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Investigation into the factors affecting learners' acceptance of online learning using TAM in the post-COVID era in Singapore

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"The more I learn, the less I know"

Jeffrey Rasley

First and foremost, I would like to begin my acknowledgement by sharing the quote that sowed the seed for my dissertation journey. "The more I learn, the less I know" reflects my mental disposition and it is the idea that as I learn more, I became more aware of how much I still do not know. My dissertation journey would not have been possible without the guidance, support, and love from some of the most important people in my life. First up, my dissertation supervisor, Dr Aditi Ghosh, for your guidance, feedback, and unwavering support. More importantly, thank you for answering my text messages and replying to my e-mails during the wee hours of the night. To my wife, Stephanie, who has been busy taking care of our lovely children, Jade and Jake, while I worked tirelessly on my dissertation. I am eternally grateful for your understanding and encouragement throughout this journey.

ABSTRACT

The unprecedented outbreak of COVID-19 left many countries unprepared, leading to significant global chaos and uncertainty, including Singapore. Many industries, including the training and adult education sectors, suffered significant fluctuations especially in the day-to-day routine in business. As for the education industry, with the introduction of governmental regulations such as physical distancing and reduced indoor gatherings, the paradigm shifts from in-person learning to online learning has emerged as the new norm. The lack of empirical studies conducted in Singapore's context forms the bedrock for this study. A correlational research design is employed to establish the prevalence of relationships among the variables, and to investigate the learners' acceptance of online learning in the education setting. The questionnaire comprised of basic demographic information and the constructs of Technology Acceptance Model, labelled with a five-point rating scale (strongly disagree to strongly agree), were disseminated through Qualtrics XM to the 130 participants. Structured Equation Modelling techniques were employed using Smart-PLS version 4 to assess the measurements and structural models during data analysis phase. The conceptual model achieved constructs' validity and reliability for structural model analysis. Three out of the five hypotheses were accepted, particularly the construct of perceived ease of use on perceived usefulness in using online learning (H1), and the perceived usefulness on both learners' attitude towards online learning (H3) and behavioral intention to use online learning (H4).

Keywords: Online learning, COVID-19, structured equation modelling, technology acceptance model

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LIST OF ABBREVIATIONS

ATU	Attitude Toward Use
AVE	Average Variance Extracted
BI	Behavioral Intention
CA	Cronbach Alpha
COVID-19	Coronavirus disease 2019
CR	Composite Reliability
ERIC	Educational Resource Information Center
HTMT	Heterotrait-Monotrait
IRB	Institutional Review Board
PEOU	Perceived Ease of Use
PLS	Partial Least Square
PRIMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PU	Perceived Usefulness
SEM	Structured Equation Modelling
SSRN	Social Science Research Network
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
VIF	Variance Inflation Factor

CHAPTER ONE: INTRODUCTION

Introduction

The unprecedented outbreak of COVID-19 left many countries unprepared, leading to significant global chaos and uncertainty. Many industries, including the training and adult education sectors, suffered significant fluctuations especially in the day-to-day routine in business. Companies are encouraged to pivot towards a new mode of working, by equipping employees to work from home. This phenomenon contributes to the surge in demand for the adoption of these appropriate technologies (Sepasgozar et al., 2020). The pervasiveness of remote working varied across occupations and industries. As for the training and adult education sector, with the introduction of governmental regulations, e.g., physical distancing and reduced indoor gatherings, the paradigm shifts from in-person learning to online learning has emerged as the new norm. The proliferation of online learning took off in many countries such as United States, China etc., whereby in-person classes were either cancelled or shifted to online learning in compliance with government's regulations (Smalley, 2020; Yuan, 2020).

Background

Moore et al. (2011) defined online learning as "the access to learning experience via the use of technology". Online learning can also be defined as distance learning where learners and lecturers are not situated in the same location despite the continued interaction using the internet (Bartley & Golek, 2004). In recent years, scholars such as Usher and Barak (2020) and Huang (2019) expanded the definition to "a learning environment that uses the Internet and other technological devices and tools for synchronous and asynchronous instructional delivery and management of academic programs. The common synonyms associated with online learning are

e-learning, computer-assisted learning, web-based learning, and virtual learning (Moore et al., 2011; Singh & Thurman, 2019). The construct of online learning remains elusive due to the overlapping definition with other synonyms such as distance learning (Ally, 2004; Park & Choi, 2009; Perry & Pilati, 2011). Despite the slight differences, the commonality between online learning and e-learning remains the use of the internet as a medium for interaction between learners and lecturers (Moore et al., 2011). The key differences between the two terms lies with the learners' autonomy and the interaction with the learning platform. For e-learning, learners are empowered to access the learning platform independently and asynchronously. On the contrary, online learning requires the learners to interact with the lecturer via the learning platform synchronously. For this study, the term online learning will be adopted to investigate the factors affecting learners' acceptance of online learning.

The unprecedented COVID-19 pandemic inadvertently accelerated the push for full online learning and the complete transition from all in-person learning to online learning. This unprecedented shift has led to profound changes to learning as we know it. Naturally, there are challenges brought forth by this unprecedented shift which are confronting both learners and lecturers alike. One of such challenges is the technical difficulties, i.e., limited internet access, coverage and internet speed, that disrupted the online classes. Landrum (2020) further posits that having a well-equipped technology infrastructure is sine qua non for the conduct of online learning. Learners' ability to perform during online classes and their perceived usefulness of online learning is also enhanced by the technology infrastructure. Suryaman et al. (2020) echoed similar sentiments whereby students were faced with many obstacles in a home learning environment during the pandemic. The lack of ability in the use of technology, expensive internet cost, limited socialization between and among learners and lecturers are some of the

obstacles confronting learners. In a similar study by Kapasia et al. (2020), the findings are largely coherent to the earlier studies highlighting the emotional state of learners, instability of internet service, and unfavorable home learning environment, accentuating the effects of learners from remote areas being marginalized.

Problem Statement

The COVID-19 pandemic unleashed unprecedented global chaos and uncertainty, deeply impacting society and the training and adult education sector. The suspension of in-person classes across all the educational institutions facilitates the proliferation of online learning as a means for instructional delivery and management. While there are numerous studies that focus on the online learning challenges that learners experience during the pandemic in many different countries, there is a lack of studies that is anchored on Singapore's context. Henceforth, this study attempts to investigate the factors affecting the learners' acceptance of online learning using Technology Acceptance Model (TAM) as the theoretical basis for this research.

Objective of Study

This study aims to establish the statistical relationship of the independent variables, namely PEOU and PU, towards the dependent variable, namely BI with ATU as the mediating variable. It is achieved by examining the four variables of TAM: perceived ease of use (PEOU), perceived usefulness (PU), perceived attitude towards use (ATU), and behavioral intention (BI).

Research Question and Hypotheses

The study aims to investigate the learners' acceptance of online learning by establishing the impact of BI on PEOU and PU with ATU as the mediating variable. The research will attempt to address the following question:

1. Is there any significant impact of learners perceived ease of use and perceived usefulness on their behavioral intent to use online learning.

The research question is further investigated consistently with the five specific hypotheses that are directly based on the TAM.

H1: PEOU has a significant impact on PU.

H2: PEOU has a significant impact on attitude towards online learning.

H3: PU has a significant impact on attitude towards online learning.

H4: PU has a significant impact on behavioral intention to use online learning.

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

An online questionnaire was administered to the learners of a post-secondary education institution in Singapore, particularly polytechnics. The questionnaire items had specific scale labels, and the Likert scale was assigned to the items. Inferential statistical analysis using Structural Equation Modelling (SEM) was deployed to analyze the quantitative data to establish the reliability and validity of the construct which is fundamental to the assessment of the conceptual model.

Conceptual Framework for the Study

Technology Acceptance Model (TAM) was adopted as the conceptual framework for this study. The TAM was first introduced by Davis (1986, 1989, 1993) as the model to investigate the extent of user behavior that is shaped by the impact of technology. Since then, many scholars such as McCloskey (2004); Venkatesh (2000); Venkatesh and Bala (2008) have expanded the model to elucidate the adoption of technology by individuals. The two constructs of TAM namely perceived usefulness and perceived ease of use are defined as the extent to which the use

of a system would enhance job performance, and it would be free of physical and mental effort respectively. Over the past three decades, numerous empirical studies have pointed out that approximately 40%, a significant proportion of the variance lies in the usage intention and behavior.

The dependent variable for this study was the behavioral intention to adopt online learning. The study investigated the relationship between two independent variables, namely PEOU and PU towards the dependent variable, BI with ATU as the mediating variable.

Definitions of Terms

The definitions of the terms used in this study are as follows:

1. Online learning: The access to learning experience via the use of technology (Moore et al., 2011).
2. E-learning: Any usage of technology in education (Donnelly et al., 2012)
3. Technology acceptance model: Examine the effects of technology on user behavior (Davis et al., 1989).
4. Perceived usefulness (PU): Potential user's subjective views that a particular system will increase job performance. (Davis et al., 1989, p. 985).
5. Perceived ease of use (PEOU): The extent to which a potential user believes that a particular system can be used effortlessly (Davis et al., 1989, p. 985).
6. Perceived attitude towards use (ATU): The extent to which an individual perceived positively or negatively towards performing the target behavior (Davis et al., 1989, p. 984).
7. Behavioral intention (BI): The extent to which an individual made conscious efforts to perform or not perform some specified behavior in the future (Davis, 1989).

8. COVID-19: An infectious disease caused by a new strain of coronavirus that targets the respiratory system (World Health Organization, 2020).

Assumptions

The four constructs of TAM are as follows: perceived usefulness (PU), perceived ease of use (PEOU), perceived attitude towards use (ATU), and behavioral intention (BI). The first assumption associated with this study is the appropriateness of the questionnaire items in delivering the message accurately and the respondents were able to comprehend the questionnaire items correctly. The second assumption was that all the participants of this study responded truthfully to the questionnaire.

Scope and Delimitations

Delimitation is often referred to as the scope or the boundaries of the study. The study adopted the non-experimental research design therefore the generalization of findings must be dealt with caution. In a similar light, the generalization of the results is limited as convenience sampling was deployed for data collection. The questionnaire deployed for this study was self-reported measures that hinged on the respondents' ability and willingness to report factually.

Significance of Study

This study provides insights into the complex and intertwined relationship between the variables of TAM that affect learners' acceptance of online learning. In addition, the study contributes to the growing body of literature on online learning in post COVID-19 era as well as aiding the policy makers around the world to be better prepared to ride the wave of 'new norm' in the higher education setting. Literature also revealed that numerous studies were conducted to establish the statistical relationship between the various variables such as culture, gender, organizational type etc. Therefore, the findings of this study contributed the insights of how

learners' acceptance of online learning is affected by the variables of TAM from the perspectives of Singapore's institute for higher learning.

Chapter Summary

This chapter established the basis for the study by investigating the learners' acceptance of online learning using the TAM in the higher education setting, specifically the post-secondary education institution. The study aims to establish the statistical relationship of the independent variables, namely PEOU and PU, towards the dependent variable, namely BI with ATU as the mediating variable. The foundation for this study, namely background of the study, problem statement, assumptions, scope and delimitations and significance of study, were also discussed in detail. The next chapter delves into the review of relevant literature on TAM, specifically the impact of TAM on technology adoption in the higher education space.

Organization of Dissertation

This dissertation consists of six chapters; with chapter one concluded comprehensively in the earlier section. Chapter two delves into the analysis of relevant literature covering the proliferation of online learning, technology adoption using TAM in general as well as the context specific articles, e.g., in the higher education setting, adoption of technology during the COVID-19 pandemic etc. Chapter three describes the research methodology that was employed for this study which includes the selection of target population, sample size and the survey instrument, as well as ethical considerations. Chapter four focuses on the discussion of data analysis processes as well as the results which include hypothesis testing and inferential statistical analysis. Chapter five presents the discussion of the findings relative to the developed hypotheses for the study. Chapter six details the conclusion for the study as well as recommendations for future studies.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The objective of this study was to investigate the learners' acceptance of online learning in the higher education setting, specifically in a post-secondary education institution. This chapter presents a holistic review of literature pertinent to the behavior acceptance of online learning in the context of education setting. Technology Acceptance Model (TAM), a seminal work by Davis (1989), is a widely cited framework in research studies focusing on users' technology acceptance (Cigdem & Topcu, 2015). The literature review undergone a rigorous analysis of peer-reviewed scholarly articles on TAM and the adoption of online learning in the education context, as well as the historical development of TAM.

The chapter begins with an elaboration of the literature search strategy to scan for peer-reviewed scholarly articles. The next section establishes the analytical perspective of key constructs in this study, including online learning, TAM etc. The third section is an inquiry into the relevant literature on the key constructs. The discussion of the literature review results, and the critique of past research studies are encompassed in the fourth section. The final section encapsulates the insights distilled from the relevant literature.

