THE FRAMEWORK ON THE USE OF ONLINE TEACHING AND LEARNING PRACTICES AMONG SECONDARY SCHOOL TEACHERS: AN EXTENSION OF TECHNOLOGY ACCEPTANCE MODEL (TAM)

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2023

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by

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Thesis submitted in fulfilment of the requirement
for the degree of
Doctor of Philosophy

June 2023

ACKNOWLEDGEMENT

بِسْـــــــــــــمِ اللهِ الرَّحْمَنِ الرَّحِيْمِ

It has been an amazing journey full of ups and downs and I am immensely grateful to Allah for guiding me and destining me to meet all the amazing people in my life who have helped me along the way! Everything and everyone I meet happens because Allah wills it so.

To Ts. Dr Rozniza Zaharudin, my main supervisor, and Dr Nor Asniza Ishak, my co-supervisor, no other word but thank you can express my gratitude for both of your expectant mentors, opportunities and support during my PhD years. I am confident that my thesis will reflect the best of both of you in terms of guidance and mentorship! To my former PhD supervisor, Dr Yahya, who got my PhD off the ground and gave me lots of wise advice. I really appreciate it! A big thank you to the panels, Dr Siti, AP Dr Lim and AP Dr Noraffandy, who invested their valuable time and expertise to review my PhD thesis. I appreciate it very much! May Allah recognise all your efforts and empathy towards me as amal, amin!

I would like to thank my family and friends for their patience, understanding and constant love and support. Thank you Abah and Umi for supporting me financially and morally. Thank you to all my siblings who always have an open ear for me. Not forgetting Cik Mah and family who prayed for me and always treated me with kind words that uplifted my motivation. You all played a huge part in making me who I am today! This has been an incredible experience that I could not have done without everyone's support.

Last but not least, I want to thank me. I want to thank me for believing in me. I want to thank me for doing all this hard work. I want to thank me for never quitting.

To future readers who may use this work as part of their references: I have prepared this work as best I could. May it be of use to you and give you ideas for your writing. May our jihad in search of knowledge be blessed and accepted by the Almighty!

"*We are led by our gut instincts, our intuition, our desires and fears, our scars and our dreams. And you will screw it up sometimes.. hard things will happen to us. We will recover. We will learn from it. We will grow more resilient because of it*"

- Dr. Taylor Swift, 2022

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LIST OF ABBREVIATIONS

AID	Authority-Innovation Decision
AU	Actual Use
AVE	Average Variance Extracted
COVID-19	Coronavirus Disease 2019
CSE	Communication Self-Efficacy
CV	Convergent Validity
CR	Composite Reliability
CVI	Content Validity Index
DoI	Diffusion of Innovation
DV	Discriminant Validity
EFA	Exploratory Factor Analysis
ESD	Exploratory Sequential Design
f^2	Effect Size
GC	Google Classroom
HREC	Human Research Ethics Committee USM
HTMT	Heterotrait-Monotrait Ratio
i-CVI	Item Content Validity Index
K	Knowledge
KMO	Kaiser-Meyer-Olkin
KPI	Key Performance Index
KT6	*Kolej Tingkatan 6*
KV	*Kolej Vokasional*
MoE	Ministry Of Education
PEU	Perceived Ese of Use
PU	Perceived Usefulness

Q^2	Predictive Relevance
R^2	Total Effect Size
SBJK	*Sekolah Bimbingan Jalinan Kasih*
SBP	*Sekolah Berasrama Penuh*
s-CVI	Sample Content Validity Index
s-CVI/Ave	Sample Content Validity Index / Average
s-CVI/UA	Sample Content Validity Index / Universal Agreement
SEM	Structural Equation Modelling
SM Khas	*Sekolah Menengah Khas*
SM SABK	*Sekolah Menengah Agama Bantuan Kerajaan*
SmartPLS	Smart Partial Least Squares
SMJK	*Sekolah Menengah Jenis Kebangsaan*
SMK	*Sekolah Menengah Kebangsaan*
SMKA	*Sekolah Menengah Kebangsaan Agama*
SMT	*Sekolah Menengah Teknik*
SPSS	Statistical Package for Social Science
STDEV	Standard Deviation
TA	Technological Access
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TAM3	Technology Acceptance Model 3
TRA	Theory of Reasoned Action
TS	Technological Skills
UA	Universal Agreement
UNICEF	United Nations International Children's Emergency Fund
USM	Universiti Sains Malaysia
UTAUT	Unified Theory of Acceptance and Use of Technology

UTAUT2	Unified Theory of Acceptance and Use of Technology 2
UTAUT3	Unified Theory of Acceptance and Use of Technology 3
VB-SEM	Variance-Based Structural Equation Modelling
VIF	Variance Inflation Factor
VLE	Virtual Learning Environment
β	Regression Weight

KERANGKA PENGGUNAAN AMALAN PENGAJARAN DAN PEMBELAJARAN ATAS TALIAN DALAM KALANGAN GURU SEKOLAH MENENGAH: SATU LANJUTAN MODEL PENERIMAAN TEKNOLOGI (TAM)

