

THE INFLUENCE OF ONLINE LEARNING READINESS
ON STUDENT RETENTION IN MALAYSIAN PRIVATE
HIGHER EDUCATION INSTITUTIONS

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**THE INFLUENCE OF ONLINE LEARNING READINESS ON
STUDENT RETENTION IN MALAYSIAN PRIVATE HIGHER
EDUCATION INSTITUTIONS**

By

KHONG ENG MUN

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ABSTRACT

THE INFLUENCE OF ONLINE LEARNING READINESS ON STUDENT RETENTION IN MALAYSIAN PRIVATE HIGHER EDUCATION INSTITUTIONS

Khong Eng Mun

The global educational landscape underwent significant changes with the onset of the COVID-19 pandemic. Many higher education institutions (HEIs) proceed with a rapid shift from traditional face-to-face learning to online platforms. Students face numerous challenges in adapting to online learning, resulting in low satisfaction and high dropout rates. Thus, students must possess online learning competencies that enable them to navigate online learning environments effectively. Drawing on Tinto's Social Integration Model (SIM), this study examines the relationships between student online learning readiness, student satisfaction, institutional support, and student retention in private HEIs. The study employed a cross-sectional survey design, utilising a combination of purposive and quota sampling to collect data from students who have experience with online learning in private HEIs. SmartPLS software was employed to examine the hypothesised relationships. The Structural Equation Model (SEM) analysis comprised of 419 voluntary student participants from private HEIs. The results revealed that student online learning readiness (encompassing technical, communication, social competencies with classmates and instructor, and self-regulated learning) positively influenced student

satisfaction, which, in turn, influenced student retention. Further, student satisfaction partially mediated the relationship between technical competencies and retention and fully mediated the relationships between social competencies with classmates, social competencies with instructors, and self-regulated learning competencies, and retention. Surprisingly, institutional support did not significantly moderate the relationship between student satisfaction and retention, contrary to the initial hypothesis. However, a notable positive association was found between institutional support and student retention. These findings hold substantial implications for higher education institutions, policymakers, and society, offering valuable insights into students' perceptions of their online learning competencies and satisfaction. The insights of the study provide educational institutions with crucial information to enhance student interest and retention from an online learning perspective.

Keywords: Online learning readiness, Competencies, Satisfaction, Institutional Support, Student Retention

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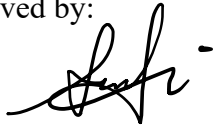
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APPROVAL SHEET

This dissertation entitled “**THE INFLUENCE OF ONLINE LEARNING READINESS ON STUDENT RETENTION IN MALAYSIAN PRIVATE HIGHER EDUCATION INSTITUTIONS**” was prepared by KHONG ENG MUN and submitted as partial fulfillment of the requirements for the degree of Master of Philosophy at Universiti Tunku Abdul Rahman.

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Yours truly,



(Khong Eng Mun)

DECLARATION

I, Khong Eng Mun, hereby declare that the dissertation is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.



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Date 30 December 2023

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LIST OF ABBREVIATIONS

CMB	Common method bias
CMC	Computer-mediated communication
COVID-19	Coronavirus disease
DOSM	Department of Statistics Malaysia
GPA	Grade point average
HEIs	Higher education institutions
ICT	Information and communication technology
LMS	Learning management system
MCMC	Malaysian Communications and Multimedia Commission
MEB	Malaysian Education Blueprint
MQF	Malaysian Qualifications Framework
MQA	Malaysian Qualifications Agency
MSU	Management & Science University
MOOC	Massive open online course
MOE	Ministry of Education
MOHE	Ministry of Higher Education
MDP	Model of the dropout process
MCO	Movement Control Order
MMU	Multimedia University
OSLQ	Online self-regulated learning questionnaire
OUM	Open University Malaysia
PLS	Partial least squares
PDF	Portable document format

PHEIA	Private Higher Education Institutions Act
QS	Quacquarelli Symonds
QR	Quick response
SETARA	Rating System for Malaysian Higher Education Institutions
SRL	Self-regulated learning
SEM	Structural equation modelling
SIM	Student integration model
SOLR	Student online learning readiness
T&L	Teaching and Learning
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UUCA	Universities and University Colleges Act
UM	University of Malaya
UniKL	Universiti Kuala Lumpur
UNITEN	Universiti Tenaga Nasional
UNITAR	Universiti Tun Abdul Razak
UTAR	Universiti Tunku Abdul Rahman
WebCT	Web course tools

CHAPTER 1

INTRODUCTION

1.0 Introduction

Chapter 1 serves as an introduction to the study that provides a comprehensive overview of the study background, including the context and key factors that led to its inception. Furthermore, this chapter identifies and explains the specific problems that the study aims to address, outlining the research questions and objectives that guide the investigation. Additionally, it describes the significance of the study and the scope of the study. Finally, Chapter 1 concludes with a cohesive and succinct summary of the overall discussion, setting the stage for the subsequent chapters to delve deeper into the research questions and methods.

1.1 Background of Study

1.1.1 Evolution of Online Learning in Education Worldwide

Higher education has experienced a revolutionary transformation fuelled by advancements in educational technology and pedagogical approaches. The traditional model of face-to-face courses, characterised by objectivist teaching methods and a teacher-centred approach, is undergoing a transition towards online and hybrid courses that embrace constructivist principles and student-centred pedagogy, supported by digital technology. As a result, many institutions are starting to replace traditional face-to-face classes with online learning options (Bryson & Andres, 2020).

The history of online learning is fascinating because it shows how individuals and institutions have contributed to the advancement of education, experiencing a new form of exchange of knowledge and skills worldwide (Alsaaty et al., 2016). In the 1980s and 1990s, there was tremendous innovation and growth of online learning in education and networking at most institution levels. The first fully online course which offered non-credit “mini-courses” and executive training programmes was introduced back in 1981 (Harasim, 2000). This pioneering education model had immense potential to redefine the design and delivery of education. In the early stage of online course offering, it was found to be long textual lectures, where no question and answer approach, and no active participation of students with long periods of virtual silence (Harasim, 2000). Such initial observations impacted the evolution of online learning to be

involved in more collaborative learning activities (Brindley et al., 2009; Hiltz & Wellman, 1997).

By the time World Wide Web's invention in 1992 was made known to online education, it was more accessible and allowed for the emergence of new teaching models. The web has broadened the choice of online courses available because it is simple to use and allows the capability for multimedia presentation (Harasim, 2000; Owston, 1997). Telecommunications and the knowledge revolution have made human communication and collaboration more extensive and faster. It brought about new types of economic activity, resulting in the knowledge economy, and required fundamental reforms in education.

In 1995, the Web led to the development of the first learning management systems (LMSs), like Web Course Tools (WebCT), which subsequently became Blackboard. LMSs offer an online teaching environment, in which content can be loaded and organised, and offer 'spaces' for learning goals, assignment questions, student activities, and discussion forums among others. The first fully online credit courses began to appear in 1995, with some utilising LMSs, and others just loading materials such as PDFs or slides. The majority of the materials were graphics and text. LMSs became the key means of providing online learning until the lecture capture systems appeared around 2008 (T. Bates, 2014). Recordings were available online, allowing students to review lectures outside of the classroom environment (Watt et al., 2014).

The rapid developments in technology have made online learning easy. Technology defines online learning by explaining how it delivers content, enriches the existing learning environment, and improves student and instructor interactions (Singh & Thurman, 2019). Similar terms such as online learning, e-learning, mobile learning, open learning, online-distance learning, computer-mediated learning, web-based learning, and blended learning have made it mutual for students to use computers connecting to the Internet. They can learn from anywhere, at any time, with any means and in any rhythm (Armstrong-Mensah et al., 2020; Cojocariu et al., 2014; Dhawan, 2020; Harrison et al., 2017; J. W. Lee & Mendlinger, 2011; J. L. Moore et al., 2011).

By using online learning as an e-learning tool, students can typically access online lessons at their convenience as long as they have Internet access (Nurhaiza & Nurnaddia, 2020). There are two types of online learning modes: synchronous and asynchronous online learning (Shahabadi & Uplane, 2015). The structure of synchronous online learning is that students participate in live-stream classes, which allow them to have real-time interactions with instructors and receive immediate feedback from instructors, while asynchronous online learning is not adequately structured. Learning content is not provided in the form of live stream classes in such an asynchronous learning environment; instead, it is accessible at different forums and learning systems. In this learning setting, immediate feedback and response are impossible (Dhawan, 2020). Hence, synchronous online learning is better in offering several chances for immediate feedback and social interaction with instructors and other students (Francescucci & Rohani, 2019).

Singh and Thurman (2019) conducted a critique of the existing definition of online learning, arguing that it should specify the type of technology used and whether the teaching style is synchronous or asynchronous. As a result, they proposed two distinct definitions of online learning to address this concern. The first definition refers to online learning in a synchronous setting via the internet or online computers, allowing students to interact with instructors and fellow students without being limited by physical location. The second definition pertains to online learning in an asynchronous setting via the internet or online computers, enabling students to interact with instructors and peers at their convenience without the need for physical presence or co-presence online. In addition to the definitions of online learning, Singh and Thurman (2019) also defined online education as education provided in an online setting via the internet, which includes students' online learning experiences that are not constrained by physical location. Additionally, it involves the online delivery of teaching content, and instructors design instructional modules to enhance interactivity and learning in both synchronous and asynchronous settings. By providing these definitions, Singh and Thurman contribute to a clearer understanding of the different modes and approaches of online learning and education.

1.1.2 Higher Education System in Malaysia

The economic output of the educational system is the generation of national human capital. In order to produce enough graduates to satisfy the needs of manpower for the nation's economic growth and to portray Malaysia

as an education centre, particularly in South East Asia, the government has democratised higher education through the Ministry of Education (MOE) as well as encourages the establishment of private higher education institutions (HEIs) in line with its vision of offering access to tertiary education for all qualified students. To ensure quality education and to transform Malaysia into an education centre of excellence, private HEIs are encouraged to comply with the government's requirements and goals (Grapragasem et al., 2014).

The higher education system in Malaysia is organised into public and private HEIs. The University of Malaya (UM) was the country's first public university established in 1959 (University of Malaya, 2021). Public universities are those universities that are directly funded and controlled by the federal government, as well as indirectly by the public sector. As of 2021, the government-funded public HEIs under the Ministry of Higher Education (MOHE) have 20 public universities, 36 polytechnics, and 103 community colleges (Ministry of Higher Education [MOHE], 2022c).

In 1996, there were no private universities and only nine public universities in Malaysia (Mohamad & Awang, 2009). As the democratisation of education has caused rising demand for public higher education, private HEIs were eventually recognised in 1996 and permitted to confer degrees after the introduction of the Private Higher Education Institutions Act (PHEIA) 1996 (Wan et al., 2020; Yeoh, 2014). Although private HEIs were already operating prior to the enactment of PHEIA, nevertheless, under the Universities and University Colleges Act (UUCA) of 1971, the establishment of universities was

still under the exclusive jurisdiction of the government. Hence, prior to the legislative amendments in 1996, private HEIs in Malaysia were considered unlawful and public institutions formally became the exclusive providers of higher education (Wan, 2007). Malaysian higher education has become progressively diversified in terms of providers of education and ways of delivery since the establishment of private HEIs.

The MOHE has authority over all privately funded HEIs, which consist of 53 private universities, 37 private university-colleges, 335 private colleges, and 10 foreign university branch campuses (MOHE, 2022b). Private universities range from those supported by government business agencies, such as Universiti Tenaga Nasional (UNITEN), Universiti Teknologi PETRONAS (UTP), University of Kuala Lumpur (UniKL), and Multimedia University (MMU), to those supported by political parties, e.g., Universiti Tunku Abdul Rahman (UTAR). Local private universities are also can be owned by individuals or organisations (Arokiasamy et al., 2009). Many private universities offer courses at all study levels that are comparable to those offered by public universities. In comparison to colleges or university colleges, private universities offer extensive postgraduate research programmes with bigger campuses cum facilities and award degrees under their names. One of the key reasons for the increased accessibility of private HEIs is that most of these institutions operating in Malaysia have less stringent admission requirements. The courses offered are also geared towards the development of technical skills and do not necessitate any high grades on school examinations. Normally, the

minimum requirement for admission to a private university is of only 5 credits in SPM (Tajudeen & Raja, 2021).

Within the Malaysian Qualifications Framework (MQF), HEIs in Malaysia offer courses that grant certificates, diplomas, bachelor's, master's, and doctoral qualifications. The MQF is a national framework that hierarchically categorises all qualifications and academic levels in higher education according to a series of national standards that have been benchmarked against international best practices (Malaysian Qualifications Agency [MQA], 2015). The MQA is currently the main quality assurance and certifying organisation as defined in the MQA Act 2007. It implements MQF and is responsible for quality assurance and certification of public and private HEIs in Malaysia (MQA, 2017).

The significance of tuition cost in the study lies in its impact on students' university choices. Public universities, whose tuition fees are subsidised by government funding, offer a more affordable option for students. However, these universities often have limited capacity to accommodate a larger number of students due to prerequisites, facilities, and administrative constraints such as resource and personnel shortages (Tajudeen & Raja, 2021). Consequently, many students prefer to enrol in public universities to take advantage of the reduced tuition costs. Conversely, students who are unable to secure a place in a public university may pursue higher education in private universities. In this context, both public and private universities play complementary roles (Wan, 2007; Wilkinson & Ishak, 2005).

Private HEIs have shown that they are capable of meeting the rising need for higher education. They help in reducing the burden of public subsidies on higher education, lowering student outflow for overseas education, and attracting foreign students to study in Malaysia. Private HEIs have complemented public universities by offering higher education in fields such as Economics and Business Studies, Engineering, Medicine and Dentistry, and Information Technology where there is limited capacity in the public sector. As a result, private HEIs have been able to accommodate the overflow of students seeking education in these fields (Grapragasem et al., 2014; Wilkinson & Ishak, 2005).

Based on the Malaysian Education Blueprint (MEB) 2015–2025 for higher education (Ministry of Education [MOE], 2015), in order to make Malaysia one of the top higher education providers in ASEAN, it is targeted that the number of student's enrolment for private HEIs is around 867,000, while public HEIs is approximately 764,000 students by 2025. Private universities play a vital role in achieving the vision of the expected number of students. This is because private universities play a crucial role in raising student enrolment to help the government meet its goal while also ensuring the sustainability of the institutions.

Enrolment refers to students currently pursuing study programmes in a higher educational institution, including student intake for a particular academic session (MOHE, 2022b). The COVID-19 pandemic had a global impact and affected enrolment numbers in Malaysia. In 2020 and 2021, when online

learning became widely implemented in the country, the number of students enrolled in private HEIs decreased. Specifically, there were 537,434 students enrolled in 2020 and 517,580 in 2021. Comparatively, the total enrolment in previous years was 666,617 in 2017, 668,689 in 2018, and 633,344 in 2019 (refer to Figure 1.1). Maintaining stable enrolment depends on both retaining existing students and recruiting new ones. Declining student enrolment in private HEIs can be attributed to retention issues. Therefore, improving student retention rates strategically will help boost enrolment numbers, leading to better services, qualifications, and resources provided by the institutions.

Figure 1.1 displays the data mentioned above and illustrates how a decrease in student enrolment directly impacts the financial resources available to institutions. This, in turn, affects resource allocation for student support services, academic programs, and infrastructure improvements. Limited resources can hinder institutions' ability to provide necessary support systems and interventions that enhance student retention. Following the announcement for all institutions to adopt online learning due to COVID-19, the year-on-year (YoY) enrolment dropped by 15.14% in 2020 (Figure 1.1). By 2021, the number further declined to 517,580, a 3.69% drop from the previous year, marking the lowest number in five years. These statistics indicate that private HEIs will face sustainability issues if the trend of declining enrolment continues, which contradicts the goals outlined in the MEB 2015–2025. Moreover, higher student attrition rates are projected in the future (MOHE, 2021).

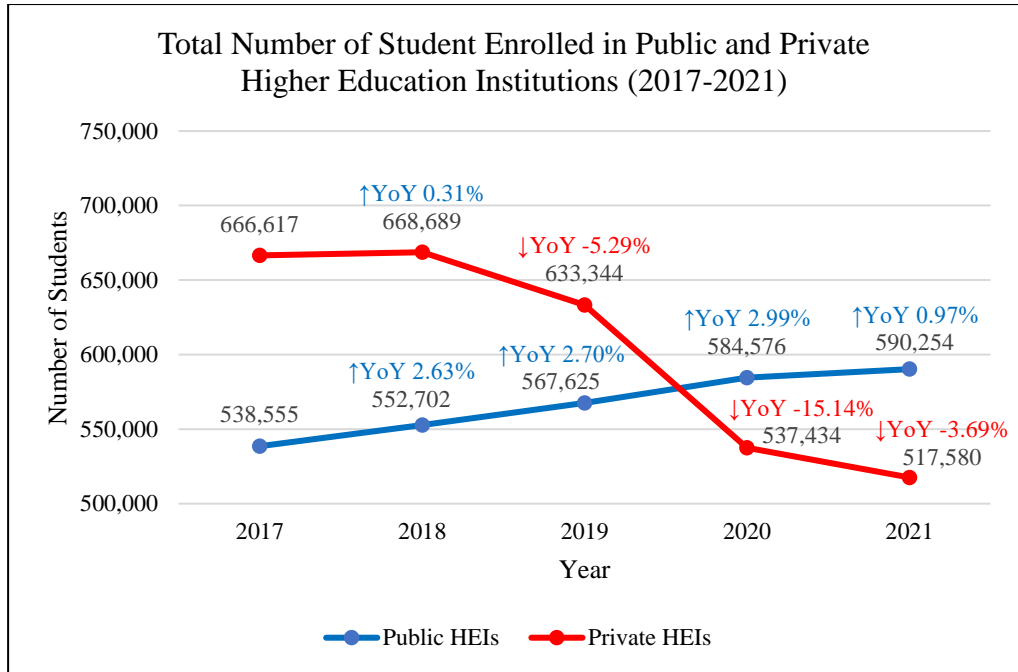


Figure 1.1: Total Number of Students Enrolled in Public and Private Higher Education Institutions (2017-2021)

Source: Ministry of Higher Education. (2022d). *Statistics*.