Literature Search Strategy

The literature search strategy was formulated with the author-led approach as the basis coupled with the guidelines and protocol of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMA) advocated by Moher et al. (2010) to reinforce the strategy. The first step begins with the author identifying the key constructs relevant to the research, like online learning, TAM, education context etc. With the identified constructs, the author proceeds to search the relevant literature through the five selected databases, e.g.,

Academic Search, CiteSeer^{X}, Google Scholar, Social Science Research Network (SSRN), Educational Resource Information Center (ERIC) using relevant keywords. The search terms consist of permutations of relevant keywords on TAM, online learning, education context. The third step of the strategy is to screen the selected literature, followed by step four to analyze the literature and finally to communicate the findings. Step three to five will be scaffolded in the subsequent sections of the chapter.

Online Learning

The adoption of online learning in the education sector was proliferated by COVID-19. This acceleration in the adoption of online learning also necessitates further research into this topic. To grasp the ongoing evolution of online learning in the post-COVID era, a deep dive into the historic evolution and the rapid acceptance during the pandemic is necessary.

Increasingly, there is a growing discourse on the definitions and terminologies in the associated fields of learning technology (Lowenthal & Wilson, 2010; Volery & Lord, 2000). The conflicting findings about the key definitions and terminologies, such as distance learning, e-Learning, and online learning, contribute to the terms being often used interchangeably without meaningful distinction. Many scholars such as Aguilera-Hermida (2020), Aguilera-Hermida et al. (2021), and Qiao et al. (2021) define online learning as classes conducted either asynchronously or synchronously via the use of internet and online tools which connect the physically distanced instructors and learners together. The transition of online learning as a value proposition in education to a necessity during the COVID-19 pandemic is unanticipated. Since the onslaught of the COVID-19 virus, many human activities have transited to the online space (Donthu & Gustafsson, 2020; Kramer & Kramer, 2020), including education where schools were compelled to explore and operationalize online mode of learning from offline (Agyeiwaah et al.,

2022; Dhawan, 2020). This sudden shift in the mode of learning has negatively impacted the learning outcomes especially when there is an absence of confidence in students employing and engaging with the tools cognitively (Aguilera-Hermida, 2020; Bower, 2019). This phenomenon contradicts the findings by García Botero et al. (2018) and Prasetyo et al. (2021) where effective utilization of technology can foster engagement and connection between the students and teachers. Furthermore, studies conducted by Majali et al. (2022) and Tarhini et al. (2017) revealed that students' acceptance in using these technologies will increase when they experience more effective online learning. Henceforth, it is apt to examine the factors influencing students' acceptance of online learning.

Historical Evolution of Online Learning

The historical evolution of online learning begins with the proliferation of Internet technology. The concept of "online learning" was introduced as a fully online course in 1981 (Harasim, 2000). This novel model of educational delivery presents much potential to shape the design and delivery of education systems at all levels. Bates (2014) detailed the development of learning management systems from web-based applications to platforms such as Blackboard with specific features like uploading of documents. The proliferation of online learning is a result of technological affordances and pedagogical developments especially in higher and adult education (Clardy, 2009; Garrison, 2011) such as the launch of New York University Online (Nawale, 2022). Moore (1993) emphasized the commonalities between online and traditional education approaches, particularly the "any time – any place" learning. Scholars such as Koch (2014) and Peterson (2008) advocated that online learning has transformed education from instructor-centered to student-centered, where the responsibility for learning is now pivoted

towards the students. The use of internet and online tools has enabled two-way collaboration between the instructors and students in the learning process (Harasim, 2000; Holmberg, 2005).

According to Martin and Westine (2020), the research on online learning has been on the increase in the last two decades, specifically in areas such as synchronous online learning (Martin et al., 2017), meaningful learning research in e-learning and online learning environments (Tsai, Shen, & Chiang, 2013), asynchronous online discussion (Thomas, 2013), and self-regulated learning in online learning environments (Tsai, Shen, & Fan, 2013). Drawing insights from these research studies dated as far back as the 1990s to as recent as 2020s, the next section of the literature review depicts the historical evolution of the research on online learning as follows: Emergence of Distance Education in the '90s, highlighted three themes of distance education; Emergence of Online Learning in the '90s, characterized by four facets of online learning; Evolution of Distance Education in the Post '00s Era, categorized the studies into macro, meso and micro levels on 15 areas of research; Evolution of Online Learning in the Post '00s Era, categorized into three levels: learner, course and instructor, and organization; and finally the Status Quo of Online Learning Throughout the COVID-19 Pandemic, presenting the challenges intensified by the pandemic on online learning.

Emergence of Distance Education in the '90s

The emergence of distance education in the '90s saw a total of 890 research articles and dissertations from 1990 to 1999 reviewed by Berge and Mrozowski (2001) through four journal databases such as American Journal of Distance Education, Distance Education, Open Learning, and the Journal of Distance Education. The categorization of articles by Berge and Mrozowski (2001) is established on the research issues in distance education highlighted by Sherry (1995). The ten theme of research issues in distance education are namely: redefining roles of instructor

and students, technologies used, issues of design, strategies to stimulate learning, learner characteristics and support, issues related to operating and policies and administration, access and equity, and costs and benefits (Sherry, 1995).

In the study by Berge and Mrozowski (2010), it was revealed that three of the ten themes have more than 100 studies conducted. The three themes are (1) design issues, (2) learner characteristics, and (3) strategies to increase interaction. The first theme, design issues, focuses on the construct of instructional system design and the peripheral topics such as content requirement, interactivity, feedback and technical constraints. The second theme, learner characteristics, is about deploying bespoke instructional theory to accommodate diverse learning styles. The next theme, strategies to increase interaction is akin to the design issues where the focus is on the mode of learning of students. There were approximately less than 50 studies on the least examined themes such as (1) cost and benefits, (2) access and equity, and (3) learner support. The cost and benefits relating to distance education is typically based on the implementation cost based on the school characteristics. Access and equity refer to accessibility and equity to the distance education system. Topics like teacher to student support as well as teacher to teacher support fall under the theme of learner support.

Emergence of Online Learning in the '90s

The emergence of online learning in the '90s is summarized by Tallent-Runnels et al. (2006) whereby 76 research articles on online learning from 1993 to 2004 was reviewed by inquiring into five journal databases like ContentFirst, Educational Resource Information Center (ERIC), Education Abstracts, PsycINFO, and WilsonSelect. The 76 research articles are categorized into four concepts, (1) course environments, (2) learners' outcomes, (3) learners' characteristics, and (4) institutional and administrative factors.

The first theme, course environments, accounts for a majority of 41 research articles encompassing classroom culture, structural assistance, success factors, online interaction, and evaluation. One of the facets of course environment is the classroom culture, and it is concluded by Anderson and Kanuka (1998) that engagement is lacking in online learning, despite the contradictory findings that students are equipped to use the internet as a medium for online discussion without much difficulty (Ahern & El Hindi, 2000). The second facet relating to course environment is the structural assistance which commonly refers to the use of scaffolds and management systems facilitating the students' learning process (Tallent-Runnels et al., 2006). Such assistance in terms of prompt announcements of courses, chapters, exercises and answers were deemed meaningful to the students (Cooper, 1999). This is further supported by authors such as Bee and Usip (1998); Edwards and Fritz (1997), students who have access and used the online course information performed better and indeed access to these information and materials affects the effectiveness of online learning. The essence of online interaction is epitomized by how the exchange of information between the learners takes place in a learning task in the virtual environment. In consonance with Davidson-Shivers et al. (2000), there are two types of online interaction that students engage in namely, (1) synchronous, and (2) asynchronous. The effectiveness of synchronous online discussion aims at enhancing social interaction while asynchronous online discussion is more effective at enhancing task-related interaction (Im & Lee, 2003). The research into the evaluation aspect of course environment is barely scratching surface despite its significance in teaching and learning in the online environment. One notable research by Levin and Waddoups (1999) shed light into the potential use of the online space for teaching, learning and assessment instead of compelling to only in-person environment.

In the study by Tallent-Runnels et al. (2006), the second theme revealed the central question in the studies involving the teaching and learning process and the exploration of cognitive and affective learner outcomes. Many studies (Caywood & Duckett, 2003; Christopher, Thomas, & Tallent-Runnels, 2004; Neuhauser, 2002; Peterson & Bond, 2004; Thirunarayanan & Perez-Prado, 2001) are keen to address the question as to whether online learning is as effective as traditional learning. Pertaining to the cognitive domains, it was discovered that online learning could potentially be more effective than traditional learning when it comes to students' learning (Maki et al., 2000). Conversely, in a study by Parker and Gemino (2001), it was reported that there was no significant difference in the students' learning when comparing online and traditional classroom. Apart from exploring the learning outcomes in the cognitive domain, many researchers (Althaus, 1997; Edwards & Fritz, 1997; Hansen & Gladfelter, 1996; Richards & Ridley, 1997; Sullivan, 2002) were also keenly interested in exploring students' attitudes, satisfaction and perceptions of online learning from the affective domain perspective. While there were 29 research studies exploring the learning outcomes variable in both cognitive and affective domains, the findings, however, were less than adequate due to the lack of rigor and flawed research design.

The next theme, learner characteristics, accounts for 12 research studies highlighting the harmonization of the design of the online course, mode of delivery and the learners. Diving into the learner's aspect, it can be unpacked into cognitive learning styles, demographics, and social interactions of online students. The research findings unveiled that there are different learning styles for online learners, e.g., non-traditional such as the Westerns who were highly motivated to learn in the online environment. There are three distinct types of social interaction in the online environment such as cooperative, competitive, and individualistic (Sonnenwald & Li,

2003). Age, gender, and ethnicity are some of the factors that make up the demographic of online learners (Bocchi, 2004; Schneider & Germann, 1999). The institutional and administrative factors on online learning is the final theme reported with 13 articles with findings such as the lack of policies supporting course development, faculty and student development as well as training and evaluation. The relevance of institutional policies in governing online learning is discussed in a study by Phipps and Merisotis (2000). Vallejo (2001) discovered through his study that administrative support such as access to course schedule, course grades, and course fees payment. Considerable studies (Jennings & Bayless, 2003; Lan et al., 2003) have uncovered that not only students who learn online require technical support, the teachers who teach online also needed the technical support.

Evolution of Distance Education in the Post '00s Era

The evolution of distance education in the post '00s era is encapsulated in the study by Zawacki-Richter et al. (2009) whereby the Delphi method was deployed to identify areas of consensus from a total of 695 articles on distance education between 2000 to 2008. The review of literature selected articles from the five renowned journals namely, American Journal of Distance Education, Distance Education, Open Learning, the International Review of Research in Open and Distributed Learning, and the Journal of Distance Education. The focus of the review lies in the identification of gaps in the distance education research. A sizeable number of 695 articles reviewed are analyzed according to micro, meso, macro levels anchoring on 15 domains of research. The three domains of research focused on micro levels are namely, (1) adult learners' characteristics, learning preferences and styles, and socio-economic backgrounds, (2) culturally sensitive materials, engagement and partnership within learners, (3) instructional design and pedagogical approaches. A deep dive into one of three research domains,

instructional design and pedagogical approaches can be categorized into two modes mainly, asynchronous online learning and synchronous online learning. Asynchronous online learning is characterized by self-paced activities that students engage with at their own time and own pace, less the real-time interaction with fellow students or teachers alike (Zeng, 2023). On the contrary, synchronous online learning involves learning activities that take place in real time, where interaction between students and teachers transpire via a virtual platform (Zeng, 2023). The merit of synchronous online learning lies in the use of conferencing techniques to drive social interactions (Karaman et al., 2013; McBrien et al., 2009) while asynchronous online learning facilitates deep engagement with content and reflective thinking leading to a larger social identity as a learning community (Hrastinski, 2008; Stein et al., 2009).

The seven domains of research anchored on the meso levels are namely, (1) assessing financial considerations of developing and implementing online programs, (2) barriers and enablers of the use of new technologies for teaching and learning, (3) concerns on quality standards of online programs, (4) faculty's professional development and support, (5) inducement to innovate, (6) support services for learner, and (7) sustaining distance education programs. Concerns on the quality standards of online programs can be unpacked into distinct factors across the teaching and learning spectrum including course curriculum, teaching methods, engagement and communication, administrative and technical support and infrastructure, and assessment and feedback (Zeng, 2023). Having said that, the interpretation of online learning quality may differ according to Chaney et al. (2009), from the stakeholders to stakeholders such as students, teachers, administrators, and the public. Different interpretations of online learning quality may inevitably lead to conflicts between the different stakeholders within the same ecosystem. Therefore, it is imperative to establish a common definition of

quality criteria and benchmarks for online learning. Apart from the factors raised by Zeng (2023), there are other comparable indicators highlighted by Chaney et al. (2009) such as active learning methods, evaluation of online programs, guidelines and procedures for course development, responsiveness of the feedback loops, technical and administrative support for learners and faculty members. To a certain extent, these factors and indicators are key in ensuring the development and sustained high quality online programs.

Amongst the seven research themes, Zawacki-Richter et al. (2009) revealed that the top three research themes are as follows; (1) 121 articles for instructional design, (2) 122 articles for interaction and communities of learning, and (3) 113 articles for learner characteristics. On the contrary, the following research themes are reported with the lowest number of articles namely, (1) 18 articles for management and organization, (2) 13 articles for research methods in distance education, (3) 13 articles for cross-cultural perspectives and globalization in education, and (4) 13 articles for innovation and change. One of the top research themes under the macro level, interaction is prevalent in online learning (Chen, 2001; Gauss & Urbas, 2003). Bernard et al. (2009) defined interaction as instructional conditions in distance education that promote interactions between students, teachers and content alike. In the meta-analysis of 74 empirical literature on distance education from 1985 to 2006, Bernard et al. (2009) concluded that students' learning is positively influenced by strategies designed to either increase interaction with the content or with the students and teachers. In consonance with Abrami et al. (2011), several strategies for enhancing interactions in online learning were identified which includes collaborative learning strategies, motivational principles, and self-regulation concepts.