ABSTRAK

Sering kali Model Penerimaan Teknologi (TAM) digunakan untuk menilai penerimaan teknologi, tetapi merupakan suatu cabaran untuk mempertahankan model yang konsisten dengan pelbagai pengguna sasaran, terutamanya dalam konteks amalan pengajaran dan pembelajaran dalam talian kerana pelaksanaannya bergantung pada persepsi guru. Kajian terdahulu mengenai TAM kebanyakanya memberi tumpuan kepada niat tingkah laku dan sikap yang tidak semestinya akan tertumpu kepada pelaksanaan sebenar. Selain itu, kajian mengenai amalan pengajaran dan pembelajaran dalam talian kebanyakannya dijalankan dalam institusi pendidikan tinggi dan bukannya sekolah menengah. Kajian ini bertujuan untuk meluaskan TAM terhadap amalan pengajaran dan pembelajaran dalam talian guru sekolah menengah. Satu Reka Bentuk Jujukan Jelajah (kaedah campuran ESD) telah digunakan untuk menjalankan kajian ini. Pengumpulan dan analisis data kualitatif telah mengenal pasti pengetahuan, kemahiran teknologi, akses teknologi dan efikasi kendiri komunikasi sebagai pemboleh ubah luar. Selain itu, teori Penyebaran Inovasi mencadangkan bahawa keputusan autoriti-inovasi adalah satu lagi pemboleh ubah luar yang boleh menguatkuasakan penerimagunaan amalan pengajaran dan pembelajaran dalam talian. Model yang dicadangkan kemudiannya dianalisis bagi bahagian kuantitatif. Data dikumpul melalui tinjauan dan dianalisis menggunakan SPSS ver. 25 dan SmartPLS

3.0. Seramai 377 orang guru dari tiga negeri di utara Malaysia telah dipilih untuk penyelidikan menggunakan persampelan rawak berlapik berkadaran. Hasil kajian menunjukkan semua pemboleh ubah yang dikaji berada pada tahap sederhana. Ini menunjukkan bahawa amalan pengajaran dan pembelajaran dalam talian telah berubah daripada tahap rendah ke tahap sederhana dalam beberapa tahun dan menjustifikasikan peningkatan penggunaan dan penerimaan kaedah pengajaran dan pembelajaran dalam talian di kalangan guru. Akses teknologi, pengetahuan dan kemahiran tidak mempengaruhi anggapan kebergunaan amalan pengajaran dan pembelajaran dalam talian. Akses teknologi tidak mempunyai pengaruh terhadap anggapan kemudahan penggunaan amalan pengajaran dan pembelajaran dalam talian. Pengaruh efikasi kendiri komunikasi dan keputusan autoriti-inovasi terhadap anggapan kebergunaan adalah sederhana. Anggapan kemudahan penggunaan yang mempunyai kesan yang besar terhadap anggapan kebergunaan, menunjukkan bahawa guru percaya amalan pengajaran dan pembelajaran dalam talian mudah digunakan yang seterusnya membawa kepada kepercayaan bahawa ia berguna untuk pedagogi mereka. Pengetahuan, kemahiran teknologi, efikasi kendiri komunikasi dan keputusan autoriti-inovasi secara sederhana mempengaruhi anggapan kemudahan penggunaan. Akhimya, model yang diperoleh kemudiannya didapati mempunyai kuasa ramalan yang sederhana dalam menentukan amalan pengajaran dan pembelajaran dalam talian guru. Oleh itu, kajian ini merumuskan bahawa TAM boleh diperluaskan ke dalam amalan pembelajaran dan pengajaran dalam talian, dan pemboleh ubah yang dikenal pasti boleh memberikan bukti empirik tentang persepsi guru terhadap amalan pengajaran dan pembelajaran dalam talian yang strategik. Ia juga menyumbang kepada pembangunan berterusan dan penghalusan TAM dalam domain yang lebih kontekstual.

THE FRAMEWORK ON THE USE OF ONLINE TEACHING AND LEARNING PRACTICES AMONG SECONDARY SCHOOL TEACHERS: AN EXTENSION OF TECHNOLOGY ACCEPTANCE MODEL (TAM)

ABSTRACT

Technology Acceptance Model (TAM) has been frequently used to evaluates technology acceptance, but it can be challenging to achieve a fixed model with multiple intended users, particularly in the context of online teaching and learning practice as the implementation depends on teachers' perceptions. Previous study on TAM mostly focused on behavioural intention and attitude which may not necessarily translate into actual implementation. Additionally, research on online teaching and learning practice has mostly conducted in higher education settings rather than secondary school settings. This research aimed to extent TAM on secondary school teachers' online teaching and learning practise. An Exploratory Sequential Design (ESD-mixed method) was used to conduct this research. The qualitative data collection and analysis identified knowledge, technological skills, technology access and communication self-efficacy as external variables. Additionally, the Diffusion of Innovation theory suggests that the authority-innovation decision is another external variable that may enforce the adoption of online teaching and learning practice. The proposed model was then analysed for the quantitative part. Data was collected through a survey and analysed using SPSS ver.25 and SmartPLS 3.0. 377 teachers from three states in northern Malaysia were selected for the research using proportional stratified random sampling. The results showed that all the variables studied were at a moderate level. This indicates that online teaching and learning practice has shifted