<https://www.mohe.gov.my/en/downloads/statistics>

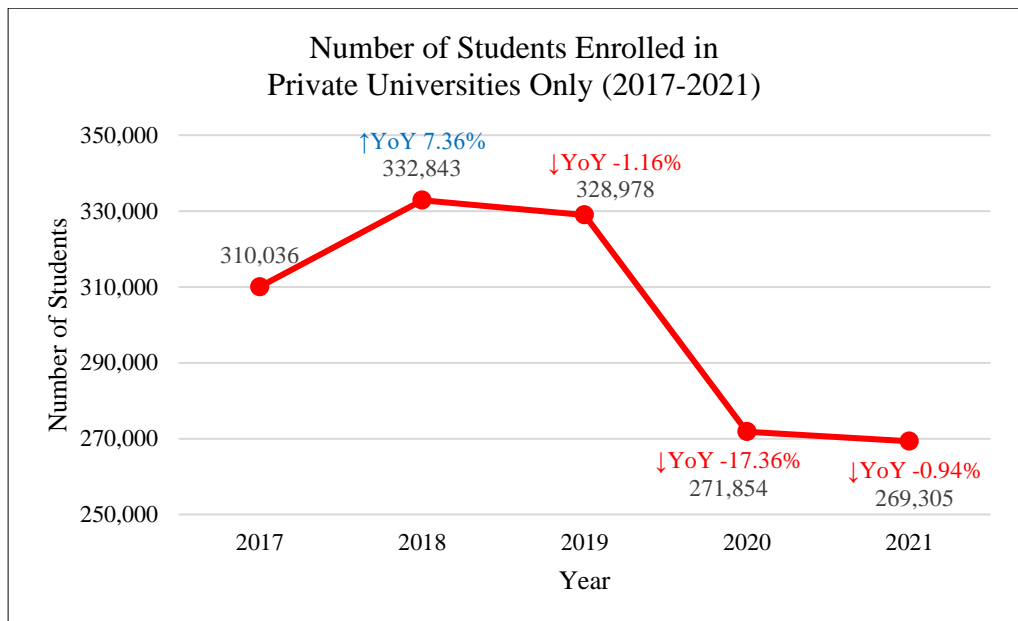


Figure 1.2: Number of Students Enrolled in Private Universities Only (2017-2021)

Source: Ministry of Higher Education. (2022d). *Statistics*.

<https://www.mohe.gov.my/en/downloads/statistics>

Private universities, in particular, experienced the most significant decline in student enrolment. The number dropped by 17.36%, from 328,978 in

2019 to 271,854 in 2020, when online teaching and learning (T&L) was implemented (Figure 1.2). By 2021, the number further decreased to 269,305, a 0.94% drop from the previous year, reaching the lowest point in five years. In some cases, students voluntarily dropped out or were expelled from institutions.

1.1.3 Implementation of Online Learning in Malaysian Private HEIs

Since the late 1990s, Malaysian private HEIs have been using online learning (Selvanathan et al., 2020). Take for instance, Universiti Tun Abdul Razak (UNITAR) was an early adopter of online courses, equipping itself with high-tech facilities in 1998 to expand the use of modern technology in T&L. Nonetheless, due to the incapability of Malaysia's IT infrastructure to support it and students' lack of understanding of the virtual university, it ultimately had changed into hybrid learning (Puteh & Hussin, 2007). Another example, Multimedia University (MMU) also provided online courses in addition to a very small number of face-to-face classes. The amount of interaction between instructors and students, among students, and among instructors has been expanding dramatically through chat, e-mail, web blogs, and forums (Hussin & Salleh, 2008). Above all, Open University Malaysia (OUM) is Malaysia's first institution for open and distance learning. It was founded in 2001, taking advantage of the potential of information and communication technologies (ICTs) to offer academic courses online (Abas et al., 2009). These three private universities (UNITAR, MMU, and OUM) are Malaysia's leading institutions in online learning, but OUM has the highest number of students who are obliged to take online learning regularly. At this point, many other universities in

Malaysia have adopted a combination of online learning tools in their academic courses, but the traditional face-to-face classroom remains dominating (Azhari & Long, 2015; Hussin & Salleh, 2008).

Consistent with the development of education, the Malaysian Education Blueprint (higher education) 2015–2025 has proposed 10 transformative concepts, of which shift number 9 emphasises the growth of globalised online learning. This shift is to enhance the course delivery quality, reduce costs of delivery, introduce Malaysian expertise globally, enhance the branding and visibility of local HEIs, and also encourage Malaysians to pursue lifelong learning. There are many opportunities to reach the expected results outlined in the National e-learning Policy. Potentially, Malaysia needs to transform from a mass production delivery model to using technological innovation to democratise education, where more individualised learning experiences can be provided. Among the main initiatives is to integrate online learning into higher education and lifelong learning (MOE, 2015).

1.1.4 Online Learning as a Key Alternative for Physical Learning

The expansion of online learning in Malaysia has increased dramatically because of the COVID-19 pandemic, particularly during the Movement Control Order (MCO) period implemented on 18 March 2020 (A. U. M. Shah et al., 2020). Educational institutions were temporarily shut down as a measure to curb the spread of the virus, impacting students worldwide (Dhawan, 2020; Wahab & Othman, 2021). The United Nations Educational, Scientific and Cultural

Organisation (UNESCO, 2021) reported that as of the end of March 2020, about 167 countries had closed educational institutions nationwide, affecting around 1.45 billion (82.8%) of the global student population.

The Malaysian educational system faced a tremendous challenge during this pandemic, requiring HEIs to swiftly shift from conventional in-person teaching approaches to online teaching (Chung, Subramaniam, et al., 2020; Wahab & Othman, 2021). In response, the MOHE instructed all HEIs to enable their students to engage in online T&L activities from their homes. This shift to online learning became a means of ensuring educational continuity during and after the MCO period. Online learning platforms and technologies played a crucial role in facilitating the delivery of courses (Al-Kumaim et al., 2021). Various online platforms and tools, such as video conferencing platforms (e.g., Zoom, Microsoft Teams, Google Meet), Learning Management Systems (e.g., Google Classroom), pre-recorded lecture videos (e.g., YouTube), and social media platforms (e.g., Facebook, WhatsApp, Telegram), were utilised by instructors to facilitate T&L (Azlan et al., 2020; Shahzad et al., 2021; Sutarto et al., 2020; Yaacob & Saad, 2020).

The duration of online learning activities, in the context of this study, encompasses both the MCO period and the subsequent shift to online T&L. It includes the period during and after the MCO when educational institutions were closed and students engaged in online learning activities from their homes. The readiness of students for online learning and the availability of suitable technological infrastructure were important factors in ensuring the success of

online learning implementation (Rafique et al., 2021; T. Yu & Richardson, 2015). While Küsel et al. (2020) emphasised the significance of students being well-prepared for online learning, specifically during the COVID-19 pandemic. Their study sheds light on the challenges faced during the rapid transition from physical to emergency remote learning, highlighting the importance of student preparedness and adaptability in an online learning environment.

As of the latest update from 7 March 2022, HEIs in Malaysia have reopened in stages for students who have completed their vaccination and passed the effectiveness period after completing their vaccination, while continuing to implement a hybrid mode of T&L for students on campus and an online mode of T&L for students who have not returned to campus (Ministry of Health [MOH], 2021).

1.2 Problem Statement

The abrupt shift from traditional face-to-face classes to online learning in many HEIs has presented both advantages and challenges. Online learning offers convenience and flexibility; however, it is also associated with lower retention rates due to a lack of engagement and inadequate support services (Osman et al., 2021). Consequently, the limited social interaction posed by online learning may not align with the preferred learning styles of all students. While online education offers adaptability during crises, its significance in the post-endemic era demands exploration. Understanding the complexities of student retention in online learning is vital for handling immediate impacts and

preparing institutions for potential future crises requiring a shift to online education.

Attributing the drop in student enrolment solely to the shift to online learning may oversimplify the multifaceted nature of this phenomenon. Factors such as the academic and social integration, self-regulation, personality, and financial status could also contribute to this decline (Bağrıacık Yılmaz & Karataş, 2022). The decrease in student enrollments and the closure of private HEIs in Malaysia underscore the urgent need to address the financial challenges faced by these institutions. A decline in student enrolments directly impacts the financial resources available to operate and sustain private HEIs, exacerbating their existing financial distress (Selvanathan et al., 2020). The closure of approximately 60 private HEIs in 2020 due to financial issues further highlights the criticality of finding solutions to improve student retention (N. H. Azman, 2021). Additionally, the operational costs associated with private HEIs, including investments in technology infrastructure, Learning Management Systems (LMS), and the development of digital content, further strain their financial resources (N. Azman & Abdullah, 2021). These investments are essential for effective online course delivery and the successful transition to online learning.

The adoption of online learning and associated technology requires substantial investments in terms of finances, time, space, and faculty support (Babu & Sridevi, 2018). However, the majority of private HEIs have little access to obtain large endowments, making it challenging to meet these

requirements. Datuk Dr. Parmjit Singh, the president of the Malaysian Association of Private Colleges and Universities, predicted that private HEIs would face substantial additional expenditure in providing access to online learning platforms and resources (MOHE, 2021). Furthermore, not all local private HEIs are competent in delivering online courses, as it takes time to prepare and equip for fully online learning (Yunus, 2020). Consequently, institutions have attempted to transition to online alternatives, but the process has been haphazard and unsatisfactory in many cases (Y. Sharma, 2020). Moreover, many students are still unfamiliar with the “new normal” study practices and environments (Al-Kumaim et al., 2021), highlighting student retention as one of the biggest weaknesses in online learning.

Investigating the readiness of students in adapting to online learning, including technical competencies, communication skills, social skills, and self-regulated learning abilities, can provide valuable insights and contribute to addressing the challenge of student retention in online learning. Enhancing students’ readiness for online learning has the potential to improve student satisfaction, increase retention rates, enhance financial stability, and attract new students.

Furthermore, it is crucial to understand student needs through student satisfaction to improve student retention (Akers et al., 2020). Dissatisfaction with online learning is considered a significant issue contributing to student attrition and dropout rates (Oregon et al., 2018; Schaeffer & Konetes, 2010). Students have expressed concerns regarding the quality of their online learning

experience (N. Azman & Abdullah, 2021). Various signs indicate that online learning has failed to meet the students' needs and students are dissatisfied with their online learning experiences. This raises significant concerns about the dropout rate and student retention rate of online courses. It is important to acknowledge that online learning may not be suitable for every student, particularly those who excel in traditional educational settings that prioritise face-to-face instructor-student interaction (Babu & Sridevi, 2018). Students often find themselves dissatisfied with specific aspects of online learning, which are outlined below.

Since online learning involves the usage of modern technology to impart learning (Shahzad et al., 2021), some students have difficulty studying online due to their limited technical skills in using online learning (Chung, Subramaniam, et al., 2020). According to a study conducted by Al-Kumaim et al. (2021), instructors and students face several obstacles when using ICT platforms for online T&L. These challenges include unfamiliarity with the information technology platforms, restricted Internet connection, and lack of experience in using online learning platforms to enhance student engagement, interactivity, and participation.

Additionally, students encountered challenges in maintaining effective communication with instructors and fellow students in the online learning environment. For instance, coordinating and allocating tasks for group projects proved to be challenging as it was not always possible to have all group members available online simultaneously. Furthermore, requesting assistance

from instructors posed difficulties, resulting in limited access to additional explanations, potential comprehension issues, and a lack of knowledge acquisition. The lack of synchronous interaction in online communication makes it challenging to determine the best time to communicate with instructors and fellow students, as everyone has different circumstances (Nassr et al., 2020). Moreover, students often feel isolated, overshadowed by their classmates, or reluctant to express their thoughts publicly. The absence of face-to-face interaction may lead to misunderstandings, unpleasant tones, and even “flame wars”. These problems are particularly troublesome for students who are new to online learning (Alawamleh et al., 2020).

Online learning is traditionally considered to be less interactive than conventional face-to-face learning. Due to the nature of online learning, students must actively interact with both instructors and classmates. However, students view online courses as personalised learning and restrict social contact with others. They feel isolated from their instructors, course content, and classmates (Alawamleh et al., 2020). In comparison to lessons conducted in a face-to-face classroom, the instructors in online teaching give less feedback to students. Students now face several obstacles, including a lack of social interaction as well as the inability to form study groups (Chung, Subramaniam, et al., 2020). Classrooms with online learning pose a significant threat to effective group communication, especially among team members who are not familiar with each other. Some students also voiced their concerns about the difficulty in getting the basic contact information of classmates (Wut & Xu, 2021).

Students also face challenges in properly self-regulating their online learning progress. They are frustrated with the new environment because they keep getting distracted and are not able to focus (Chung, Noor, et al., 2020). Students also find it difficult to break out of their comfort zone such as feeling drowsy due to irregular sleeping patterns (Nassr et al., 2020). Moreover, learning materials are generally put somewhere online and accessible in online-based learning settings. Students themselves control the “when”, “where” and “how” to access and work on the learning materials, which greatly increases the degree of self-regulation necessary to effectively achieve the learning objectives specified by instructors or students for the respective course programme (Kuo, Walker, Schroder, et al., 2014; Pedrotti & Nistor, 2019; C.-H. Wang et al., 2013).

Lack of support from institutions is also a major challenge in the Malaysian online learning environment. As online learning has become necessary and has exceeded education system capacities, institutions that are slow to adapt or unable to offer online learning have suffered greatly and failed to survive (Poo, 2021). The implementation of online learning among students in higher education is influenced by institution, administration, and instructor support (Amoozegar et al., 2017b). According to Amoozegar et al. (2017a), without sufficient institutional factors such as university support, technical support, and administrative support, students are less likely to persist in the online programme. Other institutional factors affecting online student retention include inflexible policies of online learning, deficient institutional support

performed through student services, inadequate technological support, and course subject difficulty (Muljana & Luo, 2019).

In summary, addressing the challenges related to student retention in online learning is crucial for private HEIs. This requires a comprehensive understanding of students' readiness for online learning, their satisfaction levels, and the factors contributing to their dissatisfaction. By investing in students' readiness, improving student satisfaction, and providing appropriate support, institutions can enhance student retention rates and ensure the financial sustainability of private HEIs in Malaysia.

1.3 Research Questions

According to the discussion above, this research aims to answer a few questions regarding student online learning readiness, student satisfaction, institutional support, and student retention in Malaysian private HEIs. The student online learning readiness (independent variables: technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) are expected to influence student satisfaction (mediating variable) which eventually influences student retention (dependent variable) for online learning in Malaysian private HEIs. Therefore, the general questions for this study are as follows:

(1) Do student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) have positive relationships with student satisfaction in private HEIs?

(2) Does student satisfaction have a positive relationship with student retention for online learning in private HEIs?

(3) Does student satisfaction mediate the relationships between student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) and student retention in private HEIs?

(4) Does institutional support moderate the relationship between student satisfaction and student retention for online learning in private HEIs?

1.4 Research Objectives

This study aims to investigate how student online learning readiness affects student retention in Malaysian private HEIs. This study explores the relationships between student online learning readiness, student satisfaction, and student retention. Additionally, institutional support is examined as a moderating variable to influence the relationship between student satisfaction and retention. Thus, the general objectives of this study are:

(1) To examine the positive relationships between student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) and student satisfaction in private HEIs.

(2) To examine the positive relationship between student satisfaction and retention for online learning in private HEIs.

(3) To examine the mediating effects of student satisfaction on the relationships between student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) and student retention in private HEIs.

(4) To examine the moderating effect of institutional support on the relationship between student satisfaction and student retention for online learning in private HEIs.

1.5 Significance of Study

With the situation of private HEIs in Malaysia, it is important to understand student online learning readiness and satisfaction as students decide to further study in an institution. Conducting this study can provide the authorities with some insights to address the student retention issues as the findings could determine (1) students' perception of their readiness,

competence, or confidence levels with online learning and (2) students' perception of their satisfaction levels such as educational achievements and experiences in online learning, which in turn will help HEIs to further understand students' perceptions and behaviour. It is also believed that institutional support could enhance students' satisfaction and retention because students will benefit from the backing services provided by their institutions during their online learning process. This, in turn, will improve their learning experience and encourage them to stay enrolled in the institutions until they graduate.

1.5.1 Government Perspective

Retaining higher education students until they are graduating from online learning is important to produce a knowledge-based society in Malaysia and also cater to the government's plan. The primary objective of the education system in Malaysia is to ensure that students in all levels of education, including primary, secondary, and tertiary education, possess the necessary knowledge and skills to succeed in life (Grapragasem et al., 2014). The initiatives to promote excellence in higher education nationwide are integral to the government's agenda. MOHE's Malaysia Education Blueprint (MEB) 2015–2025 has provided insights on how to improve educational quality. Malaysia has made significant progress toward becoming a knowledge-based society. Education is a continuous endeavour to further develop personal potential in an integrated manner to cultivate people who are emotionally and physically, intellectually, spiritually balanced, and harmonious (MOE, 2015). Therefore,

this study will be beneficial to the government if students continue learning even online in higher education to become knowledgeable persons.

Besides, since the government emphasises the development of globalised online learning, which is mentioned in shift number nine of MEB, thus this study is important to ensure online learning is being implemented successfully in Malaysian higher education. Examining readiness for online learning may be a significant approach to help students improve the efficiency of active learning and independent learning. The readiness of students in studying online, their satisfaction, and retention indicate the success of the government's transformation plan of T&L in the higher education sector by enabling innovative pedagogical practices. The increased use of online learning technologies in this shift number nine also enables HEIs to be more competitive on the global stage which will also be beneficial to the Malaysian government.

1.5.2 Higher Education Institutions Perspective

The HEIs must adjust to the evolving needs, desires, and expectations of students because the current system of higher education is undergoing continuous transformation. Therefore, information technologies and online learning systems are regarded as important factors in HEIs' operations, which require institutions to increasingly invest in online systems and devices (Coman et al., 2020; Popovici & Mironov, 2015).

Since student retention is a more challenging issue for online courses than face-to-face courses, it has long been a concern in Malaysian HEIs (Amoozegar et al., 2017a). HEIs play not just an institution of higher learning but also a business. Student retention is crucial especially for private HEIs in this increasingly competitive and results-oriented higher education industry because many institutions strive to increase graduation rates and reduce tuition income loss caused by students dropping out or transferring to other institutions. Private HEIs are going to face a financial crisis and eventually close down if they are unable to retain their students because many private HEIs do not enjoy access to large endowments but are driven by tuition revenue. Therefore, increased student retention is important for an institution to save costs and continue to survive. To survive and stay competitive, private HEIs should strive to be the best in delivering their services, and this effort in return will attract more students to enrol in their institutions (Harun et al., 2021). Private HEIs are required to understand the students and their obstacles, provide robust staff training, and use available digital support and teaching systems electively to promote student retention and performance.

In addition, students may withdraw from online courses at any time, which can result in low retention rates and enrolment (Bawa, 2016). This study could help private HEIs to understand the reasons behind low retention and enrolment in online courses as well as explore strategies to address the root causes of this phenomenon. By understanding students' readiness and satisfaction with online learning, this study can provide valuable insights for private HEIs in addressing the root causes of low retention and enrolment rates.

Through the identification of support structures that meet students' needs, private HEIs can take remedial measures to increase student retention and success in online courses.

The study's findings are also applicable to both public and private HEIs on how to improve their service supports for online learning, contributing to a better online learning experience for students. By providing opportunities for students to improve their competencies, the study can help students overcome potential obstacles to success in online learning, increasing their likelihood of success (T. Yu & Richardson, 2015). Therefore, this study could inform the provision of institutional support to students who are not yet ready for online learning, making them more likely to succeed in the future. Ultimately, this study could provide valuable insights into how Malaysian HEIs can enhance the online learning experience for their students and improve student retention and success rates.