Evolution of Online Learning in the Post '00s Era

In the post ‘00s era, online learning saw a surge in the number of research studies on online learning. Through the rigorous review of research studies on online learning, three major research themes emerged including learners, instructors, and content.

Learners. The research theme related to learners can be categorized into the following: (1) learners’ expectation, (2) learners’ readiness, (3) learners’ identity, and (4) learners’ participation.

Learners’ Expectation. Li and Irby (2008); and Luyt (2013) highlighted the challenges in meeting learners’ expectations and how it can interfere with the delivery of online courses. Learners may develop impractical expectations such as expecting instant feedback, appear rude and demanding in their emails, and some may not even take the assignment requirements and deadline seriously (Li & Irby, 2008; Lyons, 2004). Teachers are strongly encouraged to clearly communicate the rules and policies at the start of course to avoid learners from harboring these impractical expectations.

Learners’ Readiness. One of the major findings discussed in the literature is the learners’ readiness to attend online courses (Hung et al., 2010; Smith, et al., 2003). Online learning is not meant for all learners, and it can be challenging to identify and adopt the appropriate learning styles and skills required to navigate the online environment (Mayes et al., 2011; Luyt, 2013). Most importantly, the learners need to demonstrate their readiness by being self-motivated and self-directed. The responsibility to help the learners who lack the necessary learning skills falls on the shoulders of the teachers. Henceforth, it is imperative to gain clarity into the major facets of readiness such as learners’ digital literacy in the use of computers and the Internet (Peng et al., 2006), learners’ perceptions and attitudes towards the use of the Internet (Tsai & Lin, 2004), and

the learners' time management skills (Hill, 2002; Roper, 2007). These facets formed the cornerstone for molding the learners' readiness for online learning.

Learners' Identity. McInnery and Roberts (2004) highlighted the tendency for learners to feel isolated and disengaged in online learning which may lead to ineffective learning. Therefore, association with a community of learning helps to instill a sense of belonging and identity in the learning process (Koole, 2014). Many researchers (Goodyear & Zenios, 2007; Koole, 2014; Lapadat, 2007) argued the importance of forging a shared sense of identity, purpose and norms which plays a critical role in effective knowledge building.

Learners' Participation. The nature of participation and interaction in online learning has been heavily debated by many researchers. One school of thoughts considered participation through interaction by writing (Romiszowski & Mason, 2004; Vonderwell & Zachariah, 2005), while the other school of thoughts advocated interaction on reading more than but were still engaged in the learning process (Hrastinski, 2008, 2009; Wise et al., 2013). The review of literature reveals that combining audio or video discussion with online text discussions can greatly enhanced learners' participation in online learning (An & Frick, 2006; Ching & Hsu, 2015; Hara & Hew, 2007; Ice et al., 2007; Olesova et al., 2011). On the other hand, Ching and Hsu (2015) emphasized one specific shortcoming was the difficulty of eliciting ideas from long audio or video as compared with text.

Instructors. The second major research themes related to instructors can be categorized into four specific aspects such as changing faculty roles, transition from face-to-face to online, faculty time management, and teaching styles.

Changing Faculty Roles. The changing role of the teacher is a widely regarded challenge in online education (Collins & Berge, 1996; Coppola et al., 2001; Syverson & Slatin, 2010).

Berge (1998) identified four different roles for online instructors namely, pedagogical, social, managerial, and technical responsibilities. Pedagogical tasks are central to fulfilling the educational purpose of online learning (Doll, 1993; Robertson, 2000). There has been an increase in literature (Choi & Park, 2006; Collins & Berge, 1996; Coppola et al., 2001; Doll, 1993; Fein & Logan, 2003; Juan et al., 2011; Robertson, 2000; Syverson & Slatin, 2010; Tucker & Neely, 2010; Yang & Cornellius, 2005) supporting the shift in the ability to deliver content, evolve from teacher-centered to student-centered learning, and enhanced interaction. This shift from teacher-centered to student-centered education marks the change in faculty role from 'sage on the stage' to 'guide on the side'.

Transition from Face-to-Face to Online. The 'disconnect between the teachers' learning experience and the expectation of an effective online delivery' is one of the many challenges emerged from the study by Anderson et al. (2011). The absence of institutional expectations such as expectations of the teachers, students, courses, and administrative staff, for the online courses (Anderson et al., 2011). The non-existence of clear guidance and protocol for the faculty leads to an almost impossible task to evaluate the effectiveness of online learning in general. Communication also poses challenges in the form of language barrier for faculty communication (Sherry, 1995), and communication with different types of technology (Limperos et al., 2015; Sundar, 2008, 2009). The fundamentals of communication between teachers and students have undergone a paradigm shift especially with the changing role of the faculty from receiving verbal and non-verbal cues directly from students in a face-to-face classroom to seeing the students' faces in the format of distance education (Coppola et al., 2001). As a result of the changing role of faculty in online learning, it is highly probable that the existing lesson format of a face-to-face classroom is not going to be effective for the delivery of content via the online platform (Kember

& Kwan, 2000). Increasingly, it was observed that many teachers still preferred teaching face-to-face over the other mode of delivery due to the many years of experience teaching face-to-face and the fear of the unknown and uncertainty in online learning (Fein & Logan, 2003; Kebritchi et al., 2017; Osika et al., 2009). The preparation of teachers for online learning is also one of the challenges identified in several literatures citing that teachers are applying the classroom teaching style to the online format, and it has proven to be counterproductive (Baran et al., 2011; Coppola et al., 2001).

Faculty Time Management. The novel ways of teaching in the online environment demanded the teachers' time to prepare, plan, and teach effectively (Capra, 2011; Fein & Logan, 2003; Humphries, 2010). Cavanaugh (2005) conducted a time comparison study with an economic class of the same size, a vast difference of 93 hours was reported with online learning requiring 155 hours to prepare and teach compared with 62 hours for face-to-face. It was also observed that the class size did not have any impact on the amount of time and effort required to prepare, plan and teach an online class. The essential time and effort needed for the design, development, and facilitation of online courses may deter the faculty's take up rate of online courses (Crawley et al., 2009; McKenzie et al., 2000).

Teaching Styles. Apart from the resource challenges articulated in the earlier section, the crux of effective teaching and learning lies with the teaching styles (Crawley et al., 2009). The seven principles of effective teaching were founded on the enduring principles of teaching in a face-to-face setting. The effective teaching principles can be broadly unpacked into two categories namely, interactions and expectations. Interactions refer to good faculty-student interaction, effective communication and feedback. While expectations include setting expectations for online learning, the expectation of interaction between faculty and students and

amongst the students as well. Amidst the suggestions, e.g., the use of e-learning methods and strategies (Juan et al., 2011), to improve teachers' online teaching effectiveness, the instructor is the single most important 'tool' in driving students' learning in an online class (Tunks, 2012). Other recommendations based on the review of literatures include the provision of observation opportunities for novice teachers (Anderson et al., 2011), specific pedagogical training for online delivery (Choi & Park, 2006), and regular and periodic check in with students (Kebritchi et al., 2017).

Content. The third major research themes related to content can be categorized into four elements such as role of teachers in content development, role of instructional strategies in content development, integration of interactive media in content, and the considerations for content development.

Roles of Teachers in Content Development. Baran et al. (2011) highlighted the lack of empowerment amongst the teachers to make changes to the predefined content. This phenomenon is in consonance with Rennert-Ariev (2008) where the teachers assumed the passive role in making changes to the content based on their professional experiences. Despite the challenges involved in the conversion of learning materials from face-to-face classes to online environment, it remains the primary responsibility of the teachers to prepare and plan for the online courses (Li & Irby, 2008). Consistent with the earlier review of literatures for the changing faculty roles, Kyei-Blankson & Keengwe (2011) concluded that the lack of training and support rendered to teachers who are responsible for the conversion of learning materials is often where the problem lies. Besides the lack of proper training and support, there is a perceived lack of urgency resulting from no incentive structures to drive this online endeavor (Allen & Seaman, 2010). All in all, extrinsic motivators, e.g., appropriate incentive structures to motivate

the teachers (Hoyt & Oviatt, 2013), coupled with the intrinsic motivators, e.g., personal satisfaction and convenience from online learning, are vital to the success of online learning.

Roles of Instructional Strategies in Content Development. Chametzky (2014) and Luyt (2013) proposed that content in the online courses should be anchored on the principles of andragogy, particularly learner-centered approach. Peer learning is another strategy to enhance learning effectiveness and engagement according to the principles of andragogy (Niess & Gillow-Wiles, 2013). The combination of active learning strategies, collaborative activities, reflective activities, clear assessment requirements, and technology integration is the hallmark for online course development (Niess & Gillow-Wiles, 2013). Course redesign strategies and integration of technology are effective in converting the learning materials from face-to-face to online courses, over and above, it also reduces cost and enhances retention rates (Gilroy, 2006; Spiceland et al., 2015). Twigg (2003) posited that the use of multimedia tools to enhance interaction in online learning is consistent with the course redesign strategies.

Integration of Interactive Media in Content. Integration of multimedia strategies such as learning games, videos and simulations, in the content to enhance learning experience is on the rise (Almala, 2005). Simply incorporating interactive media into the design of the online courses may lead to the deterioration of the learning process when applied wrongly (Yue et al., 2013). Mayer (2014) put forth three instructional design approaches to enhance students' learning namely, less-is-more, more-is-more, and focused-more-is-more. The first approach, less-is-more, aims to cut down and trim off irrelevant material to avoid any confusion in the learning process. The next approach, more-is-more, prioritizes augmenting additional features such as infographics to motivate students to engage in generative processing. The last approach, focused-more-is-more, aims to augment the content with graphics and challenging learning situations to motivate

students to engage in generative processing. The use of different types of learning tools to drive students' engagement in the online classroom is highly encouraged by Hathaway (2013). Early introduction of interactive media in the online classroom is highly beneficial to the students (Niess & Gillow-Wiles, 2013).

Considerations for Content Development. The structure of the course should be clearly outlined for the students, and the content should be scaffolded meaningfully (Allen et al., 2013). Time and clarity of instructions are essential for the completion of online collaborative learning activities by the students (Allen et al., 2013; Miller, 2014). There must be constructive alignment between the student learning outcomes, objectives and assignments. Formative and summative assessment is equally important for both face-to-face and online course format (Miller, 2014). In online learning, formative assessment is not merely a way to support learning but a strategy to engage the students in the online environment (Gikandi et al. 2011).

Status Quo of Online Learning Throughout the COIVD-19 Pandemic

In the recent years from 2020 onwards, educational practices have undergone significant changes arising from the evolution of online learning coupled with the impact inflicted by the COVID-19 pandemic. As a result of the unprecedent COVID-19 pandemic in 2020, almost all educational sectors regardless of age groups, including higher educational institutions, were compelled to suspend classes worldwide (Adedoyin & Soykan, 2020; WHO, 2020). The outbreak of COVID-19 pandemic has instilled a brand-new interpretation to online learning and non-face-to-face distance education.

Challenges Affecting Adoption of Online Learning during COVID-19. Naturally, there are challenges brought forth by this unprecedented shift which are confronting both learners and lecturers alike. One of such challenges is the technical difficulties, i.e., limited internet access,

coverage and internet speed, that disrupted the online classes. (Al-Balas et al., 2020; Farooq et al., 2020). Landrum (2020) further posits that having a well-equipped technology infrastructure is sine qua non for the conduct of online learning. Learners' ability to perform during online classes and their perceived usefulness of online learning is also enhanced by the technology infrastructure (Almaiah et al., 2020; Wan Hassan et al., 2020). Suryaman et al. (2020) echoed similar sentiments whereby students were faced with many obstacles in a home learning environment during the pandemic. The lack of ability in the use of technology (Al-Balas et al., 2020; Zulkefli et al., 2020), expensive internet cost (Al-Balas et al., 2020; Farooq et al., 2020; Wan Hassan et al., 2020), limited socialization between and among learners and lecturers (Rannastu-Avalos & Siiman 2020; Zulkefli et al., 2020) are some of the obstacles confronting learners. In a similar study by Kapasia et al. (2020), the findings are largely coherent to the earlier studies highlighting the emotional state of learners, instability of internet service, and unfavorable home learning environment, accentuating the effects of learners from remote areas being marginalized. In a recent study by Almaiah et al. (2020) revealed that the five critical factors affecting the adoption of online learning can categorized as, (1) technological factors, (2) online learning system factors, (3) trust factors, (4) self-efficacy, and (5) cultural factors. Apart from the above-mentioned critical factors, there has been some drawbacks associated with online learning, e.g., lack of synchronous classroom interaction, the design structure of the online learning, and the teachers' technical difficulties faced in online learning (Giannoulas et al., 2021). Sadaf and Martin (2021) conducted a meta-analysis for 30 articles on cognitive presence and it was discovered that the focus was primarily on teachers' teaching strategies and students' learning outcomes. Notwithstanding, only a few studies besides Hsu and Lin (2022) explored the behavioral aspect to online learning during COVID-19.