from low level to moderate level over the years and justified there has been an increase in the use and adoption of online teaching and learning practice among teachers. Technology access, knowledge and skills does not influence the perceived usefulness of online teaching and learning practises. Technological access has no influence on the perceived ease of use of online teaching and learning practises. The influences of communication self-efficacy and the authority-innovation decision on perceived usefulness were moderate. Perceived ease of use had large impact on perceived usefulness, indicating that teachers believed online teaching and learning practises were easy to use which subsequently led to the belief that they were useful for their pedagogy. Knowledge, technological skills, communication self-efficacy and the authority-innovation decision moderately influenced perceived ease of use. Finally, the obtained model was then be found able to have moderate predictive power in determining teachers' online teaching and learning practice. Hence, this research concluded that TAM can be extended into online teaching learning practices, and the identified variables can provide empirical evidence on teachers' perceptions for strategic online teaching and learning practice. It also contributes to the ongoing development and refinement of TAM into more contextual domain.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Online teaching and learning practice entails creating new opportunities to expand learnings so that the students are not confined to physical classroom teaching only, since it could be conducted in borderless areas as internet allows the world to operate without borders, numerous online class sessions are now available over the internet, such as distance learning programmes and online tuitions (Al-Khresheh, 2022). Taking advantage of that, technology conglomerate, for example Apple Incorporated, has broadened its division into education via Apple Education and Google Incorporation with Google for Education to evolve its education applications (app), tools, training, and resources (Apple Inc., 2019; Google, 2021). Thus, it is a waste if the full potential of online education is not harvested. Online teaching and learning practice can be conducted either in synchronous (same time), asynchronous (time delayed) mode or by implementing both modes (Tania, Abdullah, Ahmad, & Sahmin, 2022). The asynchronous mode offers independent learning mechanism where teachers provide the materials that allow the students to access the teaching content conveniently at any time using tools such as Google Classroom (LMS) (Rasmitadila et al., 2020). Meanwhile, synchronous learning, such as video conferencing, allows teachers and students to implement the process of teaching and learning in a real-time situation (Rasmitadila et al., 2020).

Needless to say, a lot of factors may affect the implementation of online teaching and learning practice scenario. Moreover, the decision to adopt a particular technology such as online teaching and learning practice is influenced by those who

have a say. Hence, Malaysian teachers' unprecedented full online teaching and learning practice experience during schools' closure is a crucial opportunity that could be exploited for the purpose of finding the factors that influence teachers' actual use of online teaching and learning practice.

1.2 Background of Study

In Malaysia, efforts have been made to develop an educational technology approach such as online teaching and learning practice that caters to the needs and requirements of secondary school teachers (Ahmad et al., 2022; Chua & Bong, 2022; Ismail et al., 2022). Online teaching and learning practices among secondary school teachers have been varied and diverse. Many used video conferencing tools, such as Zoom and Google Meet to hold virtual class (Izhar et al., 2021) used learning management systems such as Google Classroom (Saleh et al., 2022) and social media to distribute assignments, provide feedback and communicate with students. Nevertheless, previous research has identified a range of challenges faced by secondary school teachers in Malaysia in integrating online teaching and learning practices (Chua & Bong, 2022; Saleh & Aziz, 2013; Ahmad et al., 2022; Ismail et al., 2022). Hence, there is a need for research to be conducted on secondary school teachers to identify their variables in the actual use of online teaching and learning practice. In the context of this research, secondary school teachers were referred as teachers. In addition, according to Saleh et al. (2022), Technology Acceptance Model (TAM) is an effective model for analysing the use of online teaching and learning practice among secondary school teachers as it can be useful in understanding an identify the variables that influence teachers' acceptance on online teaching and learning practice.

The Technology Acceptance Model (TAM) was developed by Davis et al. (1989) to predict individual acceptance of technology and has been continuously used in studies on acceptance and use of online teaching and learning practice. Technology is an innovation that can be in the form of hardware, software, ideas or practices (Rogers, 1983). It is a set of innovative practices that use digital tools, platforms and communication channels to facilitate teaching and learning in an online environment (Matthew et al., 2018). The concept of online teaching and learning practice as a form of technology has been found in several research (Hofer, 2021; Carillo & Flores, 2020). For example, Carillo and Flores (2020) identified online teaching and learning practices as a type of educational technology that can improve engagement and motivation. Similarly, Hofer (2021) examined the relationship between technology integration and teacher beliefs and found that online teaching and learning practice was considered a type of educational technology by the participating teachers. Hence, in the context of this research, technology refers to online teaching and learning practices, which teachers can used multitude of digital tools, platforms, communication channels to facilitate the delivery of educational content and interaction between teachers and students in an online environment.

TAM posits that teachers' acceptance of online teaching and learning practices is influenced by their perceived usefulness and perceived ease of use. The TAM model allows investigating external variables in addition to perceived usefulness and perceived ease of use and can predict the variables that influence the acceptance of online teaching and learning practices (Antoniettie, Cattaneo, & Amenduni, 2022; Li, 2022). However, attitude and behavioural intention, which are the significant determinants of technology acceptance, may not provide a more direct measure of teachers' actual behaviour in the online teaching and learning practice (Alsanad &

Alghandi, 2019; Zavala-Rojas, Ayala-Garcia & Raminez-Montaya, 2019; Tran, Truong & Nyuyen, 2019; Abushaikha & Zahran, 2019). Therefore, in the context of this research, excluding attitude and behavioural intention and studying actual use allows for a more comprehensive understanding of the variables that are significant to the online teaching and learning practices. This approach provides more direct and objective measures of teachers' online teaching and learning practice (Davis, 1989).