Furthermore, higher education courses often include diverse learning activities, assignments, multiple forms of assessment, and carefully organised and sequenced learning materials. Understanding the connections between students' readiness for online learning, satisfaction, institutional support, and student retention can aid instructional designers and educators in developing high-quality online courses. This study will also highlight the suggestions for HEIs to consider in order to make their online courses interesting and innovative for students to continue their studies. Although online learning has its advantages and disadvantages, HEIs can choose to conduct hybrid or blended

learning according to the needs of students after the end of COVID-19. Since hybrid or blended learning would become a fundamental pedagogical approach in HEIs, thus HEIs need to consider the implementation of online T&L as a new approach for teaching and learning processes in the future.

1.5.3 Society Perspective

The COVID-19 pandemic has triggered the importance of online learning to replace physical learning, and Malaysian HEIs have the opportunity to provide more accessible and flexible learning opportunities to students. By identifying the competencies required for success in online learning and evaluating the institutional supports needed to help students develop those competencies, this study can inform the development of more effective online learning programmes that meet the needs of all students. This could significantly expand access to higher education and allow more individuals, especially those who may face barriers to attending traditional face-to-face classes, to pursue their academic goals.

Furthermore, the outcomes of this study have the capacity to enhance the retention rates of students in online learning settings. This study's identification of factors that influence student retention can guide the development of strategies aimed at improving retention rates in Malaysian HEIs. This could have positive implications for both the institutions themselves and the students who would benefit from continued access to high-quality educational opportunities.

This study could also contribute to the development of a more skilled and adaptable workforce in Malaysia. By identifying the key competencies that enable students to succeed in online learning environments, the findings could help equip Malaysian graduates with the skills needed to navigate the digital age and thrive in the changing job market. This could contribute to heightened levels of productivity, innovation, and competitiveness in various industries, benefiting both employers and employees.

In addition, the transformation of the higher education system outlined in the Malaysia Education Blueprint (MEB) could lead to more attractive and personalised learning experiences that realise students' potential (Coman et al., 2020; Babu & Sridevi, 2018). With the use of technologies such as Massive Open Online Courses (MOOCs), video conferencing, and live streaming, students can take advantage of powerful network infrastructure. Malaysian HEIs that develop MOOCs in their professional fields and participate in worldwide MOOC consortiums could enhance their competitiveness in the global education market and contribute to the country's overall development (MOE, 2015).

Overall, this study's significance lies in its potential to contribute to the development of a more accessible, flexible, and effective higher education system in Malaysia, which could have positive implications for individuals, institutions, and the country as a whole.

1.6 Scope of Study

This study investigates the relationships between student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies), student satisfaction, institutional support, and student retention in Malaysian private HEIs, with a focus on online learning. The study applies Tinto's Student Integration Model (SIM), which highlights the importance of social and academic integration in the online learning environment.

The research design used is quantitative, employing a cross-sectional survey to collect primary data from a purposive and quota sample of private university students who have experience studying online. An online questionnaire is used to collect data, and SmartPLS software is used to analyse the data using Structural Equation Model analysis to address the research questions.

The study's findings provide insights into the relationships between student online learning readiness, student satisfaction, institutional support, and student retention in private HEIs. These insights would have implications for the development of effective online learning programmes and policies in Malaysian HEIs. It is also essential to note that the study's scope is limited to private university students, and the perspectives of public institutions are not considered.

1.7 Operational Definitions of Variables

Technical Competencies – The basis of a student’s knowledge, skills, and attitudes in the use of technology (Sa’ari et al., 2005).

Online Communication Competencies – Students adapt to an online communication situation by demonstrating skills in appropriating communication knowledge relevant to the situation (Salleh, 2008).

Social Competencies with Classmates – Students’ ability to handle social interactions with classmates effectively (Orpinas, 2010).

Social Competencies with Instructor – Students’ ability to handle social interactions with instructors effectively (Orpinas, 2010).

Self-Regulated Learning Competencies – Students’ competence to autonomously plan, execute, and evaluate the learning processes (Wirth & Leutner, 2008).

Student Satisfaction – The favourability of a student’s subjective evaluation of the various outcomes and experiences associated with education (Elliott & Shin, 2002).

Institutional Support – The resources, opportunities, privileges, and services provided by the institution to students (Stanton-Salazar, 2011).

Student Retention – Students’ continued to study until successful completion (Fowler & Luna, 2009).

1.7 Chapter Summary

Chapter 1 has provided a comprehensive overview of the study’s background, focusing on the evolution of online learning in education and its implementation in Malaysian higher education institutions. The problem statement has identified the research gap and issues that the study aims to address, while the research questions and objectives have been outlined to guide the investigation. Furthermore, the study’s significance has been discussed from the perspectives of the government, higher education institutions, and society. Overall, this chapter sets the foundation for the subsequent chapters to delve deeper into the research questions and methods, with the ultimate goal of providing insights into the implementation and impact of online learning in Malaysian higher education institutions.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter is started with a literature review of a theoretical model and past studies, dependent variable (student retention), mediating variable (student satisfaction), independent variables (student online learning readiness), and moderating variable (institutional support). This chapter also shows the development of the proposed conceptual framework based on the theoretical model and the hypotheses based on literature review support and evidence.

2.1 Theoretical Model

With Spady's (1970) Model of the Dropout Process (MDP), the era of building retention theories has begun. MDP was the first sociological student retention model. He considered the academic system and social system as part of his model, and at least two elements in each system will affect a student's decision to stay or leave. For example, grades and intellectual development (academic aspects) as well as normative congruence and friendship support

(social aspects). Later research and models evolved after Spady’s work to account for the nature of students’ institutional interactions (Aljohani, 2016; Tinto, 2006). Numerous student retention studies and theoretical models have been conducted and developed since then, for instance, Tinto’s Student Integration Model (Tinto, 1997, 1975), Bean’s Student Attrition Model (Bean, 1982, 1980), the Student–Faculty Informal Contact Model (Pascarella, 1980), Astin’s Student Involvement Model (Astin, 1984/1999), the Non-traditional Student Attrition Model (Bean & Metzner, 1985), Bean’s Dropout Syndrome Model (Bean, 1985) and the Student Retention Integrated Model (Cabrera et al., 1993). This study will review Tinto’s Student Integration Model (SIM).

2.1.1 Tinto’s Student Integration Model (SIM)

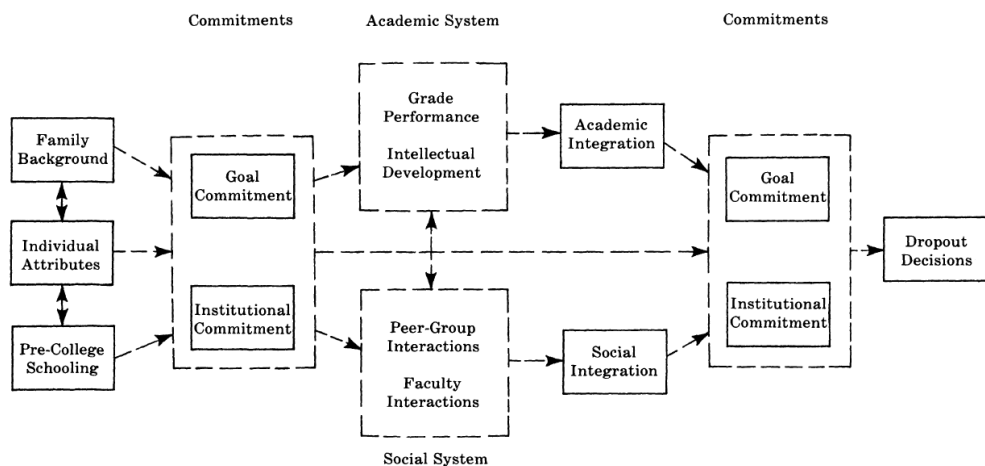


Figure 2.1: Tinto’s Student Integration Model (SIM)
 Source: Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89–125.

Vincent Tinto’s SIM regarding academic and social integration served as the foundation for the major theoretical model for studying student retention (Tinto, 1975). Tinto’s research focused on traditional-age students in the

universities' residential settings, which provided the criteria for a university to manage and gauge their student retention success (Wild & Ebbers, 2002). Although Tinto's work was centred on traditional face-to-face forms, the concepts applied to online students were the same (T. Yu & Richardson, 2015).

From higher education perspective, Tinto's SIM was the most influential model of student retention (McCubbin, 2003). The key determinant of persistence, according to his model, was how successfully the student was integrated into the college in a longitudinal process. According to Tinto (1975), students entered higher education institutions with different types of characteristics. The important characteristics involved family backgrounds (e.g., socioeconomic status, parental perceived value, parental levels of expectations), attributes (e.g., ability, gender, race), experiences before starting college (e.g., academic results, characteristics of the high school, students' academic and social attainments), each of these had impacted upon students' performance in the institution. These three characteristics affected the development of the educational expectations and commitments the students brought with them into the institution environment.

The goal and institutional commitments were key predictors of the experiences of the students, their disappointments, and satisfaction, in that institution environment. The SIM included information about the level of student expectation (e.g., two- or four-year degree attainment) and the intensity of the expectation held when it came to educational expectations. Referred to here as students' educational goal commitment, it was the degree to which the

students were committed to their goal (i.e. degree attainment). Students who were most committed to the expected goal were more likely to complete their studies than other students who were less committed to that goal. Besides, students' educational expectations also included particular institutional components that influenced their decision to study in one institution over another. Referred to here as students' institutional commitment, it included the data specifying the dispositional, financial, and time commitments students made to attend an institution (Tinto, 1975).

Individual characteristics, past experiences, and prior commitments were not the only determinants of persistence in an institution. The most significant part of SIM was how well the students were integrated into the social and academic systems of the institution (Tinto, 2017, 2006, 1999, 1998, 1997, 1988, 1975). Tinto argued the students' integration into the academic and social systems of the institution was the most important factor in students' continued attendance (discuss in the next paragraph). Based on the prior levels of students' goals and institutional commitment, it was the students' structural and normative integration into the academic and social aspects that created new levels of commitment. The better the students' integration into the academic and social aspects of an institution, the more committed students will be to the goal of study completion and the specific institution.

Besides, SIM placed goal and institutional commitments at the beginning and the end, and they served as input and process variables that offered the dynamic component of students' progress in the educational system.

Students may withdraw from institutions for reasons that had little to do with their interaction within the institution systems, thus it is best to observe these effects through the students' changing evaluations of their commitments to the goal of study completion and to the institution in which they were registered. This was because these commitments reflected the students' integration into the academic and social systems of the institution where the student's perception of the pros (e.g., personal satisfactions, friendships, academic attainments) and the cons (e.g., dissatisfactions, academic failures, financial, time) when participating in an institution (Tinto, 1975). Therefore, in this study, student satisfaction acted as a mediator between integration and retention because when students were academically and socially integrated into their institutions, they felt satisfied and were committed to their goals, and the institution they are studying at, the more likely to stay in that institution.

Tinto identified the academic and social systems as the two most essential systems at the institution. He asserted that dropout can happen when the students were not integrated into both systems sufficiently (Tinto, 2017, 2006, 1999, 1998, 1997, 1988, 1975). According to Tinto (1975), students viewed their academic integration as a result of a mixture of grade performance and intellectual development. Grade performance functioned as a type of extrinsic reward for the student's attendance at the institution. Students used it as tangible resources for future education and job advancement. Moreover, intellectual development was more of an intrinsic reward that served as an important component of the students' personal and academic development. Tinto also asserted that persisters may view their higher education as a process

of acquiring knowledge and appreciating ideas, rather than a means of advancing their careers.

Social integration happened mainly through informal peer-group relationships, semi-formal extracurricular activities, and interaction with instructors and administrators in the institution. Successful experiences in these fields brought about different degrees of social interaction, friendship support, instructor support, and collective affiliation, all of which can be considered significant social rewards that can alter students' goals and institutional commitments. Tinto also highlighted that the students who interacted with instructors promoted social integration and therefore institutional commitment, as well as increased the students' academic integration. Furthermore, he also noted that there were two sources of lack of integration, namely inconsistency, and isolation. Both inconsistency and isolation were related to social interaction. Incongruence was linked to the students' perceptions of themselves as being severely at odds with the institution, while isolation was a situation where students had little or no social interaction (Wild & Ebbers, 2002).

The final part of the model was interplaying between the students' commitment to the goal of study completion and commitment to the institution, which determined whether the students decided to drop out of the institution. It was speculated that low goals or institutional commitments can cause student dropouts. Tinto's claimed that academic and social integration, as well as goal and institutional commitment, were not separate and distinct, but they had a unique influential connection with one another. Academic integration directly

affected students' goal commitment, whereas social integration directly affected their commitment to the specific institution. Besides, both the goal and institution commitment may be unnecessary for students to stay at an institution. If students had sufficient goal commitment, they may stay in an institution where they had less commitment to (Tinto, 1975).

On the other hand, Tinto (1975) also mentioned that the characteristics of the institution were related to a difference in dropout rates. The institution's characteristics, for example, its structural arrangements, facilities, resources, and composition of its members, limited the students' growth and integration within the institution. This was true about students' accomplishment within the academic system depending on institutions of varying quality that maintained varied standards of academic achievement. This was also true for the social system of the institution because many dropouts seemed to be mainly due to a lack of congruence between the students and the institution's social environment, rather than from any specific failure on the students' part. Tinto also found that the quality of the institution affected the student persistence in the institution.

In conclusion, Tinto's SIM revealed that students' academic integration and social integration had an impact on their changing goal commitment and institutional commitment, which in turn influenced students' dropout decisions. From the perspective of HEIs, student dropout was defined as the failure to graduate after enrolling in a programme (Maldonado et al., 2021). There was a need to better understand the reasons behind students dropping out of online

education to improve student retention rates. Retention was when students continue to participate in learning activities until completion, which can be a course, programme, institution, or system in higher education (Berge & Huang, 2004). Both goal and instructional commitments in the SIM reflected the students' experiences, disappointments, and satisfactions in those institutions. Student satisfaction had long been regarded as a variable that was connected to the retention rate of students in higher education (Tinto, 1975).

The proposed conceptual framework in this study is related to Tinto's SIM. In the study, student online learning readiness reflects students' academic and social integration into the intuitions. Students' social competencies to interact with classmates and instructors are important for social integration; online communication competencies are a significant element for improving students' social interaction with classmates and instructors as well as developing a meaningful discussion with others to achieve academic integration; technical competencies are an important component for online students because it is the medium for which students' social interaction and communication with others can be implemented; and self-regulated learning is significant for academic integration by managing students' own academic progress when online learning is taken place. All five dimensions of student online learning readiness are expected to satisfy the students' academic and social experiences at the institution and increase their goals and institutional commitments, which eventually result in higher student retention for higher education institutions. Institutional support is also considered to enhance the students' perceived service quality in online learning. Therefore, the proposed

conceptual framework is intuitive for higher education institutions to consider their students' academic and social integration and take immediate actions in enhancing the integrations and services to increase overall student satisfaction and retention.

2.2 Review of Past Studies

In order to review past studies, several keywords had been used to narrow down the scope of articles. The keywords, for example, student retention, online learning, student integration model (SIM), and higher education institutions were entered to search scholarly articles on Google Scholar. Furthermore, the articles obtained were sorted by relevance to find the most relevant articles. The review of past studies has been summarised in Table 2.1 below.

Table 2.1: Summary of Previous Research

Authors (Year)	Theories/ Models	Dimensions/ Variables	Findings
Ivankova and Stick (2007)	<ul style="list-style-type: none"> • Tinto's integration theory • Bean's student attrition model • Kember's model of dropout from distance education courses 	<ul style="list-style-type: none"> • Programme • Online learning environment • Student support services • Faculty • Self-motivation • Virtual community • Academic advisor • Family and significant other • Employment 	<ul style="list-style-type: none"> • In the quantitative analysis, programme, online learning environment, student support services, faculty, and self-motivation were found to be predictors of students' persistence in the program. • Besides, virtual community, academic advisor, family and significant other and employment did not significantly affect students' persistence in the program. • In the qualitative analysis, the quality of academic experiences, online learning environment, support and assistance, and student self-motivation were pivotal to students' persistence.

Table 2.1 continued: Summary of Previous Research

Park and Choi (2009)	<ul style="list-style-type: none"> • Tinto's student integration model • Bean and Metzner's student attrition model 	<ul style="list-style-type: none"> • Individual characteristics (age, gender, and educational level) • External factors (family and organisational supports) • Internal factors (satisfaction and relevance) 	<ul style="list-style-type: none"> • Persistent and dropout learners had no significant difference in individual characteristics. • Family support, organisational support, satisfaction, and relevance in addition to individual characteristics can predict learners' decision to drop out or persist.
Boston et al. (2011)	<ul style="list-style-type: none"> • Tinto's model of student persistence 	<ul style="list-style-type: none"> • Academic credits transferred • Degree program • F Grade • W grade • GPA 4.0 	<ul style="list-style-type: none"> • Academic credits transferred, degree program, F grade, W grade, and GPA 4.0 were the predictors that only accounted for a combined 28.2% of the variance for enrolment status.
Y. Lee et al. (2012)	<ul style="list-style-type: none"> • Tinto's student integration model • Bean and Metzner's student attrition model • Rovai's composite persistence model 	<ul style="list-style-type: none"> • Support from family and work • Academic locus of control • Academic self-efficacy • Time and environment management skills • Metacognitive self-regulation skills 	<ul style="list-style-type: none"> • Support from family and work, academic locus of control, academic self-efficacy, time and environment management skills, and metacognitive self-regulation skills were significant predictors of dropout. • Persistent students had higher levels of academic locus of control and metacognitive self-regulation skills than dropout students.
Howard and Flora (2015)	<ul style="list-style-type: none"> • Tinto's theory of college student withdrawal 	<ul style="list-style-type: none"> • Summer Bridge Programs • Pre-Term Orientation • Outdoor Adventure Orientation • Targeted Seminars • Learning Communities • Early Warning/ Early Alert Systems • Service Learning • Undergraduate Research • Assessment of the First-Year Program 	<ul style="list-style-type: none"> • Pre-Term Orientation, Early Warning/Early Alert Systems, and Service Learning programs were each in place at all six institutions and produced a range of retention rates from 59% to 80%. • Summer Bridge Programs, Outdoor Adventure Orientation, Targeted Seminars, Learning Communities, Undergraduate Research, and Assessment of the First Year Program had no significant relationships with retention rates of institutions.
Gaytan (2015)	<ul style="list-style-type: none"> • Tinto's student integration model • Bean's model of student departure • Self-determination theory model 	<ul style="list-style-type: none"> • Increased faculty instruction (e.g., modules) • Meaningful feedback given to students • Transfer credit received by students • Maintaining an adequate GPA • Institutional support to students 	<ul style="list-style-type: none"> • The ranking of the top five factors that affect student retention in online courses was as followed: increased faculty instruction, meaningful feedback given to students, transfer credit received by students, maintaining an adequate GPA, and institutional support to students.