Status of Online Learning after COVID-19. While the COVID-19 has officially entered the 'endemic' phase, the future of education remains vague and uncertain. What remains clear is the importance of educational technology in supporting agile learning and teaching models to drive learning performance in the post-pandemic era. In consonance with Leask and Younie (2022), educational technology has exhibited immense potential to "do education differently" (p. 188) regardless during the pandemic or post COVID-19 era. Albeit online learning may regress back to the traditional face-to-face setting when the pandemic situation recovers, it is not business as usual but rather a new normal (Neuwirth et al., 2020). The choice of online learning during the COVID-19 pandemic is leaving the students with no alternative in terms of their preferred mode of course delivery (Baber, 2021; Bao, 2020). Therefore, it is crucial to gain deep insights into the factors that facilitate the students' acceptance of online learning in a post pandemic era. In a study by Guppy et al. (2022) reported that the outbreak of COVID-19 has significantly impacted blended and hybrid courses along with the adoption of educational technology. In the coming years after the 'endemic' phase, it is anticipated that there will be an increase in both the teachers and students' acceptance of online learning. It was apparent that the complex and intertwined relationship between the variables affecting online learning pre and post COVID-19 has drastically changed. Prasetyanto et al. (2022) observed that quality of teaching and the benefit of time management remains the two key drivers to improve students' intention to adopt online learning in a post COVID-19 era. Apart from the two predictors highlighted earlier, hedonic motivation and effort expectancy were significant predictors of students' continuous participation in micro-lectures (Wijaya & Weinhandl, 2022). Nonetheless, the existing research studies on online learning in the 'endemic' era remains insufficient.

Technology Acceptance Model (TAM)

In the 1970s, there was an increase in the system adoption in organizations along with the technological needs, however, many attempts ended up in failure. This phenomenon aroused the interest of many researchers in that era. The roots of TAM originated from the Theory of Reasoned Action (TRA) proposed by Fishbein and Ajzen (1975). The TRA model proposed a theory that an individual's actual behavior may be shaped by their perceived attitude towards the behavior and subjective norm associated with the behavior in question. Davis (1985) proposed the TAM in his doctoral thesis, and it was further refined referencing the TRA model. The three variables suggested in his model are: (1) perceived ease of use, (2) perceived usefulness, and (3) attitude toward using the system. His hypothesis was that a user's attitude toward a system was the key determining factor whether the user will actually use or reject the system. The TAM was developed to predict the probability of new technology adoption by an individual or organization. The TAM consists of four variables, including perceived ease of use (PEOU), perceived usefulness (PU), perceived attitude towards use (ATU), and behavioral intention (BI).

Perceived Ease of Use

Perceived ease of use (PEOU) as defined by Davis (1989) is the extent to which an individual believes that the use of a particular technology will be effortless. There is evidence to suggest that while the user may deem the technology as useful in enhancing his or her performance at work, concurrently they may also perceive the adoption of technology as an uphill task and the effort of using the technology outweighed the performance benefits of usage (Davis, 1989). Many empirical studies have confirmed that the perceived ease of use is a predictor for technology acceptance (Agarwal & Prasad, 1999; Chang et al., 2015; Esteves & Curto, 2013; Hu et al., 1999; Jackson et al., 1997; Rajan & Baral, 2015; Venkatesh & Brown,

2001; Venkatesh & Davis, 1996; Venkatesh & Davis, 2000). In education setting, Arpaci (2017) highlighted that perceived ease of use and perceived usefulness significantly affects students' attitudes towards the adoption of distance education tools and systems. In the field of information systems, a critical review of literature reveals that higher perceived ease of use leads to higher perceived usefulness (Zobeidi et al., 2023). This phenomenon is consistent with the findings by Ebrahimi et al. (2018) where the students perceive using the Internet as a simple task, they would also find it very useful in their learning. The research in the field of e-learning also reflected a similar positive relationship between perceived ease of use and perceived usefulness (Demoulin and Coussement, 2020; Faqih, 2013; Ibili et al., 2019; Lee et al., 2009).

H1: PEOU has a significant impact on PU.

H2: PEOU has a significant impact on attitude towards online learning.

Perceived Usefulness

Perceived usefulness (PU) is defined as the extent to which an individual believes that using a certain technology would improve his or her work performance (Al-Gahtani, 2001; Davis, 1993; Esteves & Curto, 2013; Mathwick et al., 2001; Zhou et al., 2010;). In a recent study by Huang et al. (2020) reported that the students' behavioral intention is affected by the perceived usefulness, contrary to the findings by Maheshwari (2021). Many studies have reported that perceived usefulness has a positive impact on behavioral intention to using electronics and interactive online learning system (Al-Rahmi et al., 2019; Hariguna, 2019; Salloum et al., 2019; Teo et al., 2019). Reference to TAM, the perceived usefulness and perceived ease of use have direct impact on individual's attitudes using technology. This phenomenon is supported by research studies in different domains such as cloud service (Huang, 2016), e-learning (Al-Rahmi et al., 2019; Salloum et al., 2019), learning management systems

(Revythi & Tselios, 2019), and mobile technology (Briz-Ponce et al., 2017). In a recent study by Al-Emran et al. (2020) also revealed that perceived usefulness and perceived ease of use significantly impacted students' behavioral intention to use smartwatches for educational purposes. Empirically, the behavioral intention of the students to adopt online learning is highly correlated to their use of the technology (Nicholas-Omoregbe et al., 2017).

H3: PU has a significant impact on attitude towards online learning.

H4: PU has a significant impact on behavioral intention to use online learning.

Attitude Towards Use

In the early 2000s, attitude towards the use of technology can be defined as the potential user's affective assessment of the risk and benefit of using the technology (Ndubisi, 2006). Fast forward to now, many researchers has defined attitude in a neutral form as an individual's assessment, whether favorable or unfavorable, relating to performance of a certain behavior (Ataei et al., 2021a, b; Shahangian et al., 2021; Valizadeh et al., 2021). According to research conducted by Sukendro et al. (2020), it was reported that a student's behavioral intention to use online education is significantly affected by his or her attitude towards the use of online education. In similar research by Buabeng-Andoh (2021), the behavior of students in developing countries is examined and it was discovered that attitude towards the use of mobile learning has significant impact on their behavioral intention. In the education setting, it was emphasized that teachers with negative attitudes toward the use of computers are not likely to transfer their computer skills to the students (Yildrim, 2000). Correspondingly, it is reasonable to conclude that teachers and students are more likely to accept the use of computers in the classroom when the attitudes of both teachers and students are positive toward computer use (Luan et al., 2006). Research studies conducted in developing countries, such as Chang et al. (2017) in Azerbaijan,

Hussein (2017) in Malaysia, and Hanif et al. (2018) in Pakistan, reported that the attitude towards the use of technology as the key predictor of the intention to use the technology. Ahmed (2021) discovered in his study that the students perceived ease of use and perceived usefulness of the technical courses during COVID-19 significantly affected their attitudes toward the use of technology. This consequentially led to higher behavioral intention to use the technology by students, thereby driving the adoption of online learning.

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

Behavioral Intention

Unique to this study, the dependent variable refers to the behavioral intention to use the technology by the students. Behavioral intention is defined as an individual's intention to adopt a particular technology for different activities. (Ain et al., 2016; Zhao et al., 2021). Case in point, behavioral intention refers to the students' willingness to accept the use of online learning to fulfill academic requirements. A direct and significant link is discovered between the behavioral intention to use technology and the actual usage of technology (Davis, 1989; Motaghian et al., 2013; Unal & Uzun, 2021). In a study by Bazelais et al. (2018) experimented using perceived ease of use, perceived usefulness, and attitude towards technology use to predict the technology's behavioral intention of the students. Apart from significant correlation between behavioral intention to use technology and the actual usage of technology, reassuring the intention to accept new technology is equally crucial (Lazim et al., 2021).

Conceptual Framework for the Study

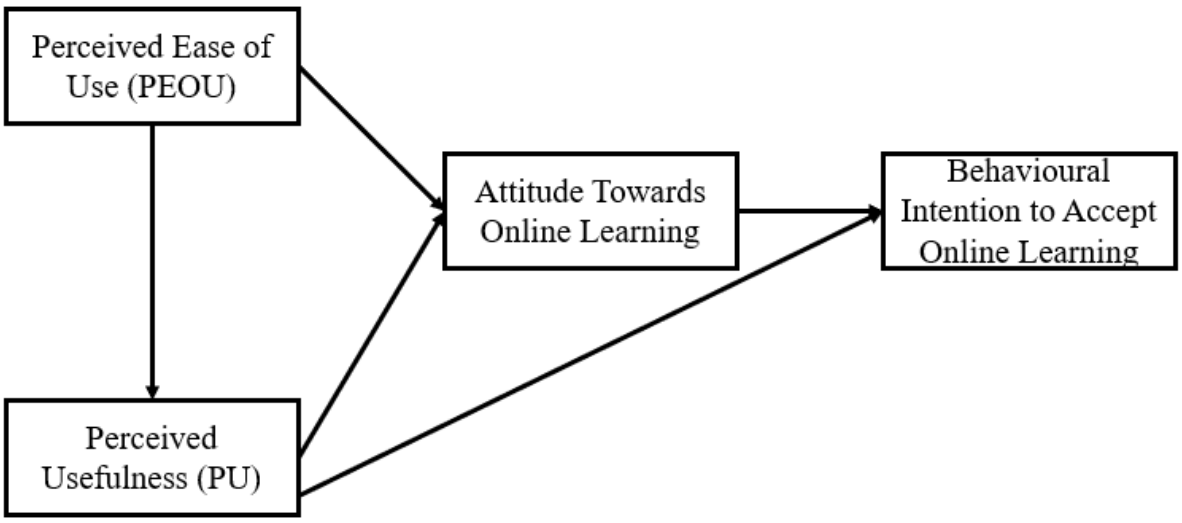
Technology Acceptance Model (TAM) was adopted as the conceptual framework for this study as it was widely cited framework for prediction of individuals' acceptance of online

learning (Kim et al., 2021). The TAM was first introduced by Davis (1986, 1989, 1993) as the model to investigate the extent of user behavior that is shaped by the impact of technology. Since then, many scholars such as McCloskey (2004); Venkatesh (2000); Venkatesh and Bala (2008) have expanded the model to elucidate the adoption of technology by individuals. The two constructs of TAM namely perceived usefulness and perceived ease of use are defined as the extent to which the use of a system would enhance job performance, and it would be free of physical and mental effort respectively. The relationship between these two constructs namely perceived ease of use and perceived usefulness, were heavily researched upon and it has a significant impact on the attitude and behavioral intention to use online learning (Fearnley & Amora, 2020; Hussein, 2017; Joo et al., 2018; Lai et al., 2022; Leong et al., 2020).

The dependent variable for this study was the behavioral intention to adopt online learning. The study investigated the relationship between two independent variables, namely PEOU and PU towards the dependent variable, BI with ATU as the mediating variable.

Figure 1

Conceptual Model for this Study



Chapter Summary

This chapter reviewed the background and historical evolution from distance education to online learning across different eras, including (1) emergence of distance education and online learning in the ‘90s, (2) evolution of distance education and online learning in the post ‘00s, and (3) status quo of online learning throughout the COVID-19 pandemic. A deep dive into the review of literature on TAM was conducted, specifically on the key variables such as perceived ease of use and perceived usefulness, attitude toward use, and behavioral intention. Relevant literature was reviewed in this study to establish a basis for the research including the choice of conceptual framework, the formulated research questions and hypothesis for this study.

CHAPTER THREE: METHODOLOGY

Introduction

This chapter presents a robust and comprehensive methodology that was adopted for this study. The objective of this study was to investigate the learners' acceptance of online learning using quantitative methods. A key aim of this study is to explore the factors affecting the learners' acceptance of online learning using Technology Acceptance Model (TAM) as the theoretical basis for this research.

The chapter begins with a description of the research methodology and research design. A description of the population and sampling, and the instrumentation was presented. The data collection, data analysis procedures, and ethical issues were also outlined in this study. Finally, the chapter concluded with a summary of the methodology used in this study.

Research Question and Hypotheses

The study aims to investigate the learners' acceptance of online learning by establishing the impact of Behavioral Intention on Perceived Ease of Use and Perceived Usefulness with Attitude Toward Use as the mediating variable. In this study, the research will attempt to address the following question:

1. Is there any significant impact of learners perceived ease of use and perceived usefulness on their behavioral intent to use online learning.

The research question is further investigated consistently with the five specific hypotheses that are directly based on the TAM.

H1: PEOU has a significant impact on PU.

H2: PEOU has a significant impact on attitude towards online learning.

H3: PU has a significant impact on attitude towards online learning.

H4: PU has a significant impact on behavioral intention to use online learning.