According to Davis et al. (1989) Technology Acceptance Model (TAM) predict the factors of individual acceptance of technology was based on the usefulness and ease of use. Perceived usefulness (PU) refers to the extent to which teachers believe that using online teaching and learning practice will improve their teaching and enhance learning experience while, perceived ease of use (PEU) refers to the degree to which teachers believe that using technology in their teaching will be easy and require minimal effort on their part. Teachers are more likely to adopt and integrate technology into their teaching practices if they perceived it as useful and easy to use (Awang et al., 2018). Therefore, it is important to consider these variables in online teaching and learning practice as they can significantly impact the success and effectiveness of such practice (Tania et al., 2022)

According to Rogers (2003) in Diffusion of Innovation theory, the source of the decision influences the actual use of the online teaching and learning practice. In the context of online teaching and learning practices, the authority-innovation decision (AID) is hypothesized to impact the actual use based on direct approach and also through usefulness and ease of use. However, there is a lack of empirical literature on the topic (Table 1.1) (Flanagan & todd-Mancillas, 1982; Givson et al., 1998; Irawan, Foster, & Tanner, 2018; Vejlgaard 2018; Birgili & Demir, 2022). The AID assumes

that the implementation of online teaching and learning practice is highly empowered by those who have decision making authority (Birgili & Demir, 2022; Irawan, Foster, & Tanner, 2018; Flanagan, & Todd-Mancillas 1982). For example, in centralized education in Malaysia, the Ministry of Education has the authority to mandate the use of online teaching and learning practices. integrating the authority-innovation decision into TAM enables a more consistent prediction of actual use of online teaching and learning practices among teachers (Al-Rahmi et al., 2019)

Table 1.1

Results of Authority-Innovation Decision based on Scopus Database

Authors	Title	Education	
		Yes	No
Flanagan, A.M., and Todd-Mancillas, W.R. (1982)	Teaching inclusive generic pronoun usage: The effectiveness of an authority-innovation decision approach versus an optional innovation-decision approach	/	
Givson, E., Fleming, N., Fleming, D., Culhane, J., Hauck, F., Janiero, M., and Spitzer, A. (1998)	Sudden Infant Death Syndrome Rates Subsequent to the American Academy of Pediatrics Supine Sleep Position		/
Imelda, K. M., David, G., Janine, T., and Peter, F. M., (2014)	Evaluation of an authority-innovation decision: Brief alcohol intervention for pregnant women receiving women, infants, and children services at two Illinois health department		/
Irawan, S., Foster, S., and Tanner. K. (2018)	The mandated adoption and implementation of an academic information system: Empirical evidence from an Indonesian University	/	
Vejlgaard, H. (2018)	Rate of adoption determinants of innovations: A case study of digital terrestrial television		/
Birgili, B., and Demir, Ö. (2022)	An explanatory sequential mixed-method research on the full-scale implementation of flipped learning in the first years of the world's first fully flipped university: Departmental differences	/	

In addition, teachers' online teaching and learning practice influences by several variables such as technological skills that related to teachers' technical skills to navigate the online teaching and learning practices, technological access,

knowledge, and confidence in communicating online (Martin et al., 2019; Izhar et al., 2021). These requirements are crucial because online teaching and learning practices require teachers to adopt a different approach than they used with traditional face-to-face teaching (Ally, 2019). Hence, it can be concluded that there are many criteria that contribute to teachers online teaching and learning practice (Martin et al., 2019).

Online teaching and learning practices require teachers who possess the necessary skills and knowledge to deliver effective lessons, creating engaging content using available online tools, and use any available learning management platform and/or social media to connect with students (Beach & Beach, 2018; Sangeeta & Tandon, 2020; Carillo & Flores, 2020; Dhawan, 2020). While teachers may already have subject area expertise, they need to learn how to use the online teaching and learning practices (Tseng & Yeh, 2019). Teacher training programs and resources from the Ministry of Education are also helpful for teachers to learn about specific online tools in online teaching and learning practice such as Google Classroom that can aid them in creating digital content, managing student assignments, and tracking student progress (Wannapiroon et al., 2022; Ministry of Education, 2020e; Google for Education, 2020).

Access to technology, including devices and a stable internet connection, is crucial for effective online teaching and learning practices (Dhawan, 2020; Hoq, 2020; Dau. 2022). Tablets and smartphones have features that make them ideal for online teaching and learning practices, with the ability for viewing documents and accessing applications and websites (Hoq, 2020). A stable internet connection is essential for clear video and audio transmission, especially during video conferencing (Dau, 2022).

Communication self-efficacy, the confidence in communicating via video and/or audio is also a significant variable in online teaching and learning practices. teachers who have confidence in their ability to communicate effectively online are more likely to deliver their lessons effectively (Wei & Chou, 2020; Lapitan et al., 2021). Conversely, teachers who lack confidence in their ability to communicate online may struggle to deliver their lessons effectively.

Thus, teachers' knowledge, technological skills, technological access, communication self-efficacy of online teaching and learning practice, the decision-making, and the usefulness and ease of online teaching and learning influence teachers' actual use of online teaching and learning practises were further studied in this research.

