the mediating role of effort. Table 3 shows that the total effect of the model (dependent variable is technology and independent variable is confidence) was significant with $t=3.327$, $p < .05$. This indicated that the dependent variable, confidence was significant. Nevertheless, the direct effect for the model was not significant with $t=1.095$, $p > .05$. Thus, this indicated that technology did not have a direct influence on confidence.

Table 3

Direct Effect of the Model

	Total Effect	**t-statistic**	**Sig**	**Direct effect**	**t-statistic**	**Sig**
Technology->Confidence	0.335	3.327	0.001	0.118	1.095	0.274

Table 4 shows that effort significantly mediated the relationship between technology and confidence. Hence, Hypothesis 6 was rejected since $t=3.202$, $p < .01$. This provided sufficient evidence to conclude that effort was the mediator in the relationship between technology and confidence.

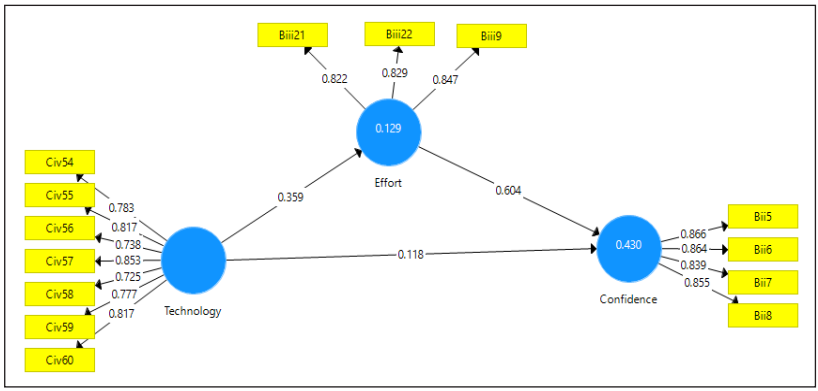
Table 4

Indirect Effect

	Indirect Effect	t-statistic	Sig
Technology->Effort -> Confidence	0.216	3.202	0.001

Figure 1

Model of Confidence with Mediator Effort



DISCUSSION

Total utilization of technology among pre-service teachers was noted to be the most suitable period during the COVID-19 pandemic. The findings showed that most pre-service teachers had chosen appropriate technological tools or resources in completing tasks. They were aware of their responsibilities in evaluating credibility and relevance on any online sources used in their teaching. This was reflected in their consensus that technology is useful in analysing and sharing information, that it can be an effective tool to support teamwork and collaboration, to communicate with experts in the field, and to keep track of work in extended tasks or assignments. The findings of this study resonate with a study conducted by Lawrence et al. (2020) which indicated that the announced benefits of technology include innovative practices, differentiated learning, enhanced collaboration, efficiency, and teacher-learner communication. Technology contributes to the creation of chances for high-quality education. It allows pre-service

or new teachers to collaborate with positive attitude and comrades through experiences in interaction (Obonyo, 2019; Tuncay & Kizilaslan, 2022). Allen et al. (2018) found that a lack of connection between curriculum design and pedagogical requirements represented in an overloaded curriculum had a negative impact on young and novice teachers. As a result, technology should serve as a catalyst and supportive tool in decreasing the heavy workload in teaching and enhancing high-quality education for students.

In the findings of this study, the respondents were also asked about their beliefs whether made effort to utilize technology in their teaching and to implement them in their practicum. They pointed out that they had gained pedagogical knowledge through interaction with other teachers. Hence, it is essential that school support in providing mentoring is essential. This was asserted by Korucu-Kış (2021), in terms of the complexity of authentic dilemmas which prompted practicum students to frequently negotiate meaning with their peers and instructors with the awareness that only having that constant exchange of ideas enabled them to have multiple perspectives and helped them develop shared understanding and a sense of learning community and thus assisted them in gaining pedagogical knowledge. Previous researches have also indicated that to fill the gap of pre-service teachers' existing technological knowledge in teaching and their intention in teaching, having a positive attitude combined with effort are essential (Afrianto, 2017; Top et al., 2021).

Pre-service teachers are expected to be confident in conducting their online classes after they have learned the necessary skills to effectively manage their classes on their own. The pre-service teachers in the study responded that they had become more confident in their teaching after practicum as they had mastered most of the skills and acquired much knowledge to become skilled mathematics teachers. It is recommended that for them to become confident in conducting online classes, they should first be equipped with positive feelings and to avoid being stressed when dealing with any upcoming situation. This is because emotional engagement performed through well-designed online learning helps to increase motivation to learn while reducing stress (Al-Kumaim et al., 2021). Hence, pre-service teachers should always be ready to apply technology during their practicum in school. The practice of utilizing technology in teaching is a good indicator that they will be responsible in teaching for the development of 21st-century skills of school students.

This study suggests that providing a more successful online learning environment could help students to be interested and more engaged in learning. This would require continual reflection by pre-service teachers on the factors that promote an ideal learning environment based on context. Active learning through technology allows students to prepare themselves better for their classes (Finch et al., 2021). This study reminds pre-service teachers to put more effort since the use of technology is becoming increasingly challenging.