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

Research Methodology

Rajasekar and Verma (2013) described research methodology as a systematic approach that researchers can adopt to describe, explain, and predict a phenomenon while maintaining the validity, reliability, and integrity of the research being studied (Mathews & Ross, 2010). The aim of this study is to investigate the learners' acceptance of online learning using TAM in the higher education setting, particularly in Singapore. The research paradigm is largely dependent on the objective of the research. Case in point, the purpose of this study is to examine the learners' acceptance of online learning using TAM, therefore the choice of quantitative research approach is an obvious one.

Positivism as the Research Paradigm

The positivism paradigm of studying the social reality originated from French Philosopher, August Comte, whose philosophies lies in the understanding of human behavior through observation and reasoning. This is in consonance with Henning (2004) belief that the true knowledge anchored upon experience of senses can be acquired through observation and experiment. Positivism is also commonly referred to as a "scientific method" where the study of social sciences and natural sciences are conducted in a similar manner (Alia, 2017). Adopting positivism as the research paradigm for this study is appropriate as Creswell and Creswell (2017)

has elucidated that theory is unpacked into distinct elements called variables, and they are basis for the constitution of research hypotheses and research questions.

Research Design

Creswell (2017) defined quantitative research as a measure for testing objective theories by investigating the relationship among variables using instruments and data can be analyzed using statistical procedures. This study employed a correlational research design that can be used to establish the prevalence of relationships among the variables, to predict current events from existing knowledge and information (Curtis et al., 2016; Yukl, 2006), to investigate the learners' acceptance of online learning in the education setting. As Lunenburg and Irby (2008) emphasized that the results of correlational research studies were used as the basis to assess consistency and predict trends. The selection of correlational research design as an approach to unravel the complex and intertwined relationships between the variables set the foundation for this study. Henceforth, it is appropriate to propose quantitative research employing correlational research design is likely to determine the presence of correlation between perceived ease of use, perceived usefulness, attitude toward use, and behavioral intention to accept online learning amongst students in Singapore.

Population and Sampling

The population of interest, as defined by Hossan et al. (2023), refers to a group of individuals or entities that the research is anchored upon including people, pairs, groups, and organizations that can be sampled. Mills and Gay (2016) provided another perspective on the term "population", describing it as a larger group from which the researcher wishes to generalize the findings.

The target population refers to a specific group of individuals where the researcher expresses keen interest in studying. This specific group is constrained by the reach that the researcher has, and it is a representation of the main group of individuals that the researcher is interested in. Ackerman et al. (2019) defined target population as one that has clear qualities or attributes of the group under study and these outputs apply to a larger 'population of interest'. The target population for this study is limited to students from higher educational institutions in Singapore that fulfilled the inclusion criteria of the following, (1) it is a post-secondary education institution in Singapore, specifically polytechnics, (2) conducts online learning as part of the curriculum, and (3) offers diploma and specialist diploma programs.

Sampling is defined as the process of identifying individuals, objects, or events from a population that is a representation of a larger group from which they originated from (Mills & Gay, 2016). It is an uncommon and impractical feat to simply collect data from the entire population as highlighted out by Gay et al. (2012). The primary purpose of survey research is to collect data from a representative sample of the population with the aim to generalize the findings to the population (Kotrlik et al., 2001). In this study, a type of non-probability sampling method (Omair, 2014; Tyrer & Heyman, 2016), particularly convenience sampling, was deployed due to practical considerations. Convenience sampling is the least expensive method as it relies on the researcher's reach to individuals who can be reached easily or have coincidentally interacted with during the period of the study. Nonetheless, due to the non-random nature of the sampling method, convenience sampling is often perceived as lacking in credibility (Gray, 2018). Aside from the lack in credibility, convenience sampling also poses possible threat to external validity due to incorrect deductions derived from the sample data and it may not be a representation to other individuals, settings, and past or future situations (Creswell & Creswell,

2018). A total of 130 learners who have either participated or currently participating in online learning in a post-secondary education institution in Singapore, specifically polytechnic.

Instrumentation

The purpose of instruments in research is to collect data as a test or tool (Gay et al., 2012). An online questionnaire is deployed as an instrument to collect data to address the research question in this study. This is further supported by Gay et al. (2012) that an appropriate instrument is pivotal in seeking information that is previously undiscovered by the researchers. Many researchers such as Cohen et al. (2011) considered questionnaires as one of the most widely used structured instruments for the collection of numerical data. Questionnaires can be deployed to collect information about a particular variable or demographic information about the individual, e.g., age, educational level, work experience etc. Johnson and Christensen (2024) highlighted the use of questionnaires to gain insights into individuals' attitudes, beliefs, feelings, perceptions, thoughts, behavioral intention etc. Henceforth, questionnaires are still widely used and remained effective in collecting large amounts of data in an unambiguous manner (Newby, 2014). Moreover, questionnaires can obtain objective data without compromising confidentiality and anonymity. With confidentiality and anonymity in place, sensitive questions can be asked, and the participants will be encouraged to respond accurately to the questionnaire (Kumar, 2018).

The questionnaire comprised of two sections. The first section consisted of questions regarding the basic demographic information such as age, gender, educational level, internet experience, and frequency of online learning. The second section consisted of 15 items to measure students' acceptance of online learning using the constructs of the TAM such as perceived ease of use, perceived usefulness, attitude toward use, and behavioral intention. The

questionnaire items had specific rating scale labels and a five-point rating scale (strongly disagree to strongly agree) assigned to evaluate the items. For all the items under the different construct requires the participants to select the answer that best describes their level of agreement. For this study, Qualtrics XM was used as an online survey platform for the distribution of the survey to the participants. Refer to Appendix A for the full questionnaire extracted from Qualtrics XM. From Table 1, the item descriptives reveal that the items of perceived ease of use held a mean value of 4.699 which is higher than the construct of perceived usefulness at 3.929, behavioral intention at 3.882 and attitude toward use at 2.976.

Table 1

Item Descriptives of Questionnaire

Construct		Items	Mean	Standard Deviation
Perceived Ease of Use	1	My interaction with online learning is clear and easy to understand	3.755	1.372
	2	It is easy for me to gain proficiency in online learning	3.672	1.331
	3	Using online learning is more flexible than traditional learning	4.211	0.858
	4	Online learning is easy for me	4.157	1.203
Perceived Usefulness	5	I would find online learning useful for my learning	3.986	1.328
	6	Online learning enables me to accomplish the task quickly	3.960	1.270
	7	Online learning increases productivity in online learning	3.742	1.352
	8	Online learning enables me to gain more knowledge	4.028	1.267
Attitude Toward Use	9	Using online learning has negative impact on learning	2.248	1.035
	10	Online learning increases learner engagement during the learning process	2.804	1.112
	11	Online learning is fun to use	3.263	1.126
	12	I like online learning	3.587	1.287
Behavioral Intention	13	I intend to use online learning in the next 6 months	3.886	1.359

14	I predict that I would use online learning in the next 6 months	4.014	1.400
15	I plan to use online learning in the next course that I would be attending	3.747	1.307

Source: Author's calculations using primary data.

Validity and Reliability

The two fundamental criteria that determine the quality of instruments and tools in quantitative research are validity and reliability. According to Sürücü and Maslakci (2020), validity refers to how well the instrument measures what it intends to measure. On the other hand, reliability is defined as the consistency of an instrument's results over time and in different situations (Bolarinwa, 2015). Henceforth, it is crucial for researchers to ensure that the selected instruments are valid and reliable so that the results are trustworthy and generalizable (Nurfatihah et al., 2021). The reliability of the questionnaire can be determined from the Cronbach's alpha, in particular a value of 0.80 or higher is acceptable for research purposes (Adeniran, 2019; Alfadda & Mahdi, 2021; Yang & Wang, 2019). This in turn boosted the researchers' confidence in using the questionnaires where validity and reliability has been established for this study.

Data Collection Procedures

In the collection of data for quantitative research, the validity of the research design must be established through a series of processes. The first and foremost is to ensure adherence to the ethical standards and the rights of the participants are protected through the approved Institutional Review Board (IRB) as described by Godwin-Jones (2016). For this study, Qualtrics XM was used as an online survey platform for the distribution of the survey to the participants. Consent will be sought at the beginning of the questionnaire, as well as the purpose of the study and contact details of the researcher will be shared. The right to decline participation or

withdrawal from the study at any point in time without consequence is also highlighted at the start of the questionnaire. Cohen et al. (1990) highlighted that participants are often asked to share their beliefs, habits, or experiences in the form of a questionnaire. While some of these questions may be sensitive, the researcher can collect anonymous responses to promote genuine response (Burnett & Illingworth, 2008) and at the same time, reassuring the participants about confidentiality (Kaufman et al., 2009). The researcher went one step further to protect participants' anonymity by not collecting any personal information.

Data Analysis Procedure

Statistical analysis of quantitative data was conducted using the "Partial Least Square" (PLS) software version 4 of the Smart-PLS. Prior to feeding the data into PLS for analysis, a detailed examination of the data to identify possible errors was conducted. First, the researcher performed the analysis to derive descriptive statistics such as mean, standard deviation, and range to get an overview of the data. Subsequently, Structural Equation Modelling (SEM) was operated through PLS software to establish the relationships between the four constructs in the study, Perceived Ease of Use, Perceived Usefulness, Attitude Toward Use, and Behavioral Intention to adopt online learning. Performing SEM through PLS can establish the validity and reliability of the constructs which is fundamental to the assessment of any measurement models. Path analysis was conducted to measure the effects of the constructs as articulated in the hypotheses. Finally, these findings based on the collected data were analyzed and reported as part of the research.

Ethical Issues

In this study of learners' acceptance of online learning, establishing and maintaining trust and confidentiality is utmost important. The access to the research data is limited only to the

researcher and strict disposal procedures of manual and digital data are in place. These measures are in place to protect the participants from potential harm and ensure confidentiality throughout the research process.

Chapter Summary

This chapter furnished an encyclopedic narration of the methodology employed for this quantitative research study. A correlational research design was employed to establish the prevalence of relationships among the constructs to predict the learners' acceptance of online learning in the education setting. For this study, Qualtrics XM was used as an online survey platform for the distribution of the survey to the 130 participants through convenience sampling. The collected data provided necessary insights to examine the relationships between the four constructs in the study, Perceived Ease of Use, Perceived Usefulness, Attitude Toward Use, and Behavioral Intention to adopt online learning through SEM. Finally, adherence to the ethical standards and the rights of the participants through the approved Institutional Review Board (IRB) is of paramount importance.

CHAPTER FOUR: DATA ANALYSIS

Introduction

In this study, a quantitative approach was employed to investigate the learners' acceptance of online learning in the post-COVID era. A key aim of this study is to explore the factors affecting the learners' acceptance of online learning using Technology Acceptance Model (TAM) as the theoretical basis for this research. The research question aimed to uncover the factors affecting learners' acceptance of online learning by establishing the impact of Behavioral Intention on Perceived Ease of Use and Perceived Usefulness with Attitude Toward Use as the mediating variable.

The chapter begins with a recap of the research question and hypotheses formulated for this study. Descriptive statistics and analysis of measurement model were also presented in great length. Next, the proposed conceptual framework was examined to establish the strength of the hypothesized relationships in this study. Finally, the chapter concluded with a summary of the analysis of the data for this study.

Research Question and Hypotheses

The central question that is in guidance of this study is as follows:

1. Is there any significant impact of learners perceived ease of use and perceived usefulness on their behavioral intent to use online learning.

The research question is further investigated consistently with the five specific hypotheses that are directly based on the TAM.

H1: PEOU has a significant impact on PU.

H2: PEOU has a significant impact on attitude towards online learning.

H3: PU has a significant impact on attitude towards online learning.

H4: PU has a significant impact on behavioral intention to use online learning.

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

Quantitative Data Analysis

The quantitative data analysis employed Structural Equation Model (SEM) to investigate the relationships between the different constructs from the TAM through the "Partial Least Square" (PLS) software version 4 of the Smart-PLS.

Descriptive Statistics of Demographic Information

Descriptive statistics collected via the questionnaire included factors such as gender, age, internet experience, and the frequency of online learning. From Table 2, a comprehensive overview of the demographic characteristics of 130 participants who participated in the study. Insights into the study's diversity and representation can be gleaned from the sample's demographic snapshot. There are a total of 130 valid respondents. A total of 50.8% of the respondents were male, 47.7% were female, and 0.8% were non-binary/ third gender and prefer not to say respectively. Amongst the respondents, more than 76% of the respondents reported either extremely familiar or very familiar with Internet experience. Approximately 20% of the respondents reported moderately familiar with Internet experience. The remaining 4% exhibited no familiarity with or slight familiarity with the use of the Internet. 43% of the respondents reported frequently engaging in online learning while the frequency of online learning engaged by the remaining 55% of the respondents were either about half the time or sometimes. Only 2%

of the respondents never engage in any form of online learning. Additionally, the average age of the respondents was 39.86 years with a standard deviation of 1.051.