1.3 Problem Statements

It is often difficult to achieve the goal focusing on one fixed theory when there are many intended users (Mohamad et al., 2021). Technology Acceptance Model (TAM) also has its limitation if it does not further extent to the intended users with teachers being the focus in the context of this research. While most of the TAM's previously conducted research centred on technology in education with the emphasis on the intention, (Kumar & Bervell, 2019; Al-Rahmi et al., 2019) and attitude (Mohamad et al., 2021) which not necessarily translated into actual use. Previous data shows that 56% of secondary school teachers are intentionally willing to adopt online teaching and learning practices but rarely actual implement in their teaching (Awang et al., 2018). Thus, it is perceptible that there are some factors that influence their actual use of online teaching and learning practices (Montoya & Barbosa, 2020; Trust, 2016). Besides, the implementation of online teaching and learning practices

particularly in secondary school setting is still in its infancy and many things about it are not well-known (Badia et al., 2019; Al-Furaydi, 2013). Chou and Chou (2021) highlighted that the online teaching and learning practice is not commonly implemented in secondary schools and most studies on online teaching and learning practices have focused on higher education settings. Hence it echoes that there is limited research on the actual use of these practices by secondary school teachers. There are several issues related to online teaching and learning practices face by secondary school teachers, such as lack of skills (Saleh & Aziz, 2013; Ahmad et al., 2022), knowledge (Saleh & Aziz, 2013) and limited access to technology and resources (Chua & Bong, 2022). Therefore, it is important to address the online teaching and learning practice among secondary school teachers to provide a quality education to students. Ergo, this research does not concern secondary teachers' perceptions of online teaching and learning practices, but rather their perceptions of the use of online teaching and learning practices in their professional affairs prior to actual use.

Scherer et al. (2019) found that perceived usefulness (PU) and perceived ease of use (PEU), of online teaching and learning practices vary significantly across several studies, and this may affect the actual use of these practices by teachers. Awang et al. (2018) found that teachers' perceived use of online teaching and learning practices learning is useful, only minority of them at 0.57% to 4.69% of teachers in Malaysia actually used it. Some of the teachers believe that online teaching and learning practices does not contribute to the usefulness for their teaching process and opted for traditional teaching practices (Ramli & Saleh, 2019). This suggests that teachers' perceptions of the usefulness of online teaching and learning practices may not always align with their actual use. Mohamad et al. (2021) found that the actual use

of online teaching and learning practices can be improved with perceived usefulness. The discrepancies in findings led to the need to analyse the perceived usefulness of online teaching and learning practices on it actual use.

Additionally, regarding the perceived ease of use (PEU), teachers perceived the online teaching and learning practices as hard to manage (Awang et al., 2020). It consumes too much time in preparing the teaching materials, and lesson plan especially if they have more than one classes to attend for the day (Adi Badiozaman et al., 2022; Kaur & Hussein, 2015). Besides, due to the internet connectivity, some lessons need to be pre-recorded which requires teachers to edit all the process which makes online teaching and learning practices difficult to manage (Dau, 2022). Teachers, due to the long use of direct approach teaching classes, are usually not very up to date with technologies and especially when it comes to teaching and learning practices as it will be hard for them to change their teaching paradigm due to them being in their comfort zone with their current system of teaching (Awang et al., 2018). This shows that even they are ready to set it into practice, and are in fact, complicated, and teachers will feel reluctant to conduct online teaching and learning practices (Taherdoost, 2018; Scherer et al., 2019).

The study conducted by Izhar et al. (2021) found that prior to conducting online teaching and learning practices, 114 teachers reported challenges in areas such as technological skills, knowledge, technology access and communication self-efficacy (Table 1.2). The highest occurrence of challenges reported by teachers was related to technological skills followed by knowledge, technology access and communication self-efficacy. In the During phase of online teaching and learning practice, Izhar et al. (2022) revealed that, technology access was identified as the most prominent challenge

by 116 respondents, followed by technological skills and communication self-efficacy, with knowledge being identified as the least challenging. In the Post-phase of online teaching and learning practices, 53 respondents identified knowledge as the most significant challenge, followed by communication self-efficacy and technological access (Table 1.2). Overall, four major variables emerged in all the three phases of online teaching and learning practices with technology access, knowledge, technological skills and communication self-efficacy being the key areas of concern for secondary school teachers. These variables were then used as external variables in the context of this research (Table 1.2).

Table 1.2

Introduced Variables in Online Teaching and Learning Practices based on Need Analysis

Element	Example of excerpts	Number of occurrences				Grand total ($\frac{\#\ of\ occurance}{total\ occurance}$ x 100)
		Pre (A)	During (B)	Post (C)	Total (A+B+C)	
Technological access	"*Internet tidak stabil (lemah)*" Translation: "*Unstable internet connection (poor internet)*"	36	85	7	128	40%
Knowledge	"*Delivering content knowledge is the hardest part. Students tend to not read before class. Even when I've told them to read. Lecture on teams meeting not a good way.* "	38	7	23	68	21%
Technological skills	"*Tak mahir menggunakan Google classroom*" Translation: "*Not proficient in using Google Classroom*"	60	8	0	68	21%
Communication self-efficacy	"*Hard to expressing my thoughts in writing and sometimes I'm used voice note to deliver my voice tone to students*".	35	8	16	59	18%