With personal efforts, as well as working together with their classmates, this would help to increase the confidence level of pre-service teachers in using technology. Watulak (2018) recommended that technology with peer coaching, should be integrated into pre-service teacher education courses. This could also assist in handling students who are up to date on technology. Effort should be made to acknowledge that they need to value their relationship with their students, show concern, cater to diversity in students' learning, and motivate the expression of creative ideas. Teachers play a crucial role in creating a positive environment in this digital era to experiment with technology-enabled learning tools (Prashanti & Ramnarayan, 2020). Teachers who deliver online classes using suitable innovative classroom technology could lead to a more interesting learning environment that would ensure optimum learning for the students.

LIMITATIONS

The present study enabled us to examine the nature of attitude and provided us preliminary evidence for what may be important for pre-service teachers from two randomly selected universities in Malaysia specifically, in the teaching of Mathematics. The results may vary from one institution to another and thus cannot be generalized to all institutions in Malaysia. Furthermore, the teaching content for different subjects is not similar as it will be based on what is being taught to the pre-service teachers during practicum and the challenges that they face may be different and thus cannot be generalized. This study is also limited to investigations conducted during the early stages of the COVID-19 pandemic (Mar-May 2020) and therefore is not a fair reflection of the current situation in 2022. Thus, it is suggested that future research in this area be conducted taking into consideration these elements for a more extensive and up-to-date findings.

CONCLUSION

Using technology necessitates greater work but more groundwork is required. Teachers who do not make concerted effort may fail to engage their students and improve their teaching. They might not be able to adequately deliver their lesson. Regardless, the work must be completed efficiently. As a result, schools may be charged with assisting recently graduated teachers. Universities, on the other hand, could plan hands-on activities to provide a good platform for the growth of pre-service teachers.

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Appendix I

Construct		Item	Loading	AVE	CR	Rho-A	Cronbach's Alpha
Confidence	Bii4 (deleted item)	I am satisfied with my practicum teaching profession.	0.65	0.73	0.92	0.88	0.88
	Bii5	I am confident in my teaching after practicum.	0.87				
	Bii6	My skills of teaching improved after going through practicum.	0.86				
	Bii7	I learned a lot from my practicum.	0.84				
	Bii8	I wish I could become a mathematics teacher in school.	0.86				
Effort	Biii9	From my practicum experience, I gained pedagogical knowledge through interactions with other teachers.	0.82	0.69	0.87	0.81	0.78
	Biii16 (deleted item)	I adapt to the way of thinking on how to teach from mathematics teachers in school.	0.64				
	Biii21	I found that the teaching skills I applied in practicum and the teaching of mathematics taught in the university methods course, matched.	0.83				

(continued)

Construct		Item	Loading	AVE	CR	Rho-A	Cronbach's Alpha
	Biii22	I shared with other teachers in school about the pedagogical approaches I applied in practicum.	0.85				
Technology	Civ54	Select appropriate technology tools or resources for completing a task.	0.78	0.62	0.92	0.91	0.90
	Civ55	Evaluate the credibility and relevance of online resources.	0.82				
	Civ56	Use technology to analyse information (e.g., databases, spreadsheets, graphic programs, etc.).	0.74				
	Civ57	Use technology to help each other share information (e.g., multimedia presentations using sound or video, presentation software, blogs, podcasts, etc.).	0.85				
	Civ58	Use technology to support teamwork or collaboration (e.g., shared workspaces, email exchanges, giving and receiving feedback, etc.).	0.73				

(continued)

Construct		Item	Loading	AVE	CR	Rho-A	Cronbach's Alpha
	Civ59	Use technology to interact directly with experts or members of local/global communities.	0.78				
	Civ60	Use technology to keep track of work on extended tasks or assignments.	0.82				

Appendix II

Collinearity Statistics (VIF)	Item	Confidence	Effort	Technology
Confidence				
2.37	I am confident in my teaching after practicum.	0.87	0.56	0.32
2.36	My skills of teaching improved after going through practicum.	0.86	0.58	0.17
2.13	I learned a lot from my practicum.	0.84	0.50	0.31
2.17	I wish I could become a mathematics teacher in school.	0.86	0.56	0.35
Effort	From my practicum	0.66	0.85	0.34
1.45	experience, I gained pedagogical knowledge through interactions with other teachers.			
1.82	I found that the teaching skills I applied in practicum and the teaching of mathematics taught in the university methods course, matched.	0.41	0.82	0.31

(continued)

Collinearity Statistics (VIF)	Item	Confidence	Effort	Technology
1.79	I shared with other teachers in school about the pedagogical approaches I applied in practicum.	0.50	0.83	0.24
Technology 2.35	Select appropriate technology tools or resources for completing a task.	0.29	0.27	0.78
2.64	Evaluate the credibility and relevance of online resources.	0.25	0.23	0.82
2.10	Use technology to analyse information (e.g., databases, spreadsheets, graphic programs, etc.).	0.08	0.21	0.74
2.66	Use technology to help each other share information (e.g., multimedia presentations using sound or video, presentation software, blogs, podcasts, etc.).	0.31	0.32	0.85
1.88	Use technology to support teamwork or collaboration (e.g., shared workspaces, email exchanges, giving and receiving feedback, etc.).	0.21	0.36	0.73
2.01	Use technology to interact directly with experts or members of local/global communities.	0.28	0.26	0.78
2.11	Use technology to keep track of work on extended tasks or assignments.	0.34	0.30	0.82

Appendix III

	Confidence	Effort	Technology
Confidence			
Effort	0.753		
Technology	0.358	0.414	

Appendix IV

	Confidence	Effort	Technology
Confidence	0.856		
Effort	0.646	0.832	
Technology	0.335	0.359	0.788