Table 2

Demographic Information of Survey Participants (N = 130)

Item	Responses	(%)
1. What is your gender?		
Male	66	50.8%
Female	62	47.7%
Non-binary / third gender	1	0.8%
Prefer not to say	1	0.8%
2. What is your age?		
Under 18 years	0	0%
18 - 24 years	4	3.1%
25 - 34 years	16	12.3%
35 - 44 years	44	33.8%
45 - 54 years	43	33.1%
55 - 64 years	21	16.2%
65 years or older	2	1.5%
3. Internet Experience		
Not familiar at all	1	0.8%
Slightly familiar	4	3.1%
Moderately familiar	25	19.4%
Very familiar	60	46.5%
Extremely familiar	39	30.2%
4. Frequency of online learning		
Never	3	2.3%
Sometimes	40	30.8%
About half the time	31	23.8%
Most of the time	38	29.2%
Always	18	13.8%

Source: Author's calculations using primary data.

Descriptive Statistics of Latent Variables

The next section reports the descriptive statistics of each latent variable in the conceptual model of this study: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude

Toward Use (ATU), and Behavioral Intention (BI). The following descriptive statistics are included for each latent variable, min, max, mean, standard deviation, kurtosis, and skewness.

Perceived Ease of Use

A detailed summary of the descriptive statistics derived from PLS for four items (PEOU1 to PEOU4) was reported for a total of 130 participants. For the range of all the items, there is a minimum score of 1 and a maximum score of 5. The mean values illustrate the central tendency of the data ranging from 3.755 (PEOU1) to 4.211 (PEOU3), implying a trend towards the higher end of the 5-point scale. The dispersion of the data is represented by the standard deviation values ranging from 0.858 to 1.372. The kurtosis and skewness of the data ranged from -1.299 to 0.344 and -1.066 to -0.315 respectively. The kurtosis values for all items are negative and below 3 ranging from -1.299 (PEOU2), -1.088 (PEOU1), -0.054 (PEOU4), and 0.344 (PEOU3), displaying a platykurtic distribution. The skewness values are relatively low for all items ranging from -1.066 (PEOU4), -0.972 (PEOU3), -0.532 (PEOU1), and -0.315 (PEOU2), displaying a left skewed distribution. Table 3 reports the descriptive statistics of Perceived Ease of Use indicator items.

Table 3

Descriptive Statistics of PEOU Indicator Items

	Min	Max	Mean	Std Dev	Kurtosis	Skewness
PEOU1	1	5	3.755	1.372	-1.088	-0.532
PEOU2	1	5	3.672	1.331	-1.299	-0.315
PEOU3	1	5	4.211	0.858	0.344	-0.972
PEOU4	1	5	4.157	1.203	-0.054	-1.066

Source: Author's calculations using primary data.

Perceived Usefulness

A detailed summary of the descriptive statistics derived from PLS for four items (PU1 to PU4) was reported for a total of 130 participants. For the range of all the items, there is a

minimum score of 1 and a maximum score of 5. The mean values illustrate the central tendency of the data ranging from 3.742 (PU3) to 4.028 (PU4), implying a trend towards the higher end of the 5-point scale. The dispersion of the data is represented by the standard deviation values ranging from 1.267 to 1.352. The kurtosis and skewness of the data ranged from -1.194 to -0.193 and -0.946 to -0.456 respectively. The kurtosis values for all items are negative and below 3 ranging from -1.194 (PU3), -0.55 (PU1), -0.464 (PU2), and -0.193 (PU4), displaying a platykurtic distribution, which is flatter compared to a normal distribution with fewer outliers. Similarly, the skewness values are relatively low for all items ranging from -0.946 (PU4), -0.883 (PU1), -0.801 (PU2), and -0.456 (PU3), displaying a left skewed distribution. Table 4 reports the descriptive statistics of Perceived Usefulness indicator items.

Table 4

Descriptive Statistics of PU Indicator Items

	Min	Max	Mean	Std Dev	Kurtosis	Skewness
PU1	1	5	3.986	1.328	-0.55	-0.883
PU2	1	5	3.960	1.270	-0.464	-0.801
PU3	1	5	3.742	1.352	-1.194	-0.456
PU4	1	5	4.028	1.267	-0.193	-0.946

Source: Author's calculations using primary data.

Attitude Toward Use

A detailed summary of the descriptive statistics derived from PLS for four items (ATU1 to ATU4) was reported for a total of 130 participants. For the range of all the items, there is a minimum score of 1 and a maximum score of 5. The mean values illustrate the central tendency of the data ranging from 2.248 (ATU1) to 3.587 (ATU4), implying a trend towards the lower end of the 5-point scale. The dispersion of the data is represented by the standard deviation values ranging from 1.035 to 1.287. The kurtosis and skewness of the data ranged from -1.202 to 0.428 and -0.177 to 0.649 respectively. The kurtosis values for all items are below 3 ranging from -

1.202 (ATU4), -0.509 (ATU3), 0.06 (ATU2), and 0.428 (ATU1), displaying a platykurtic distribution, which is a relatively flat distribution, particularly for ATU2, with kurtosis value of 0.06. Three out of the four items exhibited a positive skewness but varied in magnitude. ATU1 and ATU2 exhibited higher skewness values of 0.649 and 0.615 respectively, indicating a distribution towards the lower end with a longer tail towards the higher ratings. ATU3, with the skewness value of 0.318 suggested a symmetrical distribution around the mean. Lastly, the skewness value for ATU4 is -0.177 implied a relatively flat distribution with few outliers. Table 5 reports the descriptive statistics of Attitude Toward Use indicator items.

Table 5

Descriptive Statistics of ATU Indicator Items

	Min	Max	Mean	Std Dev	Kurtosis	Skewness
ATU1	1	5	2.248	1.035	0.428	0.649
ATU2	1	5	2.804	1.112	0.06	0.615
ATU3	1	5	3.263	1.126	-0.509	0.318
ATU4	1	5	3.587	1.287	-1.202	-0.177

Source: Author's calculations using primary data.

Behavioral Intention

A detailed summary of the descriptive statistics derived from PLS for three items (BI1 to BI3) was reported for a total of 130 participants. For the range of all the items, there is a minimum score of 1 and a maximum score of 5. The mean values illustrate the central tendency of the data ranging from 3.747 (BI3) to 4.014 (BI2), implying a trend towards the higher end of the 5-point scale. The dispersion of the data is represented by the standard deviation values ranging from 1.307 to 1.400. The kurtosis and skewness of the data ranged from -1.06 to -0.413 and -1.02 to -0.441 respectively. The kurtosis values for all items are negative and below 3 ranging from -1.06 (BI3), -0.673 (BI1), and -0.413 (BI2), displaying a platykurtic distribution, which is flatter compared to a normal distribution with fewer outliers. Like the variable of PEOU

and PU, the skewness values are low for all items ranging from -1.02 (BI2), -0.776 (BI1), and -0.441 (BI3), displaying a left skewed distribution. Table 6 reports the descriptive statistics of Behavioral Intention indicator items.

Table 6

Descriptive Statistics of BI Indicator Items

	Min	Max	Mean	Std Dev	Kurtosis	Skewness
BI1	1	5	3.886	1.359	-0.673	-0.776
BI2	1	5	4.014	1.400	-0.413	-1.02
BI3	1	5	3.747	1.307	-1.06	-0.441

Source: Author's calculations using primary data.

Measurement Model Analysis

For data analysis, the PLS-SEM techniques employed using Smart-PLS version 4 to assess measurements and structural models. In consonance with Hair et al. (2019), the following four assessments of measurement models in PLS-SEM included the factors' loading, convergent validity, reliability of internal consistency, and discriminant validity.

Factor Loadings

Factor loading is defined as "the extent to which each of the items in the correlation matrix correlates with the given principal component. Factor loadings can range from -1.0 to 1.0, with higher absolute values indicating a higher correlation of the items with the underlying factor" (Pett, Lackey & Sullivan, 2003, p. 299). All the items except for ATU1 in the study had a factor loading greater than the recommended value of 0.50 (Sarstedt et al., 2021). Henceforth, ATU1 and PEOU3 have been removed from the model. The complete list of factor loadings is presented in Table 7.

Table 7

Factor Loading

	ATU	BI	PEOU	PU
ATU2	0.768			
ATU3	0.888			
ATU4	0.927			
BI1		0.892		
BI2		0.922		
BI3		0.893		
PEOU1			0.878	
PEOU2			0.914	
PEOU4			0.84	
PU1				0.888
PU2				0.911
PU3				0.879
PU4				0.847

Source: Author's calculations using primary data.

Indicator Multicollinearity

Fornell and Bookstein (1982) defined Variance Inflation Factor (VIF) statistics as the assessment of any potential multicollinearity amongst the indicators. Sarstedt et al. (2021) elucidates that multicollinearity is not detrimental to the study if the VIF value is lower than the value of 5.0. All the indicators presented VIF values that ranged between 1.545 to 3.231 which is lower than the recommended threshold of 5.0. The completed list of multicollinearity statistics for indicators is presented in Table 8.

Table 8

Multicollinearity Statistics (VIF) for Indicators

	VIF
ATU2	1.545
ATU3	2.392
ATU4	2.68
BI1	2.593
BI2	3.079
BI3	2.279
PEOU1	2.293
PEOU2	2.401
PEOU4	1.823
PU1	2.59

PU2	3.231
PU3	2.664

Source: Author's calculations using primary data.

Convergent Validity

"Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement. The idea is that two or more measures of the same thing should covary highly if they are valid measures of the concept" (Bagozzi, Yi & Phillips, 1991, p. 425). In this study, Average Variance Extracted (AVE) was used to assess and justify convergent validity. Fornell (1981) asserted that the AVE value must be greater than or equal to the recommended value of 0.50 before convergent validity can be established. The AVE values for all the constructs ranged between 0.746 to 0.815 which is greater than the recommended value of 0.50. Henceforth, justifying the establishment of convergent validity in this study. Table 9 presents the complete list of AVE values.

Table 9

Construct Convergent Validity

	Average variance extracted (AVE)
ATU	0.746
BI	0.815
PEOU	0.771
PU	0.777

Source: Author's calculations using primary data.

Internal Consistency Reliability

Mark (1996) defines, "Reliability is defined as the extent to which a measuring instrument is stable and consistent. The essence of reliability is repeatability. If an instrument is administered repeatedly, will it yield the same results" (p. 285). In this study, Cronbach Alpha (CA), and Composite Reliability (CR) shall be used for establishing reliability. The values for CA and CR should be from 0 to 1. The Cronbach Alpha values ranged between 0.696 to 0.833

whereas Composite Reliability statistics ranged between 0.800 to 0.898. The results for construct reliability analysis are presented in Table 10. Cronbach Alpha and Composite Reliability as indicators of reliability have reliability statistics exceeding the required threshold of 0.70, for Cronbach Alpha ranged between 0.829 to 0.904 and Composite Reliability ranged between 0.869 to 0.911 (Hair, Ringle & Sarstedt, 2011). Henceforth, the construct reliability is established in this study.

Table 10

Construct Reliability Analysis (Cronbach Alpha and Composite Reliability)

	Cronbach alpha	Composite reliability
ATU	0.829	0.869
BI	0.886	0.889
PEOU	0.853	0.874
PU	0.904	0.911

Source: Author's calculations using primary data.

Discriminant Validity

"Discriminant validity is the degree to which the measures of different concepts are distinct. The notion is that if two or more concepts are unique, then valid measures of each should not correlate too highly" (Bagozzi et al., 1991, p. 425). The discriminant validity was determined by a combination of Fornell-Larcker criteria, cross loadings, and HTMT ratio.

Fornell-Larcker Criterion. In this study, discriminant validity is established as the square root of AVE (in Bold and Italics) for all the constructs that were greater than its correlation with other constructs (Fornell, 1981). For example, the value of ATU factor (0.864) is greater than all its shared variances: the BI factor (0.576), the PEOU factor (0.533), and the PU factor (0.748). Henceforth, justifying the establishment of discriminant validity in this study. The complete list of square roots of AVE was presented in Table 11.

Table 11

Discriminant Validity – Fornell & Larcker Criterion

	ATU	BI	PEOU	PU
ATU	***0.864***			
BI	0.576	***0.903***		
PEOU	0.533	0.640	***0.878***	
PU	0.748	0.663	0.637	***0.881***

Note: Bold and Italics represents the Square-root of AVE.

Cross Loadings. Cross loadings refer to the assessment of the loading strength of an item on the underlying construct amongst all the remaining constructs of interest. The factor loading of all the items is greater than the underlying construct as compared to the other constructs in the study, this is aligned to the assertion by Wasko and Faraj (2005). The outer loadings for every construct were greater than the other constructs' loadings. For example, the indicator ATU4 within the construct of ATU obtained the highest loading of 0.927 when compared to its other constructs' loadings, e.g., BI = 0.577, PEOU = 0.311, and PU = 0.519. Henceforth, it is concluded that discriminant validity is established in this study. Table 12 presents cross loadings for all the constructs.

Table 12

Discriminant Validity – Cross Loadings

	ATU	BI	PEOU	PU
ATU2	0.768	0.378	0.311	0.519
ATU3	0.888	0.512	0.494	0.622
ATU4	0.927	0.577	0.541	0.767
BI1	0.508	0.892	0.620	0.556
BI2	0.484	0.922	0.534	0.606
BI3	0.564	0.893	0.581	0.630
PEOU1	0.378	0.517	0.878	0.531
PEOU2	0.551	0.603	0.914	0.642
PEOU4	0.453	0.559	0.840	0.485
PU1	0.683	0.676	0.600	0.888
PU2	0.657	0.619	0.634	0.911
PU3	0.712	0.472	0.562	0.879
PU4	0.581	0.559	0.426	0.847

Source: Author's calculations using primary data.