In online teaching and learning practices, teachers with limited knowledge are more likely to use online teaching and learning practices as an additional purpose and communication tools (Khalid & Abdul Karim, 2018). This may due to previously, online teaching and learning practices are used as teaching aids and not as main pedagogy for lesson delivery (Awang et al., 2020). This means that the knowledge required for online teaching and learning practice is distinct from offline teaching. Noh et al. (2019) found that teachers have high knowledge but moderate technological skills, so they are not prepared to use online teaching and learning practices. The need analysis found that knowledge contributes to 21% of the challenges among teachers in online teaching and learning practices as some teachers mentioned that "*Delivering content knowledge is the hardest part. Students tend to not read before class. Even when I've told them to read. Lecture on teams meeting not a good way,*" (Table 1.2). Izhar et al. (2021) and Izhar et al. (2022) revealed that knowledge was one of the challenging issues facing by teachers in online teaching and learning practices. The physical interaction with the students in delivering the lesson, and online teaching and learning practices requires the same focus and energy as teaching individually, but with a greater amount of effort to accommodate for possible variable nature of the learning environment that requires different variations of knowledge (Jordan et al., 2021). Moreover, even with the knowledge, without appropriate technological skills, the online teaching and learning practice could prove detrimental (Bingimlas, 2009; Mishra & Koehler, 2006).

Seldomly implement online teaching and learning practices reflected the limited skills possessed by teachers (Kaur & Hussein, 2015; Rasheed et al., 2020). Technological skills were one of the challenging issues facing by teachers in initiating (Izhar et al., 2021) and during conducting (Izhar et al., 2022) online teaching and

learning practices, The lack of skills might be due to teachers' use of online tools for social communication frequently than it is for academic purposes (Siew et al., 2016). Ramli and Saleh (2019) revealed that the lack of technological skills led to teachers being unable to use online teaching and learning practices. The need analysis in the context of this research has found that technological skills contribute to 21% of challenges in online teaching and learning practices with some teachers reported as "*not proficient in using Google Classroom*," (Table 1.2). Thus, it leads to teachers having a lack of experience in conducting and operating online teaching and learning practices (Adi Badiozaman et al, 2022; König, Jäger-Biela, & Glutsch, 2020).

Subsequently, in an area with none to low internet connectivity makes it hard for the teachers to reach out to their students for the online class sessions (Adi Badiozaman et al., 2022). Izhar et al. (2021) and Izhar et al. (2022) highlighted that technological access contributed for 40% (Table 1.2) of the challenges facing by teachers in online teaching and learning practices. The availability of technological access shaped the actual use of online teaching and learning practices as without a proper access, the online teaching and learning practices could not be conducted (UNESCO, 2020b; Reimers & Schleicher, 2020; Zhang et al., 2020). For example, Ramli and Saleh (2019) has found that slow and unstable internet connection makes online class hard to conduct. Furthermore, Adi Badiozaman et al. (2022) revealed that 46% of the challenges in online teaching and learning practices were contributed by internet connection. Similarly, because online teaching and learning practices took place in Internet, the access to the technology such as the connection and devices are detrimental factors that shape the actual online teaching and learning practices (Mateus et al., 2022; Arthur-Nyarko et al., 2020).

Additionally, in teaching virtually, teachers need to be confident in using the practices (Ramli & Saleh, 2019). One of the most important but least visible features of online teaching and learning practices is how teachers' self-efficacy in communicating virtually using the video and verbal audio can influence whether or not they will teach online (Martin et al., 2019; Kebritchi et al., 2017). Communication self-efficacy such as giving instruction is hard for teachers as they felt it hard for them in expressing themselves in virtual environment (Izhar et al., 2021). A poor confidence in communication self-efficacy may cause mismatched information between teachers and students and it will be detrimental if it is related to the lesson content (Jordan et al., 2021). Communication self-efficacy contributes to 18% of challenges among teachers in online teaching and learning practices with some of the teacher reported that, "*hard to expressing my thoughts in writing and sometimes I'm use voice note to deliver my voice tone to students*," (Table 1.2).

Other point to consider is that the Ministry of Education's as the factor of authority-innovation decision to implement online teaching and learning practices (Ministry of Education, 2020c; Ministry of Education, 2020f) leaves teachers with no choice but to do so to ensure the continuation of teaching (Ng, 2020; Birgili & Demir, 2022). Moreover, less attention with only six studies that used authority-innovation decision since 1982 until 2022 using the keyword search in the Scopus database. Although the Diffusion of Innovation (DoI) suggests that the authority-innovation decision plays an important role in the implementation of such practises, Birgili and Demir (2022), found that it leads to slow adoption of online teaching and learning practices, which contradicts the theory assumption that the authority-innovation decision can accelerate adoption.

1.4 Research Objectives

The development of this research objectives was based on implementation of online teaching and learning practices. The components of Technology Acceptance Model (TAM) are perceived usefulness, perceived ease of use, and actual use. Diffusion of Innovations (DoI) consist of authority-innovation decision. While the introduced variables are knowledge, technological skills, technological access, and communication self-efficacy.

1. To investigate the level of secondary school teachers online teaching and learning practices based on
    i. Perceived usefulness, perceived ease of use, and actual use
    ii. Authority-innovation decision
    iii. Knowledge, technological skills, technological access, and communication self-efficacy.

2. To extent Technology Acceptance Model on secondary school teachers' online teaching and learning practices:
    i. To examine the relationship between perceived usefulness and perceived ease of use with secondary school teachers' actual use in online teaching and learning practices.
    ii. To examine the relationship between authority-innovation decision with secondary school teachers' actual use in online teaching and learning practices.
    iii. To examine the relationship between knowledge, technological skills, technological access, communication self-efficacy and authority-innovation decision of online teaching and learning practices conducted

by secondary school teachers with perceived usefulness and perceived ease of use.