Table 2.1 continued: Summary of Previous Research

Scarpin et al. (2018)	<ul style="list-style-type: none"> • Unified theory of acceptance and use of technology • The information systems success factors 	<ul style="list-style-type: none"> • Performance expectancy • Hedonic motivation • Self-efficacy • Social influence • System quality • Information quality • Intention to continue 	<ul style="list-style-type: none"> • There was a significant relationship between student retention and expectation factors, hedonic motivation, and information quality. • Self-efficacy, social influence, and quality of the system did not present a significant relationship with retention. • Quality of content was key to student retention in online courses.
M. Shah and Cheng (2019)	<ul style="list-style-type: none"> • Pace's measures of quality of effort • Astin's theory of involvement 	<ul style="list-style-type: none"> • Learning barriers • Engagement and experience in learning • Skills development • Motivation to complete study • Career pathway • Key reasons for selecting particular pathways 	<ul style="list-style-type: none"> • Online students were less engaged in learning and needed to be supported to improve their sense of belonging to the university. • Learning barriers and possible reasons for withdrawal were correlated with each other.
Lu (2020)	<ul style="list-style-type: none"> • Tinto's student integration model 	<ul style="list-style-type: none"> • Student engagement (academic challenge, learning with peers, experiences with faculty, and campus environment) • Student satisfaction 	<ul style="list-style-type: none"> • Student engagement is a key factor in student retention and graduation rates in online learning.
Maheshwari (2021)	<ul style="list-style-type: none"> • Technology acceptance model 	<ul style="list-style-type: none"> • Extrinsic factors • Institutional support • Intrinsic factors • Perceived enjoyment • Perceived usefulness • Online learning intentions 	<ul style="list-style-type: none"> • Perceived enjoyment was affected by extrinsic factors (ICT infrastructure and internet speed and access) and institutional support. • Institutional support and perceived enjoyment (satisfaction) had an impact on students' intentions to study the course online in the future. • Extrinsic factors indirectly influenced students' intentions to learn online.
Y. Li et al. (2021)	<ul style="list-style-type: none"> • The information system success model • Moore's three types of interactions • The theory of perceived value 	<ul style="list-style-type: none"> • Course quality • Service quality • Student-instructor interaction • Student-content interaction • Student-student interaction • Perceived value • Continuance intention 	<ul style="list-style-type: none"> • Service quality, course quality, and student-instructor interaction had indirect and positive effects on learners' continuance intentions for online learning. • Perceived value was a significant mediator for online learners' retention and had a direct influence on their continuance intentions. • Student-student and student-content interaction did not have direct or indirect effects on online learners' continuance intentions.

By referring to Table 2.1, previous studies examining student retention in online learning environments have employed various models to investigate the factors influencing retention. These models often incorporate variables such as student characteristics, academic performance, social integration, institutional support, and technology acceptance to understand the complex dynamics involved in student retention. Examples of commonly used models include Tinto's model, Astin's model, Bean's model, Moore's three types of interactions, and the TAM.

However, despite the existing research on student retention, several questions remain unanswered. Specifically, there is a lack of understanding regarding the extent to which higher education students' online learning readiness affects their satisfaction and retention. To the best knowledge of the researcher, there is little previous research that has exclusively investigated the dimensions of online learning readiness while considering the influences of student satisfaction and institutional support on the retention of higher education students. The study of student retention itself also remains largely unexplored within the Malaysian context.

In contrast, this study aims to address these research gaps by comprehensively investigating the relationships between online learning readiness, student satisfaction, institutional support, and student retention in the Malaysian context. By expanding beyond the traditional SIM framework, this study incorporates the unique dimensions of online learning readiness, which encompass technical competencies, online communication competencies, social

competencies with classmates, social competencies with instructors, and self-regulated learning competencies. By examining these readiness factors, the study aims to recognise the multidimensional nature of student preparedness for online learning, which can contribute to higher levels of satisfaction and ultimately impact student retention.

Additionally, the study explores the mediating effects of student satisfaction on the relationships between online learning readiness and retention. This consideration is crucial as it allows for a deeper understanding of the mechanisms through which readiness influences student retention. By investigating how satisfaction acts as a mediator, the study provides insights into the underlying processes that connect readiness to retention outcomes. Furthermore, the study also explores the potential moderating effect of institutional support on the relationship between student satisfaction and retention. This aspect examines how institutional support enhances satisfaction and influences long-term retention, thereby informing strategies for effective support in online learning.

By considering these distinct elements, this study not only fills the empirical gap by investigating the relationships among online learning readiness, satisfaction, institutional support, and retention but also contributes to theoretical advancements by applying Tinto's SIM in the Malaysian context. As student retention continues to be a pressing issue, understanding how student online learning readiness, satisfaction, and institutional support contribute to retention becomes crucial. By addressing these gaps, this study aims to offer

valuable insights into the factors influencing student retention in Malaysian private HEIs and contribute to the development of effective strategies to improve student retention in online learning environments.

2.3 Student Online Learning Readiness

The field of Australian vocational education and training first introduced the concept of online learning readiness, as proposed by Warner et al. (1998). They defined online learning readiness in three ways: (1) students' views of their preferred learning modes; (2) students' perceptions of competence and confidence levels in applying different types of new instructional technology like the Internet; and (3) their perceptions about their ability to participate in independent learning. Since then, student online learning readiness had been assessed across a range of aspects using different instruments (Doe et al., 2017; Farid, 2014; Martin et al., 2020).

Students must be ready to learn online in order for students to completely enjoy the benefits of online learning. Tinto's (1975) SIM was often used as the theoretical framework for online readiness research (Doe et al., 2017). Based on Tinto's SIM, the researcher has identified five dimensions of student online learning readiness to address the problems that have been discussed in Chapter 1. T. Yu (2018) developed and validated Student Online Learning Readiness (SOLR) instrument designed to evaluate student readiness in online learning through a focus on technical, communication, and social competencies. Competencies were students' perceptions of their ability or

capability. The term “competency” will be applied in order to have a consistent term used in this study. In addition, Forson and Vuopala (2019) also proved that students’ self-regulated learning skills contributed significantly to explaining their readiness for online learning. Therefore, technical competencies (M. L. Hung et al., 2010; Subramaniam et al., 2019; Torun, 2020; T. Yu & Richardson, 2015), online communication competencies (M. L. Hung et al., 2010; Subramaniam et al., 2019; Torun, 2020; T. Yu & Richardson, 2015), social competencies (Subramaniam et al., 2019; T. Yu & Richardson, 2015) and self-regulated learning competencies (Forson & Vuopala, 2019) have become as relevant and important dimensions of readiness in this study. The five dimensions of students' online learning readiness are expected to improve their satisfaction with learning experiences.

2.3.1 Technical Competencies

Technical competencies can be described as a student’s self-efficacy in technology (T. Yu & Richardson, 2015), while self-efficacy referred to students’ confidence in their ability to organise and execute the required skills to perform a behaviour successfully (Gangloff & Mazilescu, 2017; Hasan, 2005; Malureanu et al., 2021). This concept was mainly related to students’ technological knowledge, skills, and attitudes toward the use of technologies to meet educational expectations and objectives in higher education (Chung, Noor, et al., 2020). Educational institutions that relied on the use of online learning platforms were extremely difficult for computer-illiterate students. This was because not all students had the knowledge and skills needed to remain

competent in the use of online learning platforms (Al-Kumaim et al., 2021). Due to online courses being provided via the Internet, it was vital to evaluate students' views on the use of certain technology and students' abilities to utilise the technologies such as computers and the Internet (M. L. Hung et al., 2010). Students must have strong technical skills to effectively use learning management systems (LMSs), digital media, and video conferencing software in online learning (Küsel et al., 2020). Technical competencies such as using computers to send and receive emails, search reading materials through the Internet browser, download and upload documents from the Internet, and knowing how to utilise applications or software were associated with successful online students (Allam et al., 2020; Martin et al., 2020).

2.3.2 Online Communication Competencies

McCroskey and McCroskey (1988) defined communication competencies as the adequate skill to convey information via talking or writing. Online learning required students to communicate and participate through active interaction on digital devices (Küsel et al., 2020). Since there was no face-to-face interaction between instructors and students, the only means for students to communicate with their instructors and other classmates was through online communication. It was essential for online communication to happen for students to reflect and internalise what they had learnt by asking questions and expressing their feelings and thoughts. Asking questions was a good approach to an in-depth study of the subject, and in-depth study made the subject matter easier to understand (M. L. Hung et al., 2010). It was important to communicate

with others using the online system, and students' online communication competencies should be considered as attempts to overcome the limitations of online learning (Torun, 2020). Students who felt comfortable in online learning were willing to communicate and connect with instructors and classmates through computer-mediated communication (CMC) such as email, chat, and discussion boards as well as having confidence in accessing using these tools. The willingness of students to take part in online discussion boards was important to online learning effectiveness (Martin et al., 2020). Online communication competencies are deemed critical in this study to be included as part of students' assessment for online learning readiness.

2.3.3 Social Competencies with Classmates and Instructors

Rutherford et al. (1998) defined social competencies as the ability to initiate and manage good social interactions, build friendships, form collaborative networks, and respond effectively to their social environment. In online learning settings, social competencies were extremely important for communication and coordination. Students were encouraged to interact with others online in order to improve collaboration through online learning. Knowledge sharing through social interaction and participation had proved advantageous for knowledge acquisition in online learning settings (Ranganathan et al., 2021). Students needed to have collaborative social skills like open communication, decision-making, conflict resolution, and trust-building to manage their relationships and the degree of mutual learning among classmates (Dray et al., 2011). Besides, students needed social interaction and a

sense of presence in online learning. Collaborative learning had largely replaced the isolation that characterised earlier eras of online education, which indicated that this trend demands increasing interaction abilities such as social competencies of online students (Beaudoin et al., 2009). Allam et al. (2020) also asserted that feeling of isolation with no physical social interaction with their instructor and classmate influenced the level of student readiness. Students can interact with classmates through group projects or group discussions to exchange information and ideas. Besides, students can also interact with instructors by asking questions or communicating with the instructors on course activities (Sher, 2009). However, lack of physical social interaction stimulated level of anxiety, low self-confidence to perform online distance learning task and increased procrastination chances. Engin (2017) found that the online learning readiness levels of the students with high social skills were high as well. Therefore, social competencies for online learning are critical.

2.3.4 Self-Regulated Learning Competencies

Wirth and Leutner (2008) defined self-regulated learning (SRL) competencies as students' ability to plan, execute, and assess learning processes independently, which involved ongoing decision-making in the cognitive, motivational, and behavioural dimensions of the cyclic learning process. Examples of such processes included goal setting, metacognitive monitoring, self-evaluation, and help-seeking (Wandler & Imbriale, 2017). According to Zimmerman (1989), students with SRL competencies had to use specified strategies to achieve academic objectives depending on self-efficacy

perceptions. In other words, students' learning must have three significant components: students' self-regulated learning strategies, students' self-efficacy perceptions of performance competence, and students' commitment to academic objectives. In terms of online learning, Artino (2008) stated that if there were no instructors present, students had to assume increased responsibility to manage and control their academic progress. Online students required well-developed SRL competencies to guide their cognition and behaviour in these highly independent learning contexts. As online learning placed all control into the hands of online students, they were required to take it upon themselves to plan, organise, monitor, self-reflect, and evaluate their learning processes (Cho & Shen, 2013; Ejubović & Puška, 2019). Yot-Domínguez and Marcelo (2017) found that even though university students often use digital technologies, they did not use these technologies to regulate their learning process. Thus, students' self-regulated learning competencies are critical to be assessed.

2.4 Student Satisfaction

Students in HEIs were becoming more “consumer-oriented” than ever before, finding intensely for the ideal institution to enter and demanding satisfaction from their chosen institutions. This led to the turnover rate rising in HEIs because students were departing almost as quickly as freshmen were being enrolled (Haverila et al., 2020). This was both costly and inefficient for HEIs and students alike.

According to Saif (2014), satisfaction was a feeling of delight and happiness that people experience once they met their desires and needs. Student satisfaction measurement was deemed a strategic concern for educational institutions as satisfaction was equivalent to profit-and-loss accounting in business organisations. If student satisfaction was high, then the institution profited considerably by providing students with knowledge, skills, and specific abilities. In addition, Astin (1993) defined students' satisfaction as their perception of the institutional experience and perceived value of the education they obtained while enrolled in an educational institution.

Besides, Elliott and Shin (2002) defined student satisfaction as students' attitudes based on subjective evaluation of their educational achievements and experiences. Student satisfaction was usually considered a short-term attitude that stems from the assessment of students' educational experiences. Students were satisfied when their actual performance met or exceeded the expectations (Elliott & Healy, 2001). In terms of information technology, satisfaction was a basic indicator to evaluate the success, effectiveness, usage, and adoption of information systems (Al-Fraihat et al., 2020).

Moreover, satisfaction was found to be an essential determinant of success in various learning environments, particularly in online learning. Students who were satisfied appeared to be more engaged, motivated, and responsive, helped to create an effective learning atmosphere, and achieved at higher levels (Dziuban et al., 2015). Online students' satisfaction was a significant factor in understanding online learning quality. Indeed, the degree of

student satisfaction was frequently used to evaluate the effectiveness of online learning (C. L. Lim et al., 2020). Without knowing what satisfied students in online courses, it was hard to improve their learning. Undoubtedly, satisfaction research studies aided course designers, instructors, and administrators in identifying areas for improvement (Kırmızı, 2015).

In addition, satisfaction was largely seen as a desirable consequence of any product or service experience (Lin et al., 2008). Most of the research done focused on analysing student satisfaction with the main service quality offered by colleges or universities (Eresia-Eke et al., 2020; Jiewanto et al., 2012; Tan & Kek, 2004). SERVQUAL was the most extensively used service quality model, it was used to evaluate the satisfaction of students worldwide. SERVQUAL was a questionnaire designed, developed, and tested in a commercial setting by Parasuraman et al. (1985) to evaluate a business's service quality and customer satisfaction. In this study, students' perceived satisfaction will be evaluated mainly based on learning outcomes and experiences in online learning through their online learning readiness instead of the service quality of institutions. The service quality of the institutions will be discussed when comes to the institutional support (moderating variable) in the next section. Lastly, students' satisfaction in online learning is expected to enhance their retention in the institutions.

2.5 Student Retention in Online and Distance Education

Retaining students is a frequently researched topic in higher education. According to (Berger et al., 2012), by 1970, retention had become an increasingly popular subject inside and across college and university campuses. They defined retention as a college's or university's ability to graduate the students successfully who originally enrolled at that institution. Retention was also referred to as an institution's ability to keep a student enrolled from the time of admission until graduation. Hagedorn (2012) also defined student retention as staying in an institution until a degree was completed. Similarly, Fowler and Luna (2009) defined educational retention as students' continued study until successful completion.

Retention was needed to maintain the long-term success of an institution. Retaining students will increase the graduation rate. Higher graduation rates led to more academically prepared graduates who can better satisfy labour market demands. The living standards of students may also improve as a result of the gain in human capital (Maldonado et al., 2021). Eventually, a higher retention rate meant the students can benefit from completed degrees, the institutions can benefit from an increased graduation rate and tuition income, and the economy can benefit from a well-educated and competent workforce (Seery et al., 2021).

The other terms such as attrition, persistence, dropout, and withdrawal are closely related to retention. Berger et al. (2012) defined the following terms. Attrition referred to a student who had not been able to re-enrol at an institution

in consecutive semesters. Dropout referred to a student who failed to complete at least a bachelor's degree regardless of his initial educational goals. Persistence referred to a student's desire and action to remain in the higher education system from the beginning year to degree completion. Withdrawal referred to a student's leaving a college or university campus.

Even though online learning was undeniably the best way to ensure continuity of learning in the “new norm” era since 2020, online learning had always been plagued by low retention rates. One of the most serious problems in online education was that compared with traditional classes, the attrition rate of fully online programmes was too high. Numerous research comparing face-to-face and online courses found that online courses were more difficult to complete than face-to-face courses. Online versions of the same course had poorer retention rates than their face-to-face counterparts. Historically, the online retention rate was 5% to 35% lower than the retention rate in a face-to-face classroom environment (Glazier, 2016, 2020). Wladis et al. (2014) found that the retention rate in online courses was 10.4 % lower in comparison with face-to-face courses. Besides, Schaeffer and Konetes (2010) mentioned that dropout rates of students enrolled in online programmes were 15% to 50% higher than that of face-to-face courses. The study by Smart and Saxon (2016) showed that 35.6% of students enrolled in online courses dropped out, while there were only 10.1% of the students in traditional face-to-face courses. Similarly, Muljana and Luo (2019) mentioned that the online course completion rates had historically been lower than that of face-to-face courses, ranging between 8-14%. The result of Murphy and Stewart's (2017) research also found

that students enrolled in online lecture sections had an 11% lower rate of successful completion than expected.

In addition, research showed that retention rates vary by type of institution. In the United States, students enrolled in community colleges achieved a retention rate of 30-35% in fully online courses, while students enrolled in blended or seated courses had a retention rate of 50-60%. However, at the 4-year institution level (bachelor's degree level), the retention rates increased. Fully online students were reported to have a 60-65% retention rate at 4-year institutions, compared to a 75-80% retention rate for on-campus students (Seery et al., 2021).

According to Novikov (2020), in Russia, the shift from face-to-face to online learning had a negative influence on retention, with a reduction of 13.04% after the announcement was made due to COVID-19. Several international students promptly withdrew from the institution and departed the country. The immediate impacts of the emergency shift to online learning included a reduced student retention rate due to some students' inability to adjust to changes in the learning process and decreased attendance rates due to unverifiable technical issues.

Since retention is one of the most critical returns on investment especially for the private HEIs which rely on the students' enrolment as the main source of revenue, therefore, this research focuses on evaluating the

impacts of student online learning readiness and satisfaction on student retention in online learning environments.

2.6 Institutional Support

Although student satisfaction is expected to improve retention, institutional support is also important to enhance their relationship in online learning. The centralised service of online learning support was viewed to be one of the elements of future integrated institutional support systems (Žuvic-Butorac & Nebic, 2009). The process of developing online courses was not as straightforward, quick, and economically profitable as many HEIs expected. The early investment in time, technology, instructor expertise, and support services was significant. Besides, the competition was fierce because online learning had no geographical restrictions. The quality and level of support needed by the students were crucial as well. Investments focused only on technologies and infrastructure, instructional designers, or initial instructor training for online teaching were inadequate to assure online courses with high quality. Therefore, HEIs' support services for the development, implementation, and maintenance of online learning were crucial (Pedro & Kumar, 2019).

In online learning settings, it was important for institutions to provide technical assistance for instructors and students, enabling them to access and use the infrastructure, technologies, and networks for high-quality online education. Besides, administrative and academic supports such as online tutors or tutoring services, online library support services, online advisory services,

online student special needs support, online student orientation to the institution, and online student orientation to online learning skills were also important for online students (Pedro & Kumar, 2020).

Since not all students were capable of succeeding in online courses, educational institutions should also be prepared to assist students who lack the necessary online learning skills. Kebritchi et al. (2017) highlighted that HEIs played a critical role in improving the online education quality by assisting instructors, students, and content development. They suggested that institutions should offer training to students to help them overcome obstacles and enhance the effectiveness of online learning. Selvanathan et al. (2020) also claimed that enhancements should be made to improve the delivery of online T&L in Malaysia.