Heterotrait-Monotrait (HTMT) Ratio. HTMT ratio is established on the calculation of differences of the association between the constructs and this ratio plays a pivotal role in establishing discriminant validity. However, the threshold for HTMT ratio has yet to reach a consensus among scholars, Kline (2011) proposed a threshold of 0.85 or less, while Teo, Srivastava and Jiang, (2008) recommended a liberal threshold of 0.90 or less. The HTMT results in Table 13 display that the HTMT ratio for this study is lower than the required threshold of 0.90, therefore, discriminant validity evaluation supports the discriminant validity for this study.

Table 13

Discriminant Validity – HTMT

	ATU	BI	PEOU	PU
ATU				
BI	0.659			
PEOU	0.609	0.734		
PU	0.849	0.735	0.710	

Source: Author's calculations using primary data.

Structural Model Analysis

The next course of action in data analysis is to examine the significance and strength of the hypothesized relationships in the proposed model for this study. Investigating the model's predictive powers is an essential component of the structural model's calculation, including the examination of path coefficients, indirect effects, total effects, outer loadings, as well as other invaluable insights. According to Hair et al. (2019), the PLS-SEM technique can overcome the distinct dichotomy between explanations emphasized in academic research and prediction, which established the basis for managerial implications. Path analysis was employed to examine the direct and indirect linear relationship between the constructs in this study. Lei and Wu (2007) further elaborated that path analysis is one of the best approaches for studying the relationship

between constructs, as well as uncovering the causality between constructs since the causal relationships present a profound and authentic understanding.

SEM is often referred to as causal modelling (Wuensch, 2009). Almahamid and Rub (2011) described the use of linear regression analysis to establish the allotment of a construct's variance in the model, and it was represented by standardized regression coefficients, R^2. Furthermore, standardized regression coefficients, R^2, are often employed to determine the relative significance of predictor variables (Anglim, 2007), while path coefficients indicate the strength of the relationship between the variables (Chine, 1998). Figure 2, 3 and Table 14 report the path coefficient and loading value of each path lines within the PLS algorithm procedure. The highest t-value was derived from the path between PU → ATU (t = 7.930), while the lowest value came from the relationship between PEOU → ATU (t = 0.095). Three out of the five hypotheses proposed in this study were supported. The relationship between PEOU → PU (β = 0.637, t = 7.586, $p < 0.001$), H1 supported. Similarly, the relationship between PU → ATU (β = 0.688, t = 7.930, $p < 0.001$), H3 supported. In addition, the relationship between PU → BI (β = 0.528, t = 4.273, $p < 0.001$), H4 supported. For the remaining two hypotheses, PEOU → ATU (β = 0.095, t = 0.938, $p = 0.348 > 0.05$), H2, and ATU → BI ($\beta = 0.181$, t = 1.516, $p = 0.130 > 0.05$), H5, indicated that ATU does not have any significant impact on BI, likewise, PEOU does not have any significant impact on ATU. Therefore, the two hypotheses are not supported in this study.

Table 14

Structural Path Analysis Result

Number Hypothesis	Hypothesized relationships	Path	T-Values	*p*-Values	Results
H1	PEOU → PU	0.637	7.586	0.000	Accepted
H2	PEOU → ATU	0.095	0.938	0.348	Rejected

H3	PU → ATU	0.688	7.930	0.000	Accepted
H4	PU → BI	0.528	4.273	0.000	Accepted
H5	ATU → BI	0.181	1.516	0.130	Rejected

Source: Author's calculations using primary data.

Figure 2

Path Coefficient Results for the Conceptual Model of this Study

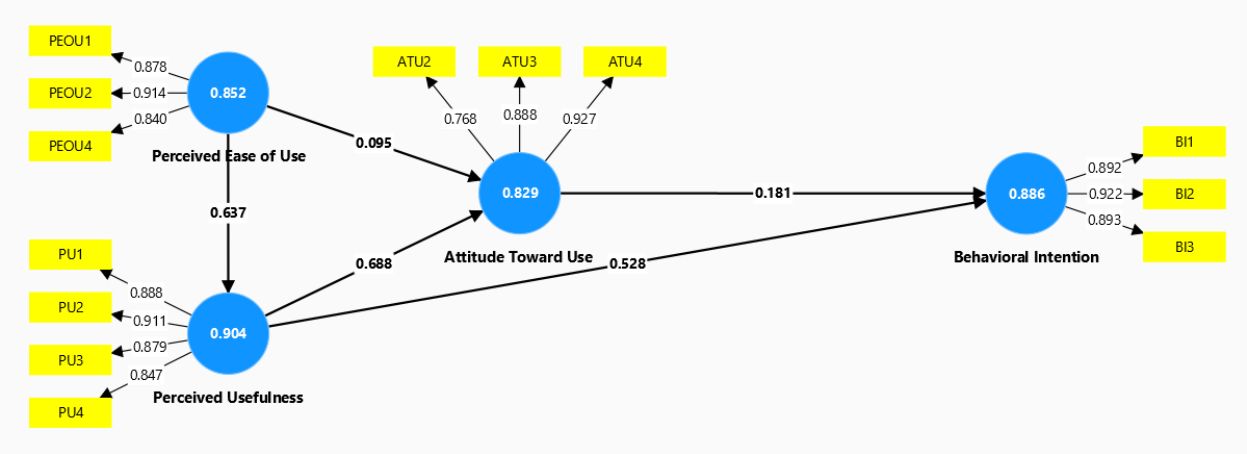
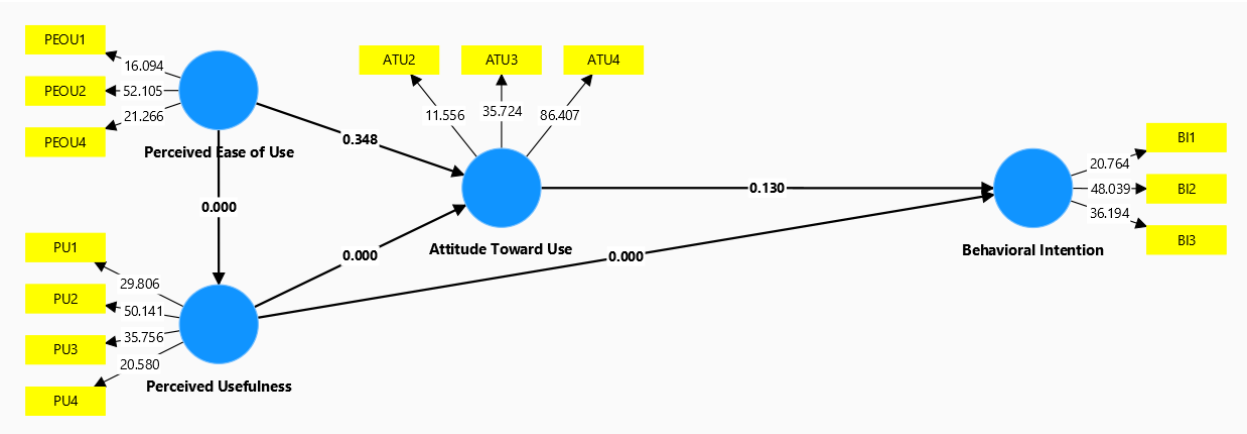


Figure 3

Path T-Values Results for the Conceptual Model of this Study



Chapter Summary

This chapter presented a robust and comprehensive analysis of the data through PLS-SEM. Out of the five hypotheses, three were accepted and supported by the analysis of data collected from the questionnaire. Through the PLS-SEM techniques employed in this study, it was

revealed that there is no significant relationship between perceived ease of use and attitude toward use of online learning from the quantitative data ($\beta = 0.095$, t = 0.938, $p = 0.348 > 0.05$), H2 was not supported. Correspondingly, it was also reported that there is no significant relationship between attitude toward use and behavioral intention to use online learning from the quantitative data ($\beta = 0.181$, t = 1.516, $p = 0.130 > 0.05$), H5 was not supported.

CHAPTER FIVE: DISCUSSION

Introduction

This study is first of its kind to employ TAM to investigate the factors affecting the learners' acceptance of online learning in Singapore. Through this study, the application of TAM as a conceptual framework for gaining insights of the predictors of the use of online learning by learners. According to the conceptual framework developed from the TAM, the hypotheses were theorized to delve into the underlying relationship between the constructs of TAM, and in turn affecting the learners' acceptance of online learning.

The chapter begins with a recap of the research question and hypotheses developed for this study. Next, the findings pertaining to the five hypotheses that developed to address the core of the research question were elaborated in detail. Lastly, the chapter concluded with a summary of the discussion findings derived in this study.

Research Question and Hypotheses

The central question that is in guidance of this study is as follows:

1. Is there any significant impact of learners perceived ease of use and perceived usefulness on their behavioral intent to use online learning.

The research question is further investigated consistently with the five specific hypotheses that are directly based on the TAM.

H1: PEOU has a significant impact on PU.

H2: PEOU has a significant impact on attitude towards online learning.

H3: PU has a significant impact on attitude towards online learning.

H4: PU has a significant impact on behavioral intention to use online learning.

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

Results Relating to the First Hypothesis

H1: PEOU has a significant impact on PU.

Perceived ease of use has one of the highest path coefficients of 0.637, and it has a significant impact on learners perceived usefulness. Davis (1989) defined PEOU as the extent to which an individual believes that the use of a particular technology will be effortless. This relationship has been corroborated by other research studies (Alqahtani et al., 2017; Al-Rahmi et al., 2019; Bhatiasevi & Yoopetch, 2015; Briz-Ponce et al., 2017; Chang et al., 2017; Ebrahimi et al., 2018; Huang, 2016; Joo et al., 2018; Kim, 2014; Lee, 2009; Luarn and Lin, 2005; Park et al., 2012; Revythi & Tselios, 2019; Salloum et al., 2019; Tao et al., 2019; Zobeidi et al., 2023). This phenomenon is consistent with the findings by Ebrahimi et al. (2018) where the students perceive using the Internet as a simple task, they would also find it very useful in their learning. The research in the field of e-learning also reflected a similar positive relationship between perceived ease of use and perceived usefulness (Demoulin & Coussement, 2020; Faqih, 2013; Ibili et al., 2019; Lee et al., 2009). However, Davis (1989) suggested that while the user may deem the technology as useful in enhancing his or her performance at work, concurrently they may also perceive the adoption of technology as an uphill task and the effort of using the technology outweighed the performance benefits of usage. Naturally, the learners will perceive online learning as useful and effective when they are at ease in using online learning without experiencing any technical difficulties. Most of the respondents were in the age group of 35 – 44 years (34%) and 45 – 54 years (33%) which indicates a dominating presence of mid-career professionals who are more interested in using technology that is simple and easy to use which

sequentially leads to learners perceived usefulness of online learning. Finally, the results indicate that the estimated path coefficient value at 0.637, which is statistically significant at the level, $p < 0.001$. Henceforth, this finding is consistent with the hypothesis that learners perceived ease of use of online learning would significantly impact their perceived usefulness of using online learning.

Results Relating to the Second Hypothesis

H2: PEOU has a significant impact on attitude towards online learning.

From the findings, it was reported that there is no statistically significant positive influence of perceived ease of use on the attitude towards online learning. Perceived ease of use (PEOU) as defined by Davis (1989) is the extent to which an individual believes that the use of a particular technology will be effortless. Unique to the findings of this study, the learners perceived ease of use of online learning does not significantly affect their attitude towards using online learning. This finding is inconsistent from earlier research studies where the perceived ease of use is a predictor for technology acceptance (Agarwal & Prasad, 1999; Arpaci, 2017; Chang et al., 2015; Esteves & Curto, 2013; Hamid et al., 2016; Hess et al., 2014; Hu et al., 1999; Jackson et al., 1997; Mou et al., 2017; Rajan & Baral, 2015; Venkatesh & Brown, 2001; Venkatesh & Davis, 1996; Venkatesh & Davis, 2000). However, Davis (1989) suggested that while the user may deem the technology as useful in enhancing his or her performance at work, concurrently they may also perceive the adoption of technology as an uphill task and the effort of using the technology outweighed the performance benefits of usage. This phenomenon further elucidated the importance of perceived convenience in influencing learners' attitude towards the use of online learning. It might be attributed by the high percentage of respondents reported for internet familiarity (76%) as well as frequency of online learning (43%), which highlighted that the

perceived ease of use of online learning do not affect their attitude especially when the respondents are extremely familiar with internet and frequently engaged in online learning. Finally, the results indicate that the estimated path coefficient value of 0.095 which is considered as less than moderate statistically, and similarly for, which is much greater than the significance level of 0.05. Henceforth, this finding is inconsistent with the hypothesis that learners perceived ease of use of online learning would significantly impact their attitude towards the use of online learning.

Results Relating to the Third Hypothesis

H3: PU has a significant impact on attitude towards online learning.