1.5 Research Questions

1. What is the level of secondary school teachers online teaching and learning practices based on:
    i. Perceived Usefulness, perceived ease of ese, and actual use?
    ii. Authority-innovation decision?
    iii. Knowledge, technological skills, technological access, and communication self-efficacy?

2. What is the extended Technology Acceptance Model of secondary school teachers' online teaching and learning practices based on:
    i. What are the relationships between perceived usefulness and perceived ease of use with secondary school teachers' actual usage in online teaching and learning practices?
    ii. What are the relationships between authority-innovation decision with secondary school teachers' actual use in online teaching and learning practices?
    iii. What is the relationship between knowledge, technological skills, technological access, communication self-efficacy, and authority-innovation decision of online teaching and learning practices conducted by secondary school teachers with perceived usefulness and perceived ease of use?

1.6 Research Significances

Digital technologies such as computers, smart phones, and tablets help teachers in several ways when it comes to classroom management, lesson planning and conducting face-to-face meetings with parents and other stakeholders (Martin & Budhrani, 2008). Despite this trend in online teaching and learning practices becoming a popular trend, there is still much room for improvement when it comes to the support provided to schools in Malaysia. This research will provide a platform for teachers exposed to online teaching and learning practices to share their views and experiences, which can be used as a tool for encouraging and facilitating the development of policies and the provision of support that will support teachers in implementing their online teaching and learning practices strategies and activities.

From a theoretical perspective, this research integrated two different theories (Technology Acceptance Model and Diffusion of Innovation) and introduced new variables to extent Technology Acceptance Model to explain the actual use of online teaching and learning practices among secondary school teachers. In particular, the integration of Diffusion of Innovation and newly founded variables in Technology Acceptance Model offers the possibility to extend Technology Acceptance Model in the school setting. To strengthen the extension of Technology Acceptance Model, the newly founded variables, which are introduced in this research based on the need analysis, are revolved on real scenarios faced by teachers which further discuss in Chapter 2.

The tool (questionnaire) developed could be used by teachers or administrators to find out what factors they lack to prepare for a better online teaching and learning practices for them. It could also be used to create a professional development

opportunity that increases the likelihood of actual use of technology such as online teaching and learning practices. Research by Hoq (2020) highlighted that appropriate training and workshops are needed to make online teaching and learning practice more effective and efficient. Therefore, the findings of this research support content publishers and online service providers to produce high-quality materials that could improve the quality of online teaching and learning practices.

Moreover, the task of preparing teachers for the scenario of online teaching and learning practices will be easier and more successful if it is based on research findings that examine the factors that influenced online teaching and learning practice during its full implementation. This research would thus be the starting point as it is based on the real-life practise of fully online teaching and learning practices at the Malaysian secondary school level, a novel experience that occurred during the physical school closure scenario. The first exploratory phase of this research seeks out on the factors to use online teaching and learning practices among secondary school teachers. The findings from the overall data are valuable for teachers, stakeholders and researchers in this area. The findings can be used as a reference for school management and education policy makers who wish to oversee and support the implementation of online teaching and learning practices in schools. For teachers, the findings can serve as a reference for further research on their readiness towards actual implementation of online teaching and learning practices systems in their schools.

Therefore, the extended theory should provide stakeholders such as the government, state and district education department and school administrators with a better knowledge of actual use in online teaching and learning practices among secondary school teachers.

1.7 Research Limitations

Despite the fact that the Malaysian education system is uniform, there are differences across the country in different cultures, government administration, race and type of school. Secondary schools in Malaysia include government-funded schools, vernacular Chinese and Indian schools, hostels, privately funded institutions, and religious schools (both national and private). This research focused exclusively on teachers in national secondary schools limited to government-funded day schools. Therefore, the findings would not represent secondary residential schools, sports schools, religious secondary schools, vocational schools, private institutions, and other educational institutions.

In addition, the data collected for this research is only from three states in the northern part of West Malaysia, namely Pulau Pinang, Kedah and Perlis. Therefore, generalisation would not represent all national secondary school teachers in Malaysia. There is also constraint that the researcher must consider as data collection were conducted during the restricted movement period that limits the movement of researchers and samples across the country. Moreover, in view of the easy spread of COVID -19 disease, it is not possible for the researcher to meet the samples face to face. Therefore, using online platform to conducted survey overcome the space and time constraints that exist in physical survey. Moreover, the factors used in the research was based on the situation of sudden physical school closure, which different scenarios may offer different factors.

1.8 Operational Definitions

1.8.1 Online Teaching and Learning Practices

Online teaching and learning practices refers to the education that takes place over the internet (Matthew et al., 2018). In the context of this research, online teaching and learning practices refers to the pedagogy of teaching and learning practice of using multitude of digital tools, platforms, communication channels to facilitate the delivery of educational content and interaction between teachers and students in an online environment by the secondary school teachers.

1.8.2 Actual Use

Actual use which according to Davis (1989) is the behaviour of actual system use. In the context of this research, actual use refers to actual use of online teaching and learning practices by the secondary school teachers

1.8.3 Perceived Usefulness

The degree "to which a person believes that using a particular system would enhance his or her productivity" (Davis, 1989). In the context of this research, perceived usefulness refers to how teachers perceived that using online teaching and learning practices is beneficial for the practice of teaching and learning.