B. C. Y. Lim et al. (2008) asserted that educational institutions should offer better technology facilities, accreditation systems, copyright systems, and human and technical assistance. Lau (2003) also asserted that administrative staff had to help students adapt to the new learning environment and ensure that the institution catered to the student's interests, requirements, and learning styles. Thus, institutional support should not be neglected in order to improve online learning adoption, student satisfaction and retention.

2.7 Proposed Conceptual Framework

The above discussion suggests that the proposed conceptual framework depicted in Figure 2.2 draws upon Tinto's (1975) Student Integration Model (SIM) as the theoretical foundation for this study. According to the model, students' academic and social integration are crucial factors that determine their satisfaction and retention in HEIs.

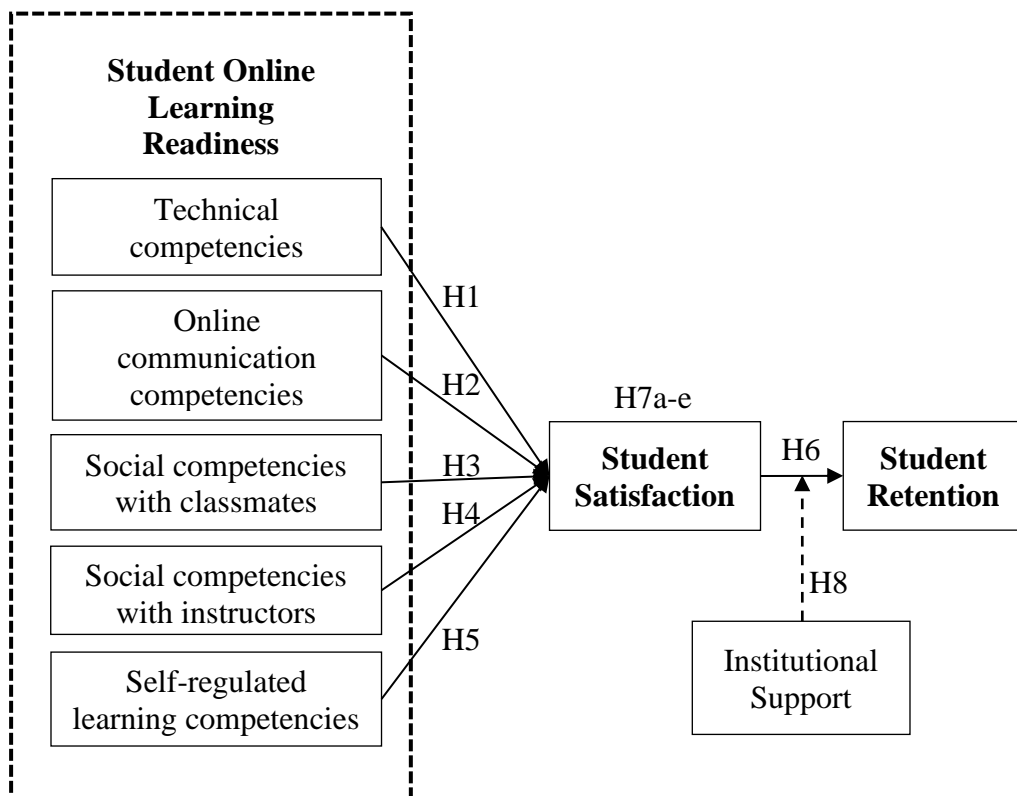


Figure 2.2: Proposed Conceptual Framework

This study intends to examine five dimensions of student online learning readiness, namely technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies and their relationship with student

satisfaction for online learning in Malaysian HEIs. The study will further examine the relationship between student satisfaction and retention. In addition, student satisfaction serves as a mediating variable that mediates the relationship between the five dimensions of student online learning readiness and student retention. Institutional support is also added as a moderating variable to moderate the relationship between student satisfaction and retention. The conceptual framework for the study comprises 12 hypotheses that will be tested to determine the relationships among the variables.

2.8 Hypotheses Development for the Study

2.8.1 Technical Competencies and Student Satisfaction

Technical competencies are deemed a vital component for successful online learning experiences because students are required to master the subject provided in the course and completely understand the technology utilised to convey information and manage discussions (Al-Kumaim et al., 2021; Allam et al., 2020; Dabbagh, 2007; Kamaruzaman et al., 2021; Küsel et al., 2020; Osika & Sharp, 2002; Selim, 2007; Williams, 2003). Hendricks and Bailey (2014) mentioned that online courses come with some technological prerequisites and required students to have technical skills. The student must be at least proficient in computer technology to be successful in online learning. According to Osika and Sharp (2003), they had identified many technical skills that were labelled as the minimum technical competencies for online learning students, such as student's ability to start/shut down a personal computer properly, send/receive

an e-mail, access information on the Internet, log into the university network and so on.

Ouma et al. (2013) argued that one of the reasons for failures in the implementation of online learning was users' poor technical skills. Students needed experience and some level of competencies in ICT systems for effective use of ICT in online learning. According to Selim (2007), having technical competencies is crucial for students to accept and succeed in online learning. Those who had previous experiences in using personal computers and software applications were particularly more equipped to handle online learning-based courses. Students who had more prior experience in online learning and were proficient in computer skills would feel more comfortable and satisfied with their online learning experiences (Tallent-Runnels et al., 2006). Aldhahi et al. (2022) also stated that students' satisfaction with online learning experiences at universities was typically affected by technology-related self-efficacy.

Since online learning are dependent on technologies such as computers and the Internet (Chung, Noor, et al., 2020; Coman et al., 2020), therefore technical competencies like computer and Internet self-efficacy will be examined. Chen (2017) defined computer self-efficacy as students' confidence in their ability to solve tasks and manage situations successfully by using computers. C. K. Lim (2001) discovered that students with better computer self-efficacy had higher satisfaction levels with their online courses. J. H. Wu et al. (2010) also discovered that students' computer self-efficacy provided an

indirect effect on learning satisfaction by achieving their expected performance in a blended e-learning system.

Besides, Hsiao et al. (2017) defined Internet self-efficacy as individuals' judgement of their own capability to interact with the Internet. Eastin and LaRose (2000) also mentioned that Internet self-efficacy not only referred to a person's ability to perform particular Internet-related tasks, such as using a browser, transferring files, or writing HTML but also referred to the ability of a person to apply higher levels of skills such as troubleshooting and problem-solving technical issues and searching information when using the Internet (Paul & Glassman, 2017; Rafique et al., 2021). Kuo, Walker, Schroder, et al. (2014) in their online learning studies showed that students' Internet self-efficacy was interrelated with their satisfaction. Similarly, in terms of computer and Internet self-efficacy, Kırmızı (2015) showed that the students who can use the Internet and online learning software comfortably felt confident to execute basic Microsoft Office functions. Wei and Chou (2020) also agreed that students who were more confident in utilising computers or the Internet were more satisfied with the course.

The study of Al-Hariri and Al-Hattami (2016) discovered a link between students' use of technology and their academic performance in health colleges. Increased use of this technology will improve students' understanding of content and the development of skills in areas such as problem-solving, creative thinking, analytical reasoning, and information evaluation. Therefore, students with technical competencies would support themselves to actively learn in an

online learning environment, which then assisted them to accomplish meaningful learning, leading to positive and cumulatively progressive gains in learning outcomes.

In online learning, since all learning activities have to be conducted using some types of ICT tools, it may be easier for students who have high competencies in using these tools to perform well in online courses. Therefore, it can be inferred that students with technical competencies will have better performance, online learning experience, and satisfaction. As a result, the hypothesis is proposed as follows:

H1: There is a significant and positive relationship between technical competencies and student satisfaction.

2.8.2 Online Communication Competencies and Student Satisfaction

In the online context, communication is an important concept used to define the effectiveness and quality of educational systems, that is, qualified communication among participants that enabled mutual understanding in the educational context to obtain effective results (Isman & Altinay, 2005). There were few studies had proposed that interpersonal and communication competencies were perceived as critical success factors in online learning (Dabbagh, 2007; Williams, 2003).

Past studies had indicated that online communication competencies were required by students to avoid the disadvantages of online communication and isolation in online learning (M. L. Hung et al., 2010). Rafique et al. (2021) also indicated that students who use computer-mediated tools to communicate with each other, as well as raise questions in an online discussion to gain a deeper understanding of their subject, would succeed in online learning. Besides, Tang et al. (2021) mentioned that online communication competencies were a key factor to enhance student satisfaction. Ansari and Khan (2020) and C. Li et al. (2014) also mentioned that online communication contributed to collaborative learning and fulfilled the psychological need for satisfaction. Kırmızı (2015) found that online communication competencies were correlating with the concept of student success and student satisfaction. In the study, students had a high degree of online communication competencies, which were important skills for online learning students, as well as a high level of student satisfaction.

Furthermore, Lin et al. (2008) viewed written communication skills as one of the social abilities, which represented students' worries about being restricted by their writing ability when engaging in online learning and interaction. The researchers stated that students' perception of their social ability would influence satisfaction, which meant that students with greater ability to interact with classmates and utilise meaningful social-environmental resources tended to have more favourable attitudes toward their learning. Thus, online communication competencies are important elements to enable students' social interaction. According to Sahin and Shelley (2008), students' satisfaction

with a course could be enhanced if they had the flexibility to engage in interpersonal communication and information sharing, were proficient in using online tools, and perceived online learning as effective.

Lastly, online communication competencies are critical to enabling student interaction with instructors and classmates. They are also an important element for better understanding the material taught and effective online learning. As a result, the hypothesis is proposed as follows:

H2: There is a significant and positive relationship between online communication competencies and student satisfaction.

2.8.3 Social Competencies and Student Satisfaction

Orpinas (2010) defined social competencies as the ability to effectively deal with social interactions. In other words, social competence referred to the ability to get along with others, create and sustain close relationships, and behave adaptively in social situations. Students with social competencies were more likely to actively engage in online human interactions, such as seeking or offering assistance, posting questions, exchanging information, sharing emotions, and participating in online discussions. Students who engaged in online human interaction can experience positive emotions such as happiness, joy, and satisfaction (Cho & Jonassen, 2009). Besides, the importance of social competencies to online students' academic performance had been supported (Parker et al., 2006).

M. G. Moore (1989) suggested the primary forms of formal interactivity within educational contexts included student-student, student-instructor, and student-content. A more satisfying educational experience would arise when there was more than one high level of interactivity, a more satisfying educational experience would arise (Anderson, 2003). In Tinto's (1998) research, he found that student-instructor and student-student interactions can contribute to students' feelings of connectedness and reduce their sense of isolation. In the next part, this review will focus on students' social competencies with classmates and instructors.

For those students who were dissatisfied with online courses, the most common reason was the absence of opportunities to interact with the instructors and classmates (Cole et al., 2014). This lack of interaction, as noted by Faize and Nawaz (2020), hindered the learning process. Fredericksen et al. (2019) also emphasised the importance of interactions with both instructors and classmates in enabling students to perceive learning in online courses. Students who cannot reach their instructors felt they learnt less and were dissatisfied with their courses. On the contrary, students who had the highest degrees of interaction with classmates experienced the highest degrees of perceived learning in the course.

Through making connections with classmates, students' online learning experience was considerably enhanced by interaction and relationships. Students can use online threaded discussions in their course management system to expand classroom discussions beyond the conventional limitations of

face-to-face classes. Students in online classrooms may get to know each other by recognising the writing styles and expressions of thoughts and ideas, rather than by physical characteristics (Roper, 2007). In addition, the quantity of interaction between a student and their instructor was associated with increased student satisfaction (Gopal et al., 2021). J. H. Wu et al. (2010) indicated that student-instructor interaction sustained a supportive learning environment, improved the performance of students, and increased their satisfaction in a hybrid e-learning system. As the interaction increased, the probability of students being able to fulfil their individual learning needs also increased (Kaymak & Horzum, 2013). Socially integrated students were more likely to be satisfied and remain in an institution than socially isolated students (Hawken et al., 1991).

Since the student's social interaction with classmates and instructors will enhance academic and social integration into an institution, a more satisfying educational and online learning experience will occur. As a result, the hypotheses are proposed as follows:

H3: There is a significant positive relationship between social competencies with classmates and student satisfaction.

H4: There is a significant and positive relationship between social competencies with instructors and student satisfaction.

2.8.4 Self-regulated Learning Competencies and Student Satisfaction

Zimmerman (1989) described self-regulated learners were those who actively participated in their learning process metacognitively, motivationally, and behaviourally. The self-regulated students initiated and directed their own endeavours to gain knowledge and skill rather than depending on parents, instructors, or other agents. The researcher further inferred that students' use of SRL strategies was closely related to excellent academic ability, which was an important predictor of students' academic performance. In Zimmerman's (2000) cyclical self-regulatory phases, the self-reaction process was one of the two processes in self-reflection, which was related to self-satisfaction. The self-satisfaction consisted of students' perceptions of dissatisfaction or satisfaction after learning or their responses to learning experiences on performance. Accordingly, self-regulated learning competencies could influence student satisfaction.

Students were more likely to succeed in online learning environments if they had better self-regulatory competencies (Kuo, Walker, Schroder, et al., 2014). When students had sufficient self-regulated learning skills and techniques, they often developed an interest and applied for online courses (Forson & Vuopala, 2019). Self-regulated learners found satisfaction in success and did not let failure discourage them (Wandler & Imbriale, 2017). Besides, students will show a lack of goal commitment, academic self-efficacy, and locus of control if they failed to complete online courses due to a lack of SRL (Cho & Shen, 2013).

Research indicates that students' SRL is a critical component in achieving successful learning outcomes, such as academic achievement and satisfaction, in online education (Artino, 2007, 2008; Greene & Azevedo, 2009; C. L. Lim et al., 2020; Puzziferro, 2008). For instance, Artino (2007) found that task value and self-efficacy were two elements in the motivation construct of SRL, which were associated with overall student satisfaction with online military training courses. Similarly, Artino (2008) demonstrated that academic self-regulation significantly explained students' satisfaction with online courses. Besides, Greene and Azevedo (2009) highlighted the link between SRL and students' acquisition of conceptual knowledge and understanding in a web-based science course. C. L. Lim et al. (2020) asserted that self-regulated learners had a higher level of satisfaction with online learning because they were better at regulating their learning process and responding to varied learning contexts. Puzziferro (2008) found that meta-cognitive self-regulation, time management, study environment, elaboration, and rehearsal were shown to be related to the community college students' satisfaction level in liberal arts online courses. The researcher also indicated that compared with the students in the low tier of the SRL group, self-regulated students from the high SRL group were more satisfied with online learning.

Since students with self-regulated learning competencies are better at regulating their learning process and responding to online learning environments, therefore students who engage in SRL are more likely to have a high commitment to their goals and/or institution. As a result, the hypothesis is proposed as follows:

H5: There is a significant and positive relationship between self-regulated learning competencies and student satisfaction.

2.8.5 Student Satisfaction and Retention

Fischer (2007) asserted that students with higher levels of satisfaction strongly reduced the likelihood of leaving an institution. Pervin and Rubin (1967) also mentioned that student satisfaction was strongly linked to student retention, and this relationship would hold more for non-academic (personal reasons, transfer, etc.) reasons than for academic (poor grades) reasons. However, Beelick (1973) found that achievement, as measured by GPA, was one of the key factors of student satisfaction, while the major sources of student dissatisfaction were the instructor's behaviour, institutional policy and administration, and interpersonal relationships with classmates. Satisfaction and dissatisfaction with the institution appeared to have a great influence on the performances, educational goals of students, attitudes toward the institution, health, and personalities.

In addition, Weerasinghe et al. (2017) mentioned GPA was the most influential factor in student satisfaction, while Elliott and Healy (2001) mentioned that one of the factors that may affect students' retention rates was their grades. Many students aspired to achieve high grades, and if they did, they were more likely to retain at the institutions they were presently attending. Some instructors may award better grades to improve student satisfaction. The total effect of this over time and instructors might have a favourable influence on an

institution's student retention rates. Martirosyan et al. (2014) also indicated that students who were more satisfied with their overall institution experience obtained higher GPAs than those students with low satisfaction. Intuitively, higher academic performance would increase student retention. Besides, Elliott and Shin (2002) stated that student satisfaction was important because it had a favourable influence on student motivation, student retention, fundraising, and recruitment efforts.

Previous research also showed that students who were dissatisfied with their experiences or viewed the online system negatively were less likely to participate in future online courses (Lim, 2001). Moreover, Deshields et al. (2005) indicated that students who had a good institution experience were more likely to be satisfied with the HEIs than students who lacked a good institution experience. Levy (2007) also found that students' satisfaction with online learning played a crucial role in their decisions to drop out of online courses. Furthermore, students who dropped out expressed less satisfaction with online learning compared to students who completed the same courses. Besides, research involving 27,816 student participants in 65 four-year institutions found a convincing link between student satisfaction and retention (Schreiner, 2009). Dhaqane and Afrah (2016) also found that satisfaction boosted students' academic success and retention. Bornschlegl and Cashman (2018) also suggested that students' desire to continue with an online programme was associated with their overall satisfaction, which was influenced indirectly by their satisfaction with critical program elements and the quality of their online student experience.

Based on Tinto's (1975) SIM, it can be said that if students integrate into the academic and social aspects of the institution, they will tend to stay in their studies. Therefore, it is crucial to study whether students' academic and social experiences for online learning in the institution are satisfying, which results in higher student retention for higher education institutions. Accordingly, the following hypothesis is proposed:

H6: There is a significant and positive relationship between student satisfaction and student retention.

2.8.6 The Mediating Effect of Student Satisfaction

According to Tinto's (1975) SIM, students' integration into the academic and social system of the institutions determined their dropout decisions through the change of their goal and institutional commitments. The student retention process was reliant on the students' experiences. In other words, students who had satisfaction with the informal and formal academic and social aspects in an institution tended to stay. Instead, students who had poor academic and social experiences tended to become disillusioned with the institution, withdraw from their instructors and classmates, and ultimately, drop out of the institution. Thus, this study extended the theory by proposing that student online learning readiness is an antecedent of student satisfaction, and satisfaction mediates the relationship between student online learning readiness and retention.

Firstly, Shaw et al. (2016) demonstrated that the technical skills of students' readiness influenced student attrition and retention in online courses. The technology-related self-efficacy also influenced the students' satisfaction with the online learning experiences at universities (Aldhahi et al., 2022). Students with a greater degree of technical competencies generally obtained better academic performance (Al-Hariri & Al-Hattami, 2016; C.-H. Wang et al., 2013), hence learning outcomes and satisfaction can be achieved. Technical competencies were a good predictor of student performance in online courses. Students were expected to have high technical competencies for the courses if they chose to take online classes (R. Bates & Khasawneh, 2007). Since students who are competent in the use of technology in online learning can communicate and interact with classmates and instructors, higher satisfaction can be achieved through the improvement of their academic performance and social interaction with others, which eventually leads to higher student retention. Thus, technical competencies are expected to have an indirect effect on student retention through the satisfaction of online learning experiences.