Perceived usefulness has the highest significance, $p < 0.001$, on attitude towards online learning is the perceived usefulness of online learning. There is a consensus amongst scholars (Al-Gahtani, 2001; Davis, 1993; Esteves & Curto, 2013; Mathwick et al., 2001; Zhou et al., 2010) on the definition of PU which refers to the extent which an individual believes that using a certain technology would improve his or her work performance. Case in point, when the learners perceive the use of online learning as useful and productive, they tend to develop a positive attitude towards the use of online learning. This finding is in consonance with existing research studies that confirm the significance and positive impact of perceived usefulness on learners' attitude towards online learning (Al-Rahmi et al., 2019; Briz-Ponce et al., 2017; Huang, 2016; Huang et al., 2020; Kimathi & Zhang. 2019; Revythi & Tselios, 2019; Salloum et al., 2019; Sukendro et al., 2020). However, this is contrary to the findings by Maheshwari (2021) where the Vietnam students' unfamiliarity with online learning could lead to their inability to perceive the usefulness of the technology. Most of the respondents were in the age group of 35 – 44 years (34%) and 45 – 54 years (33%) which indicates a dominating presence of mid-career

professionals who focused more on the use of technology to improve work performance which sequentially leads to learners' attitude towards online learning. Finally, the results indicate that the estimated path coefficient value at 0.688, which is statistically significant at the level, $p < 0.001$. Henceforth, this finding is consistent with the hypothesis that perceived usefulness of the use of online learning has a significant impact on learners' attitude towards online learning.

Results Relating to the Fourth Hypothesis

H4: PU has a significant impact on behavioral intention to use online learning.

According to the findings, the Perceived usefulness (PU) is a strong predictor of the behavioral intention to use online learning, with a high path coefficient of 0.528. Perceived usefulness (PU) is defined as the extent to which an individual believes that using a certain technology would improve his or her work performance (Al-Gahtani, 2001; Davis, 1993; Esteves & Curto, 2013; Mathwick et al., 2001; Zhou et al., 2010). When an individual perceives the use of online learning to improve their academic performance, then they will likely be keener to use online learning. This is in consonance with many mainstream literature (Alqahtani et al., 2016; Al-Rahmi et al., 2019; Calisir et al., 2014; Fallah Haghighi et al., 2018; Hariguna, 2019; Huang et al., 2020; Salloum et al., 2019; Tao et al., 2019; Tarhini et al., 2017). This phenomenon is supported by research studies in different domains such as cloud service (Huang, 2016), e-learning (Al-Gahtani, 2016; Al-Rahmi et al., 2019; Elkaseh et al., 2016; Hsia et al., 2014; Lee et al., 2014; Salloum et al., 2019; Tarhini et al., 2014; Tarhini et al., 2016). The findings from this study is also consistent with Li et al. (2012) and Tao et al. (2019) who reported the indirect influence of perceived usefulness on learners' behavioral intention to use online learning through attitude. Most of the respondents were in the age group of 35 – 44 years (34%) and 45 – 54 years (33%) which indicates a dominating presence of mid-career professionals who focused more on

the use of technology to improve work performance which sequentially leads to learners' behavioral intention to use online learning. Finally, the results indicate that the estimated path coefficient value at 0.528, which is statistically significant at the level, $p < 0.001$. Henceforth, this finding is consistent with the hypothesis that perceived usefulness of the use of online learning has a significant impact on learners' behavioral intention to use online learning.

Results Relating to the Fifth Hypothesis

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

From the findings, it was discovered that there is no statistically significant positive impact of attitude towards online learning on individuals' behavioral intention to use online learning. Attitude towards the use of technology can be defined as the potential user's affective assessment of the risk and benefit of using the technology (Ndubisi, 2006). Unique to this study, attitude refers to an individual's assessment towards the use of online learning. The behavioral intention of the students is not motivated by their perceptions or assessment of the potential risks and/or benefits of using online learning. This finding poses a contradiction to several studies' findings where there is a significant effect of attitude on the intention to use online learning (Al-Rahmi et al., 2019; Buabeng-Andoh, 2021; Calisir et al., 2014; Chang et al., 2017; Hanif et al., 2018; Hussein, 2017; Lee et al., 2013; Sukendro et al., 2020). However, the findings from this study coincide with the original TAM assertions coupled with the findings from Teo and Schalk (2009) where the attitude toward computer use has no significant influence on intention to use. It might be due to the majority of the respondents (55%) who either engaged in online learning for half the time or sometimes coupled with 2% of the respondents who never engage in any form of online learning, which highlighted individual who does not frequently engage in online learning

is not affected by the affective assessment of the risk and benefit in using the technology which in turn drives behavioral intention to use online learning. The direct effects of attitude toward online learning on behavioral intention to use online learning was only approaching significance, $p = 0.181$, which is greater than the significance level of 0.05. Henceforth, this finding is inconsistent with the hypothesis that learners' attitude towards online learning has a significant impact on their behavioral intention to use online learning.

Chapter Summary

This chapter presented a detailed discussion of the results of the data analysis. The crux underlying the research question is the investigation of any significant impact of learners perceived ease of use and perceived usefulness on their behavioral intent to use online learning. Out of the five hypotheses, three were accepted and supported by the analysis of data collected from the questionnaire. For the construct of perceived ease of use, it was reported that the first hypothesis was supported, which refers to the learners perceived ease of use of online learning would significantly impact their perceived usefulness in using online learning. However, the second hypothesis was not supported, which hypothesized the impact of perceived ease of use of online learning on the learners' attitude towards the use of online learning. The second construct, perceived usefulness, was reported that both hypotheses were accepted and supported. The perceived usefulness of the use of online learning significantly influenced the learners' attitude towards online learning is the third hypothesis while the perceived usefulness of the use of online learning significantly influenced the learners' behavioral intention to use online learning is the fourth hypothesis. Finally, the last hypothesis which is formulated as the learners' attitude towards online learning has a significant impact on their behavioral intention to use online learning, was not supported.

CHAPTER SIX: CONCLUSION

Introduction

The unprecedented COVID-19 pandemic inadvertently accelerated the push for full online learning and the complete transition from all in-person learning to online learning. This unprecedented shift has led to profound changes to learning as we know it. This shift to online learning is prevalent globally, even in developing countries where it was not previously well-established (Heng & Sol, 2021). The impact of COVID-19 pandemic goes beyond the borders of countries worldwide, including Singapore. Henceforth, justifying the basis for this study to investigate the factors affecting the learners' acceptance of online learning using Technology Acceptance Model (TAM) as the theoretical basis for this research.

The chapter begins with a recap of the research question and hypotheses developed for this study. Next, the conclusions derived from the data of the study followed by the examination of the study's limitations. Lastly, the chapter concluded with recommendations for future research and concluding remarks for this study.

Research Question and Hypotheses

The central question that is in guidance of this study is as follows:

1. Is there any significant impact of learners perceived ease of use and perceived usefulness on their behavioral intent to use online learning.

The research question is further investigated consistently with the five specific hypotheses that are directly based on the TAM.

H1: PEOU has a significant impact on PU.

H2: PEOU has a significant impact on attitude towards online learning.

H3: PU has a significant impact on attitude towards online learning.

H4: PU has a significant impact on behavioral intention to use online learning.

H5: Attitude towards online learning has a significant impact on behavioral intention to use online learning.

Conclusion

In conclusion, the researcher formulated five hypotheses from the key research question aim at investigating the factors influencing online learners' acceptance of online learning using the TAM constructs, such as perceived ease of use, perceived usefulness, attitude toward use, and behavioral intention. As articulated earlier, the key objective of this research was to determine the factors affecting online learners' acceptance of online learning in the post-secondary institution, particularly polytechnic. The findings of this study, justified by three out of the five hypotheses accepted statistically, suggest that the TAM can elucidate learners' behavioral intention to online learning to a large extent. The present study reported that perceived ease of use of online learning affected both perceived usefulness and attitude toward use of online learning. However, the impact of these relationships is antithesis, with the impact of perceived ease of use of online learning on learners' perceived usefulness being statistically significant ($\beta = 0.637$, t = 7.586, $p < 0.001$), and the impact of perceived ease of use of online learning on learners' attitude toward use of online learning being statistically significant ($\beta = 0.095$, t = 0.938, $p = 0.348 > 0.05$). Likewise, it was reported in this study that perceived usefulness affected both attitude toward use ($\beta = 0.688$, t = 7.930, $p < 0.001$) and behavioral intention to use ($\beta = 0.528$, t = 4.273, $p < 0.001$) online learning in a statistically significant manner. The attitude toward use of online learning did not have any significant predictive

relationship with behavioral intention to use online learning, $\beta = 0.181$, t = 1.516, $p = 0.130 > 0.05$.

Limitations of the Study

Whilst this study provides invaluable insights into factors affecting learners' acceptance of online learning in the post COVID-19 era, it is fundamental to acknowledge the inherent limitations. Limitations are not uncommon in research, and it belongs to an aspect within the study that researchers recognize as potential negative impact on the research outcomes (Gay et al., 2012).

Reduced Generalizability

Many scholars defined generalizability as the extent to which a study's findings can be applied to a broader spectrum of individuals or schemes (Maxwell, 1992; Polit & Beck, 2010). This research is conducted within the post-secondary education institutions within Singapore which includes publicly funded universities, polytechnics, and private institutes, and the data source originated from polytechnics only. Therefore, the findings of this study may not be generalizable across the different types of post-secondary education institutions. In addition, participation to this study is essentially voluntary which is a plausible risk to the generalizability of the results.

Convenience Sampling

This study employed non-probability sampling method (Omair, 2014; Tyrer & Heyman, 2016), particularly convenience sampling, due to practical considerations. As a result, the selection bias was introduced to the study. Convenience sampling is the least expensive method as it relies on the researcher's reach to individuals who can be reached easily or have

coincidentally interacted with during the period of the study. The use of convenience sampling may pose a threat to the generalizability of the study's findings to a wide-ranging population.

Recommendations for Future Research

The significance and implications of online learning in the context of post COVID-19 setting was once again illuminated by the findings of this study. Specifically, there are two recommendations for future researchers to consider when carrying out research in the field of education.

Longitudinal Studies

This research evaluated individuals' perceptions and views at specific timestamp, particularly in the post pandemic phase. However, it was emphasized by Venkatesh et al. (2003) that people's perception will change over time, as their experiences deepen. Therefore, future researchers should consider the conduct of longitudinal studies to gain insights into how individuals' perceptions and preferences develop over time.

Alternative Sampling Methods

This study adopts a quantitative research design, utilizing convenience sampling as the data collection method. Inevitably, there are affordances that convenience sampling provides, there are also potential drawbacks including sampling errors, inability to hypothesize the findings beyond the sampled group, and the reduced generalizability of the research outcomes. Henceforth, future researchers should seek different sampling methods apart from convenience sampling, to achieve a representation of the sample population.

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APPENDIX A

Survey: Investigation into the Factors Affecting Learners' Acceptance of Online Learning using the TAM in the Post-COVID Era in Singapore

Instruction

Welcome to the research study!

We are interested in investigating the acceptance of online learning by learners using the Technology Acceptance Model (TAM). For this study, you will be presented with questions related to the four variables of TAM namely, Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Attitude Towards Use (ATU) and Behavorial Intention (BI). Then, you will be asked to answer some questions about it. Your responses will be kept strictly confidential.

The study should take you around 15 minutes to complete. Your participation in this research is voluntary. You have the right to withdraw at any point during the study. The Principal Investigator of this study is Mr Tan Guo Qiang, and he can be contacted at gtan@my.ggu.edu.

By clicking the button below, you acknowledge:

1. Your participation in the study is voluntary.
2. You are 18 years of age.
3. You are aware that you may choose to terminate your participation at any time for any reason.

Gender: (Male, Female, Non-binary/ Third gender, Prefer not to say)

Age: (Under 18, 18 – 24, 25 – 34, 35 – 44, 45 – 54, 55 – 64, 65 or older)

Internet Experience: (Not familiar at all-Slightly familiar-Moderately familiar-Very familiar-Extremely familiar)

Frequency of Online Learning: (Never-Sometimes-About half the time-Most of the time-Always)

Perceived Ease of Use (strongly disagree-somewhat disagree-neither agree nor disagree-somewhat agree-strongly agree)

1. My interaction with online learning is clear and easy to understand.
2. It is easy for me to gain proficiency in online learning.
3. Using online learning is more flexible than traditional learning.
4. Online learning is easy for me.

Perceived Usefulness (strongly disagree-somewhat disagree-neither agree nor disagree-somewhat agree-strongly agree)

5. I would find online learning useful for my learning.
6. Online learning enables me to accomplish the task quickly.
7. Online learning increases productivity in online learning.
8. Online learning enables me to gain more knowledge.

Attitude Toward Use (strongly disagree-somewhat disagree-neither agree nor disagree-somewhat agree-strongly agree)

9. Using online learning has negative impact on learning.
10. Online learning increases learner engagement during the learning process.
11. Online learning is fun to use.
12. I like online learning.

Behavioral Intention (strongly disagree-somewhat disagree-neither agree nor disagree-somewhat agree-strongly agree)

13. I intend to use online learning in the next 6 months.

14. I predict that I would use online learning in the next 6 months.

15. I plan to use online learning in the next course that I would be attending.