1.8.4 Perceived Ease of Use

The degree "to which a person believes that using a particular system would be free of effort" (Davis, 1989). In the context of this research perceived ease of use refers to teachers perceived online teaching and learning practices is easy to be use for the teaching and learning.

1.8.5 Authority-Innovation Decision

"Choices to adopt or reject an innovation that is made by a relatively few individuals in a system who possess power, status, or technical expertise" (Rogers, 1983). In the context of this research, the authority-innovation decision is the belief of teacher that the decision to practice online teaching and learning determined by the authority in education which is the Ministry of Education (MoE) and school administration.

1.8.6 Technological Access

Technological access is one's opportunity to access the technology (Zhang et al., 2020). In the context of this research, technological access refers to teachers' belief on their opportunity to the access of devices and internet connection including it stability and capacity to conduct online teaching and learning practices.

1.8.7 Knowledge

Knowledge is declarative (knowing what) and procedural (knowing how) (Mishra & Koehler, 2006). In the context of this research, knowledge refers to how teacher perceived their knowledge in online teaching and learning practices, look for teaching materials, access students' learning, and utilise available online resources for the said purposes.

1.8.8 Technological Skills

Technological skills is the essential skills in using online teaching and learning practices for a teacher (Martin et al., 2019). In the context of this research, technological skills are how teachers perceived on their basic technical skills such as

using devices (computer/laptop/smartphones), the web browser, basic software (Microsoft Word and PowerPoint), and online classroom management for online teaching and learning practices.

1.8.9 Communication Self-Efficacy

Communication self-efficacy is an individual's confidence in their ability and assessment in communicating and completing a task successfully online (Hung, 2016; Martin et al., 2019). In the context of this research, communication self-efficacy is how teachers perceived their confidence on their ability in communicating, expressing themselves in words, voice and videos, and their comfortability in doing so in online teaching and learning practices.

1.8.10 Secondary School

It is the Malaysian public education institution for students at the age of thirteen (Form 1) to seventeen (Form 5). There are few types governmental secondary school in Malaysia secondary schools such as Government Assisted Religious School (*Sekolah Menengah Agama Bantuan Kerajaan, SM SABK*), national religious secondary school (*Sekolah Menengah Kebangsaan Agama, SMKA*), vernacular schools (*Sekolah Menengah Jenis Kebangsaan, SMJK*), Malaysian sports schools (*Sekolah Sukan*), State sports schools (*Sekolah Sukan Negeri*) Malaysian arts schools (*Sekolah Seni*) national secondary school (*Sekolah Menengah Kebangsaan, SMK*), and fully residential school (*Sekolah Berasrama Penuh*) that spread to different geographical area such as urban, suburb and rural (Ministry of Education Malaysia (MoE), 2021). In the context of this research, secondary school is referred to national secondary school (SMK) that located in urban area.

1.9 Summary

In conclusion, this chapter discusses the introduction, background of the research, problem statement, aim, research objectives, research questions, significance of the research, the limitations, and the operational definition. The needs analysis has found four variables namely knowledge, technological skills, technological access, and communication self-efficacy as newly introduced factors and subsequently used in this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Technology integration is the process of integrating the use of new technologies into existing education practices (Ni et al., 2019). It is a way to create interactive teaching environments for teachers, using an increasingly diverse range of communication and information technologies (e.g., digital communication systems, computer networks). Online teaching and learning practice are one such way that enhance and expand the practice of teaching and learning within a classroom setting (Ebrahimi & Yeo, 2018). As educators, teachers are using online teaching and learning practice to disseminate learning content to students. The adoption of online teaching and learning practices by teachers is influenced by several external factors, including authority-innovation decisions from the Diffusion of Innovation theory. Authority-innovation decision were referred to the decision of adopting or rejecting technology was influenced by the who have says. Besides, through a need analysis, it has been found that knowledge, technological access, technological skills, and communication-self efficacy are the potential external variables that can predict teachers' actual use of online teaching and learning practices (Izhar et al., 2022). These factors align with the Technology Acceptance Model (TAM), which highlights that external variables determine the perceived usefulness and perceived ease of use, and these two variables then determine its actual use of online teaching and learning practices.

2.2 Online Teaching and Learning Practices

Online teaching and learning practices has become a buzzword in education, particularly during the situation of school closure due to the outbreak of COVID-19 (Torrau, 2020). During this period, using technology for learning is a prominent trend in online education. According to research by Martin et al. (2019), online teaching and learning practices uses the internet as a medium to deliver information and interact with students. The change in the implementation of technology to enhance and expand the practice of teaching and learning has been carried out gradually over the past years to promote the usage of technology for a better teaching-learning process (Education Performance and Delivery Unit (PADU), 2013).

Online courses boast countless benefits over traditional face-to-face courses. This is especially true for those who face challenges such as accessibility and affordability of education (Dhawan, 2020; Zhang et al., 2020 ;Hoq, 2020). There are no geographical boundaries to limit where a student can study, and they can even log in from different locations during the day (Rapanta et al., 2020). Traditional classes requires that students arrive at a specific place at a certain time, which may be difficult for some students who need flexibility in their schedules (Rejón-Guardia, Polo-Peña, & Maraver-Tarifa, 2019) (Kumar & Bervell, 2019). However, observing this mode of pedagogy from teachers' perspectives, online teaching and learning practices method can be used by teachers to deliver information to students anytime and anywhere without geographical boundaries. Therefore, it is one of the most effective ways of delivering quality education to needy students (Badia et al., 2019).