Furthermore, there were few empirical studies linking students' communication competencies and college success and withdrawal from college. Hawken et al. (1991) highlighted the importance of the communication competencies construct in a student's social and academic experience and also contributed to student retention. Rubin et al. (1990) found that students' communication competencies related to success in GPA and completion of study in college. GPA had been discussed as a key factor of student satisfaction (Beelick, 1973; Weerasinghe et al., 2017). If students are comfortable

communicating with classmates and instructors through online platforms, they not only can eliminate the sense of isolation through social interaction but also understand the discussed topic in a deeper way resulting in better academic performance.

Besides, Roberson and Klotz (2002) stated that human interaction between instructors and students, and students to students, was an incredibly crucial element of the educational process and should be taken into account while developing online courses. Besides, Fischer (2007) studied the relationship between various types of participation during the first year of study and student satisfaction, academic performance, and retention in the second year. The study discovered that establishing more formal academic connections with instructors, as well as formal and informal social ties with instructors, staff, and classmates, were all linked to satisfaction and persistence for all students, regardless of race or ethnicity. In contrast, the lack of such relationships, which was associated with dissatisfaction with academic and social isolation, was discovered as a predictor of departure. Orpinas (2010) also mentioned that socially competent students were more likely to have superior academic accomplishments and overall psychological well-being. On the contrary, loneliness and dissatisfaction with social relationships were indicators of issues like institution withdrawal. Therefore, students who lacked social competencies were at risk for various current and future unfavourable consequences.

In addition, an online learning environment was primarily self-directed, placing a significant responsibility on students to manage their academic

workload. Students who have never experienced this form of self-imposed academic discipline before may feel frustrated and be more likely to drop out. For students who are uncomfortable with self-directed learning and constructing knowledge based on their own initiative, the online environment may become intimidating (Bawa, 2016). In an online course, persistent students exhibited better self-regulation than dropout students. As a result, students' satisfaction can be reasonably related to persistence, positive learning experiences, and self-regulation in online courses. More satisfied students may achieve better academic performance in online courses (Oyelere et al., 2021). Students with self-regulated learning competencies can boost their motivation for online courses, thereby improving course satisfaction and performance (C.-H. Wang et al., 2013). Besides, self-regulated learners can achieve academic goals by managing and controlling their own academic progress. Thus, learners were likely to persist in their learning when participating in learning (Ju et al., 2014).

In short, compared with students with poor academic performance and social isolation, academic and socially integrated students who are competent in technical, online communication, social interaction with classmates and instructors, and self-regulated learning are more likely to be satisfied and the institutions can retain them. Student satisfaction may be a critical mediating variable to explain the processes through which students' perceptions of online learning readiness led to student retention. In this study, as student online learning readiness is composed of five dimensions, the following sub-hypotheses have been put forward:

H7a: There is a mediating effect of student satisfaction on the relationship between technical competencies and student retention.

H7b: There is a mediating effect of student satisfaction on the relationship between online communication competencies and student retention.

H7c: There is a mediating effect of student satisfaction on the relationship between social competencies with classmates and student retention.

H7d: There is a mediating effect of student satisfaction on the relationship between social competencies with instructors and student retention.

H7e: There is a mediating effect of student satisfaction on the relationship between self-regulated learning competencies and student retention.

2.8.7 The Moderating Effect of Institutional Support

An institution's inability to maintain its enrolment numbers impacted its graduation and retention rates, which were performance metrics for HEIs (Archambault, 2008). Kumar (2021) stated that there was a high probability of higher student satisfaction if students came to an online course with some preparation to give direction to his/her own learning progress. Pedro and Kumar (2019) highlighted crucial online learning-related institutional support that HEI must provide to ensure high-quality online teaching and, therefore, to increase the quality of online programmes and students' learning experiences. Student

satisfaction with particular institutional characteristics had an impact on their choice to remain at their current institution, transfer to another institution, or drop out of institutional education (Kieng et al., 2021).

Howard and Flora (2015) found that the implications of first-year programmes provided by institutions such as Pre-Term Orientation, Service-Learning programmes, and Early Warning/Early Alert Systems resulted in retention rates ranging from 59% to 80%. Pre-Term Orientation assisted students in integrating into both the academic and social aspects of the institution and developing more realistic expectations for their institutional experience. Service Learning also helped to promote social and academic integration and a sense of community care and support. Likewise, Early Warning/Early Alert Systems showed that early intervention could have a significant impact on the grades and retention rates of first-year students.

Lau (2003) also mentioned that institutional instructors and administrators played a significant role to enhance student retention. For example, instructors can assist students in maintaining a pleasant learning atmosphere in the class by using innovative teaching techniques like collaborative and cooperative learning in the class. Institutional administrators can also assist students in retaining at the institution by offering adequate academic support services and funding to them. Besides, instructor supports were an important element influencing student satisfaction had been supported (Bolliger & Martindale, 2004; Walker & Fraser, 2005). Roberson and Klotz (2002) also suggested that institutional administrators should adopt policies and

practices that paid attention to the exposure of students to content and interaction with the instructors and classmates.

In addition, Kamal et al. (2020) suggested that interactive online learning content and technical support provided by an institution can improve the learning process of students and the completion of their studies. Since students sought assistance for reasons that included unfamiliarity with new technology and anxiety with the technology, technical support was essential in order to minimise fear and anxiety (Cheurprakobkit et al., 2002). Students' satisfaction and their online learning progress relied on sufficient facilities and infrastructures of technology and support provided by institutions (B. C. Y. Lim et al., 2008). Fredericksen et al. (2019) found that students who were most satisfied with the help desk for technological support had greater perceived learning levels than those who were least satisfied with the help desk. Students felt that technical obstacles can and do hinder their ability to study. Therefore, providing technical support to students is critical for the institution to ensure a positive student experience. Gaytan (2015) also noted that students who feel supported by their institution in areas such as registration, tutoring, admissions, courses, financial assistance, and policies and procedures are more likely to persist in online courses.

Providing adequate institutional support to students who engage in online learning in HEIs is a crucial aspect. Institutional support is services provided that limit the development and integration of students within the institution. The HEIs, particularly the institutions conducting online teaching

must offer sufficient institutional support that matches the individual requirements of students, and improve their academic success and learning experience because student satisfaction assists institutions to retain current students. Based on the above, it is suggested to include institutional support as a moderating variable to assess the quality of service offered by the institution and to determine whether such support can improve student satisfaction and retention in online learning. As a result, the hypothesis is proposed as follows:

H8: The relationship between student satisfaction and student retention will be stronger when institutional support is present.

2.9 Chapter Summary

This chapter has discussed the literature review for Tinto's Student Integration Model (SIM), a summary of past studies, student retention, student satisfaction, student online learning readiness and institutional support. This chapter also proposed a conceptual framework that is based on Tinto's SIM in the setting of online learning. Next, multiple empirical studies have been reviewed to develop hypotheses. Lastly, the research gap in the literature has been identified.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter provides an overview of the research methodology used to investigate the relationship between students' online learning readiness, satisfaction, and student retention in private HEIs, as well as the mediating effect of student satisfaction and the moderating effect of institutional support. The aim is to present the research designs and methodologies employed to achieve the objectives of the study.

3.1 Research Design

Research designs are a set of strategies and processes that cover the decisions from general assumptions to specific data collection and analysis methodologies (Creswell, 2009). The overall decision in this study involves the designs that were used to investigate the topic. The decisions encompassed assumptions of a paradigm the researcher brings to the study, research strategies, and specific data collection methods, analysis, and interpretation (Creswell,

2009). The research designs utilised in this study aimed to address the research questions and provide a good understanding of the impact of student online learning readiness on student retention in private HEIs.

3.1.1 Quantitative Research Design

Ahmad et al. (2019) defined quantitative research as a research method that employs statistical, logical, and mathematical methodologies to create numerical data and evidence that is true and cannot be refuted. Quantitative research was chosen as the preferred approach in this study over qualitative research because it is more scientific, objective, fast, and generalisable. The research design aligned with a deductive approach aimed at testing hypotheses derived from Tinto's Student Integration Model. Quantitative research focuses on examining relationships between variables in order to test objective theories (Creswell, 2009). Consequently, the variables in this study were quantitatively evaluated using instruments, enabling the application of statistical procedures to analyse numerical data and address questions related to the sample population. This study employed Likert scales and close-ended questions as part of its quantitative research methodology. The research strategy used was a quantitative survey, involving the distribution of questionnaires to private higher education students to gather the necessary data.

3.1.2 Descriptive Research Design

Descriptive research was employed to describe the features and facts of the target population in a systematic and accurate manner (Isaac & Michael, 1979). It also discovered the relationships between variables. Two types of descriptive research were used in this study: the descriptive survey and the descriptive correlational study. The descriptive survey collected information about a subset of the target population and describe their characteristics, practices, preferences, differences, or commonalities (Dulock, 1993). Besides, a descriptive correlational study was conducted to examine how one variable is linked to other variables. The descriptive research's numerical data were organised and presented using descriptive statistical techniques to achieve three aims: (1) describe the variables; (2) describe the relationships between the variables; and (3) describe the distributions (Dulock, 1993). Measures of central tendency such as mean, median, and mode, as well as variability measures like range and standard deviation, were used to describe variables. Besides, correlations were used to examine the relationships between variables, while frequency and percentage were used to describe distributions.

Demographic information was collected from the participants who had experienced online learning before through Section B of the questionnaire. The information includes the name of the institution, online learning experience, average hours spent on online learning per week, device(s) used for online learning, Internet connectivity at the study area, gender, age, ethnicity, type of student, mode of study, level of study, year(s) of study at the institution, current

CGPA, and field of study. These data points were used to observe and analyse the characteristics of private higher education students and provide additional information for the study.

Besides, the major objective of this research was to accurately justify current practice and theory, which was achieved through the use of descriptive research to establish a clear picture of student online learning readiness leading to student satisfaction and then retention. The study also describes the relationships between student online learning readiness, satisfaction, and student retention, and examined the mediating effect of student satisfaction as well as the moderating effect of institutional support.

3.1.3 Correlational Research Design

To predict scores and explain the relationship between variables, a correlational research design was employed. The study utilised correlation statistical tests to measure and describe the degree of relationships between two or more variables (Creswell, 2009). Correlational research, in this context, did not seek to establish cause-and-effect relationships through variable manipulation, as in an experimental design. Instead, correlation statistics were used to establish relationships between variables. Two primary correlation designs were utilised in this study: explanation and prediction.

For explanatory research design, the researcher was interested in the degree of covariation of two (or more) variables, meaning that the change in

one variable was reflected in the change of another variable (Creswell, 2012). The explanatory study was characterised by a research hypothesis that stipulated the nature and direction of the relationships between the research variables (Sue & Ritter, 2012). The hypothesis in explanatory research stated the relationship between two or more variables, which not only assumed that A was related to B but also assumed that A had some effects on B (Akhtar, 2016). Thus, this study focused on determining the “why” aspect of the observed correlations.

For the prediction research design, the objective was to determine the variables that would predict an outcome. In correlational research, predictors are variables used to estimate an outcome, whereas a criterion is the predicted outcome. Predictive research used correlation statistical tests to report correlations, it may have included advanced statistical procedures. This study was interested in several predictors that helped explain the criterion (Creswell, 2012).

Lastly, this study aimed to examine the relationship between student online learning readiness, satisfaction, and retention while also exploring the mediating effect of student satisfaction and the moderating effect of institutional support using both explanatory and predictive research designs.

3.1.4 Cross-Sectional Survey Research Design

In this study, a cross-sectional survey design, which is the most frequently used survey design in education, was employed. The data was

collected only once at a single point in time (Creswell, 2012). The advantage of this design was that it could evaluate respondents' current practices or attitudes. For example, when higher education students in Malaysia were studying online, they could fill up questionnaires based on their present perceptions of online learning. This design also provided information in a short period, for example, the time spent conducting the survey and gathering data (Creswell, 2012). In order to reach a large population of target respondents, this study was conducted from May 2022 to November 2022. The six-month data collection duration was due to challenges in reaching the target audience through online means. To expedite the process and align with COVID-19 protocols, a Quick Response (QR) code on printed materials was introduced. Regarding potential changes in students' feelings over time, it is crucial to note that the study period coincided with a post-COVID phase in Malaysia. This post-COVID period likely minimised significant fluctuations in students' perceptions during the data collection timeframe.

3.2 Data Collection Method

To evaluate the students' perception of online learning readiness, satisfaction, institutional support, and retention, this research preferred to collect primary data directly from the students. Data collection is a process of gathering and measuring information related to specific variables of interest, which enables the researcher to find answers to research questions, test hypotheses, and evaluate results (Kabir, 2016).

This study collected primary data through first-hand experience as it offered an opportunity to gather data that is relevant to the research questions. Additionally, there was no doubt regarding the quality of the data collected, and there was an opportunity to obtain additional data during the study period. Primary data was preferred over secondary data as it is more objective, authentic, and reliable, and its validity is higher than secondary data. The researcher also obtained secondary data, such as statistical data published by the Ministry of Higher Education to support this study.

In this study, the primary data was gathered using a survey, with the questionnaire being the most commonly used method. A quantitative approach was adopted to collect data, using a list of closed-ended questions for respondents to provide answers. The collected data was quantitative, comprising numerical data that could be statistically analysed to draw inferences related to the study objectives. The quantitative data was assessed using different scales, including nominal, ordinal, and interval scales (Kabir, 2016).

3.3 Sampling Design

Sampling is a technique used to select a statistically representative sample of individuals from a population of interest (Kamangar & Islami, 2013). This is an effective tool for research projects as the population of interest typically comprises many individuals, making it impractical to survey all of

them. A good sample is statistically representative of the interested population and is sufficiently large to address the research questions (Majid, 2018).

3.3.1 Target Population

A population is defined as a collective of individuals with similar traits (Sekaran & Bougie, 2016), while the target population refers to the specific group of individuals that the researcher is interested in studying and whose information will contribute to the completion of the research. Public HEIs receive large amounts of public funding through national or subnational governments, whereas most private HEIs are not government-funded and rely on private funds and tuition revenue to cover operating and maintenance costs.

This study focuses on students from private HEIs in Malaysia, especially the universities, as these institutions are facing decreasing student enrolment rates and concerns about retention, which may lead to financial difficulties and eventual closure if students cannot be retained during online T&L. The study encompasses all levels of study, including postgraduate and part-time students. The inclusion of a diverse student body ensures a comprehensive understanding of the challenges and experiences related to online T&L. According to the MOHE (2022b), 517,580 students enrolled in private HEIs in 2021 when online learning is launching widely in the country.

The private HEIs selected for this study were chosen based on the latest Rating System for Malaysian Higher Education Institutions (SETARA)

2018/2019, which was released by the Ministry of Higher Education (MOHE) and Quacquarelli Symonds (QS) World University Rankings 2022. The MOHE (2020b) recommends that students choose a private HEI with a SETARA rating, as the rating system has been aligned with the Malaysian Education Blueprint (MEB), evaluating the institution's academic quality, accountability, and performance. The SETARA is evaluated through 38 indicators that cover four (4) main core functions, namely general, teaching and learning, research, and services. The SETARA uses a star rating system from a scale of one (1) star to six (6) stars. Six (6) stars indicate that an HEI is at an excellent level and has international competitiveness, while one (1) star indicates that the HEI is less competitive and does not meet the minimum criteria (MOHE, 2020a).

This study also uses the QS World University Rankings as a reference because the QS ranking is the oldest global ranking that gives a broader viewpoint. The rankings serve as a useful yardstick and benchmark to determine the strengths of an education system and how it can improve to raise student and institutional outcomes (MOE, 2015). QS World University Rankings uses its ranking method on six key indicators, including (1) employer reputation, (2) academic reputation, (3) citations per faculty, (4) faculty/student ratio, (5) international student ratio, and (6) international faculty ratio (Quacquarelli Symonds, 2021). Based on the ratings and rankings, this study targeted the private HEIs that had achieved 5-Star in SETARA ratings and were involved in QS rankings. The reason for selecting these institutions was that although they had unique strengths to achieve 5-Star in SETARA ratings, they still had room

for improvement to reach the highest level of 6-Star by improving online T&L as well as services to retain students.

Table 3.1: Top Private Universities in Malaysia based on SETARA Ratings and QS Rankings

No.	Top Private Universities in Malaysia	SETARA Ratings 2018/2019	QS Rankings 2022
1.	Taylor's University	5	332
2.	UCSI University	5	347
3.	Management and Science University (MSU)	5	601-650
4.	Universiti Tenaga Nasional (UNITEN)	5	751-800
5.	Sunway University	5	651-700
6.	Universiti Tunku Abdul Rahman (UTAR)	5	801-1000
7.	Universiti Kuala Lumpur (UniKL)	5	801-1000
8.	Multimedia University (MMU)	5	1001-1200

Sources: Ministry of Higher Education (2020a) and Quacquarelli Symonds (2021)

3.3.2 Sampling Frame

The sampling frame usually selects a group of people or organisations that share similar characteristics, which the researcher can identify and study (Creswell, 2012). Since the sampling frame must represent the population, it is a list of those who can be sampled within a population. In this study, the sampling frame should consist of a name list and contact information of all the students from the eight selected private universities in Malaysia. However, access to the students' name list and contact information will not be granted due to data protection issues, as the data are private and confidential.

3.3.3 Sampling Location

To ensure a well-spread pool of respondents, the students who were attached to any of the campuses of the eight selected private universities were included in this study. All the students from different campus locations as stated in Table 3.2 were selected to be the sample in this study. Since all eight selected private universities have campuses located in Selangor and/or W.P. Kuala Lumpur, this study mainly focuses on these two states due to the highest concentration of the universities' campuses.

Table 3.2: Locations of the Eight Private Universities

No.	Private Universities	Numbers of Campus	Campus Locations
1.	Taylor's University	1	• Subang Jaya, Selangor.
2.	UCSI University	4	• Cheras, Kuala Lumpur. • Kuching, Sarawak. • Marang, Terengganu. • Port Dickson, Negeri Sembilan.
3.	Management and Science University (MSU)	1	• Shah Alam, Selangor.
4.	Universiti Tenaga Nasional (UNITEN)	2	• Kajang, Selangor. • Muadzam Shah, Pahang.
5.	Sunway University	1	• Subang Jaya, Selangor.
6.	Universiti Tunku Abdul Rahman (UTAR)	2	• Sungai Long, Selangor. • Kampar, Perak.
7.	Universiti Kuala Lumpur (UniKL)	12	• Bandar Baru Bangi, Selangor. • Gombak, Selangor. • Dengkil, Selangor. • Kajang, Selangor. • Kulim, Kedah. • Jalan Sultan Ismail, Kuala Lumpur. • Taman Shamelin Perkasa, Kuala Lumpur. • Kampung Datuk Keramat, Kuala Lumpur.

Table 3.2 continued: Locations of the Eight Private Universities

		<ul style="list-style-type: none"> • Alor Gajah, Melaka. • Lumut, Perak. • Ipoh, Perak. • Masai, Johor.
8. Multimedia University (MMU)	3	<ul style="list-style-type: none"> • Bukit Beruang, Melaka. • Cyberjaya, Selangor. • Iskandar Puteri, Johor.

Sources: Universities' website

3.3.4 Sampling Elements

The sampling element is associated with the population (Sekaran & Bougie, 2016). There were many samples available from the target population whose characteristics were necessary for this study to obtain a better understanding of the collected data. The sampling elements in this study were the local and international students from the eight selected private universities who were enrolled in foundation programmes, diplomas, advanced diplomas, bachelor's degrees, master's degrees, or doctoral degrees and had experience with online learning. All of the sampling elements involved increased the validity of the data. Therefore, this study analysed the perceptions of students towards their retention in private HEIs.

3.3.5 Sampling Technique

Non-probability sampling is a sampling method where the sample collection process does not provide all units in the population an equal opportunity to be included (Etikan et al., 2016). Given that a sampling frame of specified private higher education students from the targeted universities was

not available, non-probability sampling was employed in this study. Purposive sampling, also known as judgment sampling, was used because it allowed the researcher to access a particular subset of people. All participants in the survey were selected based on their characteristics (Etikan et al., 2016). In this study, participants were chosen based on their experience with online learning and exclusive enrolment in one of the eight selected private universities. Quota sampling was also utilised in this study, dividing the sample according to the size of the university's total student population. This approach ensured a proportional representation of participants from each university, providing a more balanced view of the overall private higher education student population. Additionally, this study used another non-probability sampling technique called self-selected sampling because students voluntarily participated in the survey, and the researcher did not directly contact them.

3.3.6 Sampling Size

Before composing data, an appropriate sample size must be accurately calculated. The sample size must reflect the truth of the data and results, rather than being too large or too small (Heale & Twycross, 2015). For this study, the sample size for the population of private higher education students in Malaysia was determined based on Table 3.3 to ensure that the sample size is sufficient. According to Table 3.3, the sample size for private higher education students with a population of 517,580 should be at least 384 respondents (Krejcie & Morgan, 1970).

Table 3.3: The Sample Size for a Given Population

N	S	N	S	N	S
10	10	220	140	1 200	291
15	14	230	144	1 300	297
20	19	240	148	1 400	302
25	24	250	152	1 500	206
30	28	260	155	1 600	310
35	32	270	159	1 700	313
40	36	280	162	1 800	317
45	40	290	165	1 900	320
50	44	300	169	2 000	322
55	48	320	175	2 200	327
60	52	340	181	2 400	331
65	56	360	186	2 600	335
70	59	380	191	2 800	338
75	63	400	196	3 000	341
80	66	420	201	3 500	346
85	70	440	205	4 000	351
90	73	460	210	4 500	354
95	76	480	214	5 000	357
100	80	500	217	6 000	361
110	86	550	226	7 000	364
120	92	600	234	8 000	367
130	97	650	242	9 000	368
140	103	700	248	10 000	370
150	108	750	254	15 000	375
160	113	800	260	20 000	377
170	118	850	265	30 000	379
180	123	900	269	40 000	380
190	127	950	274	50 000	381
200	132	1 000	278	75 000	382
210	136	1 100	285	1 000 000	384

Source: Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607–610. <https://doi.org/10.1177/001316447003000308>

In this study, the researcher aimed to receive at least 400 responses from private university students. The number of samples required for full study from each university was determined according to the percentage of students enrolled in the eight selected private universities as shown in Table 3.4.

Table 3.4: Number of Samples Required for Full Study by University

No.	Private Universities	Number of Students' Enrolment	Percentage (%)	Number of Samples Required
1.	Taylor's University	10,811	9.76	39
2.	UCSI University	11,880	10.72	43
3.	Management and Science University (MSU)	17,811	16.08	64
4.	Universiti Tenaga Nasional (UNITEN)	6,136	5.54	22
5.	Sunway University	8,131	7.34	29
6.	Universiti Tunku Abdul Rahman (UTAR)	20,328	18.35	74
7.	Universiti Kuala Lumpur (UniKL)	22,372	20.19	81
8.	Multimedia University (MMU)	13,322	12.02	48
Total		110,791	100	400

Sources: MOHE (2022a) and universities' website

3.4 Research Instrument

A data-collecting tool, also known as a research instrument, was utilised. In this study, an online questionnaire was utilised to gather response data from respondents (refer to Appendix A). The questionnaire included a list of questions that the students completed to provide their opinions. This questionnaire became the primary method for collecting quantitative primary data in this study. A questionnaire is a standard method for collecting quantitative data, resulting in internally consistent and coherent data for analysis (Roopa & Rani, 2012). This method was selected due to the nature of behavioural study and the social distancing measures necessitated by the COVID-19 pandemic.

3.4.1 Questionnaire Design

The design of the questionnaire was carefully considered to collect relevant and useful information. A well-designed questionnaire takes effort to be planned and developed through multiple stages: (a) initial considerations, (b) content of the questionnaire, phrasing and response format, (c) question layout and sequence, (d) pretesting, pilot survey, revision and final questionnaire (Roopa & Rani, 2012). The questionnaire design for this research was presented in Table 3.5.

The questionnaire consisted of closed-ended questions, where respondents were provided with a limited set of response options to choose from that best reflected their views. Examples of closed-ended questions included Yes/No questions, multiple-choice questions and scaled questions using a 5-point Likert scale. Besides, in the question sequence, screening questions were used at the beginning of the questionnaire to screen out those who were unqualified to answer the following questions. Only students from the eight selected private universities who had experienced online learning before were qualified to participate in this questionnaire.

Table 3.5: Summary of Questionnaire Design

Sections	Questions/ Variables	Scales
Section A (Screening questions)	1. Studying at private HEI	Nominal
	2. Having online learning experience	Nominal
Section B (Demographic profile)	1. Name of institution	Nominal
	2. Online learning experience	Ordinal
	3. Average hours spent on online learning per week	Ordinal
	4. Device(s) used for online learning	Nominal
	5. Internet connectivity at study area	Ordinal
	6. Gender	Nominal
	7. Age	Ordinal
	8. Ethnicity	Nominal
	9. Type of student	Nominal
	10. Mode of study	Nominal
	11. Level of study	Ordinal
	12. Year(s) of study at institution	Ordinal
	13. Current CGPA	Ordinal
	14. Field of study	Nominal
Section C (Independent variables)	Technical Competencies (7 questions)	Interval
	Online Communication Competencies (5 questions)	Interval
	Social Competencies with Classmates (5 questions)	Interval
	Social Competencies with Instructors (5 questions)	Interval
	Self-Regulated Learning Competencies (6 questions)	Interval
Section C (Mediating variable)	Student Satisfaction (7 questions)	Interval
Section C (Moderating variable)	Institutional Support (7 questions)	Interval
Section C (Dependent variable)	Student Retention (6 questions)	Interval

To reach the target respondents, an Internet survey was conducted through Google Forms, which allowed respondents to self-administer and provide answers to questions by clicking on bullet points displayed online. The questionnaire design was categorised into three sections. Section A consisted of two screening questions to ensure that only students from the eight selected private universities who had prior experience with online learning participated in the study. Section B involved 14 questions related to the demographic profiles

of the respondents, including the name of the institution, online learning experience, average hours spent on online learning per week, device(s) used for online learning, Internet connectivity at the study area, gender, age, ethnicity, type of student, mode of study, level of study, year(s) of study at the institution, current CGPA, and field of study. All questions in both sections were nominal or ordinal scales.

Furthermore, Section C used the interval scale to determine all the variables. Part one consisted of seven questions related to technical competencies, Part two contained five questions about online communication competencies, Part three had five questions about social competencies with classmates, Part four had five questions on social competencies with instructors, while Part five had six questions about self-regulated learning competencies. Part six was related to the mediating variable, which consisted of seven questions about student satisfaction. Part seven was related to the moderating variable, which consisted of six questions about institutional support. Part eight was related to the dependent variable, which consisted of six questions about student retention. All questions in Section C were measured using the method of 5-point Likert scales anchored from “strongly disagree” to “strongly agree”.

3.4.2 Pretesting

Pretesting was conducted to improve the questionnaire design and identify errors that may only be apparent to the target population (Reynolds et al., 1994). Pretesting ensured the potential effectiveness of the questionnaire

before conducting the actual survey. Expert reviews were used as a pretest method to evaluate the draft questionnaire. Two experts in educational research were invited to provide feedback on the survey design. The experts gave feedback on how to structure the items that needed improvement. After receiving feedback from the experts, the researcher revised the questionnaire items (refer to Appendix B), considering how well each questionnaire item truly reflects the construct intended to be evaluated.

3.4.3 Pilot Study

Before conducting the full survey, a pilot study was conducted to evaluate the effectiveness of the research methodology and assess the reliability of the constructs. The questionnaire was revised based on pre-test or expert reviews, and the pilot study aimed to test the feasibility of the data collection methods intended for larger-scale research (In, 2017). A total of 30 questionnaires were distributed to students from the eight selected private universities as part of the pilot study.

The number of samples required for the pilot study was determined based on the percentage of students enrolled in each university (Table 3.6), following the recommendation by Johanson and Brooks (2010) that a minimum of 30 participants from the target population is needed for scale development or preliminary surveys. The online questionnaire (Google Form) was distributed to students through online platforms.

Table 3.6: Number of Samples Required for Pilot Study by University

No.	Private Universities	Number of Students' Enrolment	Percentage (%)	Number of Samples Required
1.	Taylor's University	10,811	9.76	3
2.	UCSI University	11,880	10.72	3
3.	Management and Science University (MSU)	17,811	16.08	5
4.	Universiti Tenaga Nasional (UNITEN)	6,136	5.54	2
5.	Sunway University	8,131	7.34	2
6.	Universiti Tunku Abdul Rahman (UTAR)	20,328	18.35	6
7.	Universiti Kuala Lumpur (UniKL)	22,372	20.19	6
8.	Multimedia University (MMU)	13,322	12.02	3
Total		110,791	100	30

Sources: MOHE (2022a) and universities' website

The pilot study included students who had prior experience with online learning, ensuring diverse perspectives and experiences relevant to the constructs under investigation. The data collected from the pilot study were analysed using SmartPLS 4 software to evaluate the reliability of the questionnaire. Table 3.7 showed that the reliability coefficients were calculated for each construct, including students' online learning readiness scales (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies), student satisfaction, institutional support, and student retention. The results indicated the internal consistency and reliability of the measurement items within each scale. These findings were crucial in determining the reliability of the measurement scales and validating the suitability of the data collection procedures for the main study.

Table 3.7: Reliability Test for the Pilot Study

Constructs	Cronbach's Alpha	Composite Reliability
TC	0.898	0.920
OCC	0.892	0.920
SCC	0.915	0.937
SCI	0.876	0.911
SRLC	0.869	0.904
SS	0.907	0.925
IS	0.845	0.874
SR	0.838	0.864

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention

3.5 Constructs Measurement

There were three sections in the questionnaire, including screening questions, respondent demographics, and constructs of student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies), student satisfaction, institutional support, and student retention. A 5-point Likert scale was used for all constructs. The Likert scale was used because it can quantify Likert items and allow the researcher to conduct statistical analysis on the received results. Furthermore, the odd Likert scale was used because it allowed respondents to respond to the choice neutrally. Moreover, the 5-point Likert scale was used to reduce respondents' frustration level while answering the questions, along with increasing the response quality and rate (Babakus & Mangold, 1992). This scale could also compare reliability coefficients with other researchers who also used 5-point Likert scales.

3.5.1 Origin of Constructs

All items were adapted from existing literature and were previously validated. Table 3.8 summarises the origin of the constructs used in this study and shows the items and sources used for each construct (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies).

Table 3.8: Summary of Origin of Construct

Constructs	Items	Adapted Sources
Technical Competencies	1. I am confident in performing the basic functions of office suites (e.g., MS Word, MS Excel, and MS PowerPoint, etc.).	TC 1-3: M. L. Hung et al. (2010)
	2. I am confident in managing online learning software/platforms (e.g., Zoom, Google Classroom, and MS Teams, etc.).	TC 4-7: X. Wang et al. (2021)
	3. I am confident in using the Internet to search for online learning information (e.g., Google, Microsoft Bing, Yahoo, etc.).	
	4. I am aware of the legal and ethical issues with the use of digital technologies.	
	5. I can use digital technologies to team up with others and learn effectively.	
	6. I can overcome the problems that arise from the digital technologies used in online learning.	
	7. I keep myself updated on the latest developments in digital technologies for online learning.	

Table 3.8 continued: Summary of Origin of Construct

Online Communication Competencies	<ol style="list-style-type: none"> 1. I am comfortable in responding to others via online. 2. I am able to express my opinion to others via online. 3. I can give constructive feedback to others via online. 4. I feel confident in expressing myself (both emotions and humour) via online. 5. I feel confident in posting/asking questions during online learning discussions. 	<p>OCC 1-3: Yu and Richardson (2015)</p> <p>OCC 4-5: M. L. Hung et al. (2010)</p>
Social Competencies with Classmates	<ol style="list-style-type: none"> 1. I can build bonding with my classmates via online discussions. 2. I can participate with my classmate actively during online discussions. 3. I can communicate with my classmates about the course content through different electronic means. 4. I can seek assistance from my classmates via online if necessary. 5. I respond to my classmates via online in a timely manner. 	<p>SCC 1-2: Shen et al. (2013)</p> <p>SCC 3: Kuo, Walker, Schroder, et al. (2014)</p> <p>SCC 4-5: Cho and Cho (2017)</p>
Social Competencies with Instructors	<ol style="list-style-type: none"> 1. I can easily ask questions and get answers from my instructor regarding online learning content (e.g., instructional materials). 2. I can freely discuss with my instructor about my online learning activities (e.g., assignments, discussions and exams). 3. I can share my thoughts with my instructor when his/her explanation is different from my standpoint. 4. I do not hesitate to share concerns about my online learning progress with my instructor. 5. I express my opinions to my instructor in a respectful manner during online course. 	<p>SCI 1-3: Kang and Im (2013)</p> <p>SCI 4-5: Cho and Cho (2017)</p>

Table 3.8 continued: Summary of Origin of Construct

Self-Regulated Learning Competencies	<ol style="list-style-type: none"> 1. I set short-term (daily/weekly) learning goals and long-term learning goals (monthly/semester/trimester) from time to time. 2. I choose the spot where I want to study to avoid too much distraction. 3. I prepare my discussion materials before joining the chat room for conversation. 4. I allocate extra studying time for online courses as I know it is time demanding. 5. I seek help from someone who is knowledgeable to understand course contents when necessary. 6. I summarise the online course contents to revise what I have learned based on my understanding. 	SRLC 1-6: Barnard et al. (2009)
Student Satisfaction	<ol style="list-style-type: none"> 1. I am satisfied with the online study discussions/forums. 2. I am satisfied with the quality of interaction among all the course parties involved. 3. I am satisfied with the collaboration/activities during the online courses. 4. I am satisfied with the class assignments as it is clearly explained to me. 5. I am satisfied with the given level of self-directedness in online learning. 6. I am satisfied with my performance from online courses. 7. I am well satisfied with the online learning experience/courses as compared to face-to-face sessions. 	SS 1-7: Bolliger and Halupa (2012)
Institutional Support	<ol style="list-style-type: none"> 1. My university provides web-based information geared toward the needs of online learning. 2. My university provides the financial aids to support students for online programmes. 3. My university provides multiple communication options on online support services (e.g., Hotlines, email, help desk, live chat, etc.). 4. My university provides a technical support centre equipped with hardware, software and trained staff. 5. My university provides online access to the library's electronic resources. 6. My university has a procedure for receiving regular and objective feedback about their online courses. 7. My university responds to online inquiries and manages in a timely manner. 	IS 1-7: Hirner (2008)

Table 3.8 continued: Summary of Origin of Construct

Student Retention	<ol style="list-style-type: none"> 1. I am confident that I can overcome any obstacles while studying online at my university. 2. I will finish my studies at my university no matter how difficult it may be. 3. I will certainly enrol for the next semester/trimester at my university until I graduate. 4. I am more likely to continue my studies at my university. 5. I will not quit my studies at my university. 6. It is important for me to graduate from my university. 	SR1-6: Shin (2003)
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3.5.2 Scales of Measurement

The scales of measurement play a significant role in data collection, analysis, and presentation (Mishra et al., 2018). There are four commonly recognised scales of measurement: nominal, ordinal, interval, and ratio. In this study, only three of these scales were utilised in the questionnaire.

3.5.2.1 Nominal Scale

Nominal data essentially have at least two classifications, and there is no ranking to the classifications (Mishra et al., 2018). Also, the nominal scale has no quantitative value. In the questionnaire used for this study, screening questions 1 and 2 with yes or no options, and multiple-choice questions in Section A, as well as demographic questions 1, 4, 6, 8, 9, 10, and 14 in Section B, such as the name of institution, device(s) used for online learning, gender, ethnicity, type of student, mode of study and field of study, were nominal scales because they had two or more classifications with no order. Figure 3.1 shows the example of the nominal scale in this study.

6. Gender *

Male

Female

Figure 3.1: Example of Nominal Scale

3.5.2.2 Ordinal Scale

The ordinal scale ranked the classifications. According to the questionnaire, questions 2, 3, 5, 7, 11, 12, and 13 in Section B, which pertained to the online learning experience, average hours spent on online learning per week, internet connectivity at the study area, age, level of study, year(s) of study at the institution, and current CGPA were ordinal scales. Figure 3.2 shows the example of an ordinal scale in this study.

7. Age *

18 years old and below

19 – 22 years old

23 – 26 years old

27 – 30 years old

31 years old and above

Figure 3.2: Example of Ordinal Scale

3.5.2.3 Interval Scale

The interval scale is characterised as a quantitative measurement scale, and the variance between the two variables is expressive (H. Wu & Leung, 2017). In Section C of the questionnaire, the interval scale, namely the 5-point Likert scale, was used by classifying responses as (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree and assigning values from 1 to 5. Figure 3.3 shows the example of interval scale in this study.

1. I am confident that I can overcome any obstacles while studying online at my university. *

1 2 3 4 5

Strongly disagree Strongly agree

Figure 3.3: Example of Interval Scale

3.6 Data Collection Procedures

The data collection process for this study was conducted from May 2022 to November 2022 and involved students with experience in online learning from eight selected private universities. All items in the questionnaire were adapted from existing literature, previously validated, and undergone expert review through a pre-test process. Initially, the online questionnaires were distributed to targeted students virtually using online platforms in compliance with the Standard Operating Procedures (SOPs) implemented in Malaysia. However, it proved challenging to effectively reach a more specific group of respondents through online means. Therefore, in order to expedite the data

collection process and minimise the interaction time with students during the COVID-19 pandemic (Faggiano & Carugo, 2020), a QR code of the Google Form was created. This QR code was then printed on physical materials and distributed to students, especially those with campuses in Selangor or W.P. Kuala Lumpur. The survey fieldwork involved five rounds of trips to conduct, and the necessary protocols were followed to ensure compliance with university guidelines and ethical considerations. To ensure smooth coordination and compliance, the course coordinator and Head of Department assigned an assistant to supervise the entire data collection process. Participants were duly informed about the confidentiality, anonymity, and voluntary nature of the online survey.

3.7 Ethical Clearance

The researcher has applied for ethical clearance and obtained approval from the Scientific and Ethical Review Committee (SERC) of Universiti Tunku Abdul Rahman (UTAR) prior to collecting data for this study (refer to Appendix C). This approval was necessary as the study involves collecting primary data from human participants, specifically students from eight selected universities. Furthermore, the researcher has adhered to all the codes of practice for research involving humans as prescribed by UTAR to ensure ethical and responsible research practices.

3.8 Data Processing

According to B. Sharma (2018), after the fieldwork had been completed, the collected data was centralised and input into the computer. The data collected from the study was required to be complete and accurate and checked for accuracy and adequacy before proceeding further. In this study, a total of four processes were carried out in data processing.

3.8.1 Data Checking

This meant checking the accuracy of the collected data and ensuring that there was no erroneous data by verifying the logic. The researcher checked whether there were any irrational responses, prohibited codes, omissions, or unreliable responses from the respondents. During the preliminary pilot study, all these errors were identified, and adjustments and amendments were made to the questionnaires to improve the reliability of the study.

3.8.2 Data Editing

Daalmans (2018) specified that data editing was a way of inspecting and correcting data. Correction of previously mentioned errors was necessary to prevent flaws and inconsistencies. If only two or three items were left blank in the questionnaire, one of the solutions was to derive a coherent response to the missing answers based on the participant's previous responses.

3.8.3 Data Coding

To enter the respondents' answers into a database, a number was assigned to each response. In Sections A and B of the questionnaire, the responses to every question were coded as shown in Table 3.9 below.

Table 3.9: Data Coding for Questions in Sections A and B

No.	Questions	Coding
Section A		
1.	Are you currently studying at a private HEI in Malaysia?	Yes = 1 No = 2
2.	Have you experienced online learning before?	Yes = 1 No = 2
Section B		
1.	Name of your university	Taylor's University = 1 UCSI University = 2 Management and Science University (MSU) = 3 Universiti Tenaga Nasional (UNITEN) = 4 Sunway University = 5 Universiti Tunku Abdul Rahman (UTAR) = 6 Universiti Kuala Lumpur (UniKL) = 7 Multimedia University (MMU) = 8 None of the university = 9
2.	Your online learning experience	< 6 months = 1 6 – 11 months = 2 12 – 17 months = 3 18 – 24 months = 4 > 24 months = 5
3.	Average hours spent on online learning per week	< 10 hours = 1 10 – 19 hours = 2 20 – 29 hours = 3 > 29 hours = 4
4.	Device used for online learning	Desktop = 1 Laptop = 2 Smart phone = 3 Tablet = 4 Others = 5

Table 3.9 continued: Data Coding for Questions in Sections A and B

5. Internet connectivity in your area	Very poor = 1 Poor = 2 Average = 3 Good = 4 Very good = 5
6. Gender	Male = 1 Female = 2
7. Age	18 years old and below = 1 19 – 22 years old = 2 23 – 26 years old = 3 27 – 30 years old = 4 31 years old and above = 5
8. Ethnicity	Malay=1 Chinese=2 Indian=3 Others=4
9. Type of student	Local = 1 International = 2
10. Mode of study	Full-time mode = 1 Part-time mode = 2
11. Level of study	Foundation = 1 Diploma = 2 Advanced Diploma = 3 Bachelor's degree=4 Master's degree=5 Doctoral degree=6 Others=7
12. Year(s) of study at your institution	< 1 year = 1 1 year = 2 2 years = 3 3 years = 4 4 years = 5 > 4 years = 6
13. Current CGPA	< 2.0 = 1 2.0 – 2.49 = 2 2.5 – 2.99 = 3 3.0 – 3.49 = 4 3.5 – 4.00 = 5
14. Field of study	General Programmes = 1 Education = 2 Arts & Humanities = 3 Social Sciences, Business & Law = 4 Science, Mathematics & Computing = 5 Engineering, Manufacturing & Construction = 6 Agriculture & Veterinary = 7 Health & Welfare = 8 Services = 9 Others = 10

In Section C of the questionnaire, all answers using the 5-point Likert Scale were coded as:

Strongly Disagree=1

Disagree=2

Neutral=3

Agree=4

Strongly Agree=5

3.8.4 Data Transcribing

The codes have been entered into the database after ensuring that all responses have been properly coded. Additionally, the raw data has been imported into both SPSS and SmartPLS software for data analysis purposes.

3.9 Data Analysis

Data analysis was the progression of transforming data into information and knowledge and investigating the relationship between variables in the study. The main statistical techniques applied were descriptive analysis and inferential analysis. The data that was collected was interpreted and analysed using IBM SPSS Statistics version 28.0 software and SmartPLS version 4 software.

3.9.1 Descriptive Analysis

In the initial stages of data analysis, descriptive analysis was conducted to gain insights into the dataset. This process involves several key steps. First, the collected research data was summarised and described in a meaningful and proficient manner using descriptive statistics, as suggested by Vetter (2017). A frequency distribution table was created to present a comprehensive overview of the frequency of various outcomes for the respondents' profiles. The respondents' profile was presented numerically in tables to aid in understanding the distributional characteristics of the variables under investigation. Additionally, measures such as the mean, median, and mode were computed to provide valuable information about the central tendency of the data, assisting in summarising and interpreting the dataset.

Furthermore, outliers were also examined in this study. Outliers are extreme responses given by respondents to a single question, or to all questions (Hair et al., 2017). According to Tabachnick and Fidell (2013), given the design of the study with multiple variables, it is preferable to use multivariate techniques that analyse the variables collectively instead of conducting a series of univariate or bivariate analyses. Therefore, the detection of multivariate outliers is best achieved through the use of the Mahalanobis distance. The Mahalanobis distance considered the interrelationships among the variables, which aligned with the objective of exploring the overall relationships between variables in the study. It calculated the distance of each case from the multivariate centre, enabling the researcher to identify cases that significantly

deviate from the overall pattern of the data. The criterion for identifying multivariate outliers is Mahalanobis distance at $p < .001$. By employing the Mahalanobis distance, the researcher identified outliers that had the potential to impact the relationships between variables, including cases that exhibit influential or a typical behaviour beyond what would be expected in a multivariate distribution.

Besides, partial least squares structural equation modelling (PLS-SEM) is a nonparametric statistical approach that does not require normal data distribution. Nonetheless, it is crucial to assess whether the data is not significantly different from the normal distribution, as extremely non-normal data could create issues in assessing the parameter significance. In particular, non-normal data could exaggerate standard errors produced through bootstrapping, which would decrease the likelihood of certain relationships being considered significant. Thus, in this study, two distribution measures were examined—skewness and kurtosis. Firstly, skewness assesses the degree of symmetry of the distribution of a variable. The distribution is regarded as skewed if a variable's response distribution extends to the left or right tail of the distribution. Secondly, kurtosis measures whether a distribution is too peaked, which indicates a relatively narrow distribution with the majority of responses in the middle. If the values for both skewness and kurtosis are close to zero, the response pattern is considered to be normally distributed. Skewness values within the range of -1 to $+1$ are deemed outstanding, while values between -2 and $+2$ are typically regarded as satisfactory. However, values that fall outside of this range, beyond -2 and $+2$, are seen as a sign of significant non-normality.

For kurtosis, a number larger than +2 indicates that the distribution is too peaked, whereas a number smaller than -2 indicates that the distribution was too flat (Hair et al., 2022).

In addition to these steps, the researcher also considered examining the presence of common method bias (CMB). CMB refers to a potential bias that can occur in research studies due to the measurement method used rather than the constructs being measured (Podsakoff et al., 2003). It has emerged as a significant concern in survey-based research, particularly when self-reported measures are employed. When participants are asked to respond to questions about different constructs within the same survey, their answers may become correlated with each other to avoid cognitive dissonance or inconsistency. This correlation can be a result of the shared measurement method rather than a genuine reflection of the relationships among the constructs. When multiple constructs or items are measured using the same statistical method, such as a scaled format, it may lead to a spurious effect (Kamakura, 2010). Consequently, the validity of conclusions drawn regarding the relationships between the measured constructs can be impacted. In order to identify CMB, Kock (2015) suggested using a full collinearity test. If the variance inflation factor (VIF) obtained from this test exceeds 3.3, it indicates pathological collinearity and suggests the presence of common method bias in the model. Conversely, if all VIF values resulting from the full collinearity test are equal to or below 3.3, it can be inferred that the model is not affected by common method bias.

3.9.2 Inferential Analysis

Inferential statistics involve drawing inferences or conclusions based on a collection of results (Sutanapong & Louangrath, 2015). They are fundamental methods for interpreting sample data since gathering population-level data is difficult (Gibbs et al., 2015). Structural equation modelling (SEM) was used because this modelling method is very useful in hypothesis testing and inferential data analysis where the pattern of relationships among variables is specified a priori and based on established theory (Hoe, 2008). It is also a multivariate approach that combines components of multiple regression analysis and factorial analysis with multiple variables to predict a variety of concurrently interrelated dependency relationships (Martínez-Torres, 2006). With SEM, this study was able to examine the relationships that existed among variables for HEIs to prioritise resources to better serve their students.

The researcher employed the SmartPLS software, which comes with a graphical user interface, to conduct variance-based structural equation modelling using the partial least squares path modelling approach. The choice of PLS-SEM was motivated by the need to test a complex model set-up involving mediation and moderation (Hair et al., 2017). Therefore, this research used PLS-SEM to examine the relationships between student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies), satisfaction, and student retention in HEIs as well as to examine the mediating effect of student satisfaction and the

moderating effect of institutional support. The researcher followed a two-step process when dealing with the PLS model. First, the researcher analysed and interpreted the reliability and validity of the measurement model. Once the measurement model produced reliable and valid constructs, the researcher proceeded to assess the structural model. By following this process, the researcher ensured that the nature of the construct relationships was deduced from a reliable and valid measurement model.

3.9.2.1 Reflective Measurement Model

Before evaluating the measurement model, the measurement model mode was confirmed because the constructs of the reflective measurement model are evaluated differently from those of the formative measurement model. As shown in Table 3.10, the guidelines provided by Hair et al. (2017) were used to choose the appropriate measurement model mode for the constructs applied in this study.

The measurement model was specified for each construct because they could not be directly observed. The questionnaire used in this study assessed eight constructs (TC, OCC, SCC, SCI, SRLC, SS, IS and SR) through multiple items (Table 3.8). These constructs were considered reflective measures, as the indicators were viewed as consequences or outcomes of the constructs. Based on the literature review, it was justified that the constructs in this study were reflective in nature. The decision to use reflective constructs was supported by the literature in educational research, particularly in the field of online learning.

Past studies have employed reflective constructs due to their ability to capture individuals' subjective perceptions, attitudes, and beliefs (Barnard et al., 2009; Bolliger & Halupa, 2012; Cho & Cho, 2017; Hirner, 2008; M. L. Hung et al., 2010; Kang & Im, 2013; Kuo, Walker, Schroder, et al., 2014; Shen et al., 2013; Shin, 2003; X. Wang et al., 2021). The constructs assessed in this study relied on students' subjective evaluations of their experiences and abilities in the online learning environment. By using reflective constructs, the study aimed to capture students' self-assessments and gain a comprehensive understanding of their experiences and behaviours in the online learning context. This approach aligned with existing literature on online learning and contributed to the broader knowledge in the field.

Table 3.10: Guidelines for Choosing the Measurement Model Mode

Criteria	Decision	Reference
Causal priority between the indicator and the construct	<ul style="list-style-type: none"> • From the construct to the indicators: reflective • From the indicators to the construct: formative 	Diamantopoulos and Winklhofer (2001)
Is the construct a trait explaining the indicators or rather a combination of the indicators?	<ul style="list-style-type: none"> • If trait: reflective • If combination: formative 	Fornell and Bookstein (1982)
Do the indicators represent consequences or causes of the construct?	<ul style="list-style-type: none"> • If consequences: reflective • If causes: formative 	Rossiter (2002)
Is it necessarily true that if the assessment of the trait changes, all items will change in a similar manner (assuming they are equally coded)?	<ul style="list-style-type: none"> • If yes: reflective • If no: formative 	Chin (1998)
Are the items mutually interchangeable?	<ul style="list-style-type: none"> • If yes: reflective • If no: formative 	Jarvis et al. (2003)

Source: Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Los Angeles, CA: Sage.

3.9.2.2 Assessment of Reflective Measurement Model

Before examining the structural model, the researcher evaluated the reliability and validity of the latent variables in the reflective measurement model. The acceptability of the measurement model was evaluated by: (1) the internal consistency, (2) the convergent validity, and (3) the discriminant validity. The criteria used for the assessment of the measurement model are presented in Table 3.11.

Table 3.11: The Criteria for Assessment of the Reflective Measurement Model

Reliability and Validity	Criteria	Sources
Internal consistency reliability	Cronbach's alpha ≥ 0.7	Hair et al. (2017)
Indicator reliability	Composite reliability ≥ 0.7	Hair et al. (2017)
Convergent validity	Outer loadings > 0.7	Hair et al. (2017)
Discriminant validity	Average variance extracted (AVE) > 0.5	Bagozzi and Yi (1988)
	The square roots of the AVE $>$ any other correlation between the constructs	Fornell and Larcker (1981)
	Heterotrait-monotrait ratio of correlations (HTMT) < 0.85	Henseler et al. (2015)

Internal consistency reliability was examined by assessing Cronbach's alpha and composite reliability (CR). Cronbach's alpha was used to estimate the reliability of the observed indicators based on their intercorrelations. However, CR was more suited for PLS-SEM than Cronbach's alpha since it did not imply that all indicators were equally reliable, which prioritised indicators based on their reliability in the model variables (Hair et al., 2017). In addition, to evaluate convergent validity, which measured how closely two measures of the same construct were correlated, the outer loadings of the indicators and the average variance extracted (AVE) were examined. Outer loadings were used to measure

the contribution of an item to its assigned construct. Accepting items with loadings of 0.7 or above was the rule of thumb, implying that the error variance was lower than the shared variance between the construct and its measure (Hulland, 1999). The AVE measured the variance related to measurement error captured by the indicators (Fornell & Larcker, 1981), with AVE values larger than 0.5 considered adequate (Bagozzi & Yi, 1988). Lastly, discriminant validity, which measures the distinctiveness of constructs, was evaluated by confirming that the square roots of AVE were larger than any other correlation between the constructs studied in this research (Fornell & Larcker, 1981). However, the Fornell-Larcker criterion may not be sensitive and specific for determining the discriminant validity of measures in a variance-based SEM. Thus, to solve this critical issue, this study also proposed HTMT as a new method for assessing discriminant validity. HTMT was the ratio of the within construct correlations to the between construct correlations, measuring the similarity between latent variables. Discriminant validity could be considered proven if the HTMT was less than 0.85 because it was the most conservative critical value (Henseler et al., 2015).

3.9.2.3 Assessment of Structural Model

After confirming the reliability and validity of the construct measures, the researcher proceeded to evaluate the results of the structural model. This involved analysing the predictive power of the model as well as examining the relationships between the constructs. According to the hypotheses stated in the conceptual framework of this research, the constructs were assembled into the

structural model. Figure 3.6 below displays the approach used to evaluate the results of the structural model systematically.

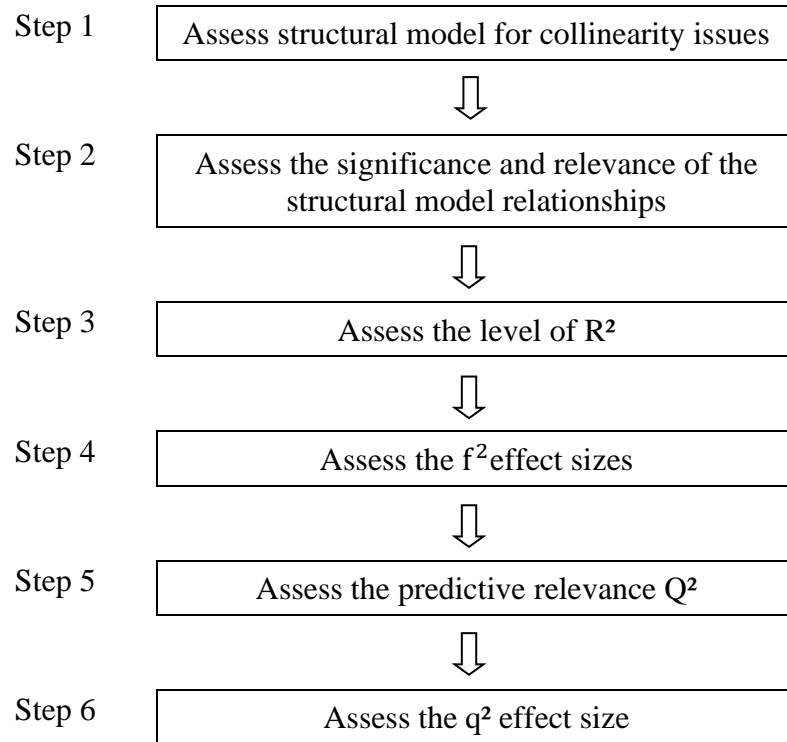


Figure 3.4: Structural Model Assessment Procedure

Source: Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Los Angeles, CA: Sage.

Step 1: Since the assessment of the structural model largely depends on the characteristics and concepts underpinning multiple regression analysis, this study has evaluated the structural model constructs to analyse whether there is a high degree of multicollinearity before assessing the structural model. The VIF value for each predictor construct had to be less than 5. To address collinearity issues, the research considered removing constructs, creating higher-order constructs, or merging predictors into a single construct.

Step 2: The estimated values of the structural model relationships (e.g., the path coefficients) were obtained, which reflected the hypothesised relationships among the constructs. Testing for significance required applying a bootstrapping procedure with 5,000 resampling techniques and assessments of t-values, p-values, or bootstrapping confidence intervals. Besides, the researcher compared the relative sizes of path coefficients to determine the primary construct with the greatest relevance in explaining the endogenous latent variables.

Step 3: The coefficient of determination (R^2) was used to evaluate the structural model prediction. It measured the in-sample prediction of all endogenous constructs. In other words, it showed the amount of explained variance of endogenous constructs. The R^2 value varied from 0 to 1. The higher the R^2 value, the higher the level of prediction accuracy. Generally, R^2 values of 0.25, 0.50, or 0.75 for the endogenous construct could be considered as respectively weak, moderate, and substantial.

Step 4: The f^2 effect size was the second measure of the structural model's predictive ability that was assessed to provide an estimate of each exogenous construct's predictive power in the model. The f^2 effect size measured the change in the value of R^2 when a certain exogenous construct was removed from the model. It evaluated whether the removed construct had a substantial influence on the value of R^2 of the endogenous construct. Cohen (1988) proposed that the effect size of an exogenous construct on an endogenous construct was indicated by the f^2 values of 0.02, 0.15, and 0.35, which

represented small, medium, or large effects. No effect was indicated if the effect size value was smaller than 0.02.

Step 5: Q^2 was a measure of the out-of-sample predictive power or predictive relevance of a model. This study used the blindfolding procedure to evaluate the Q^2 value of the path model. Blindfolding was a sample re-use technique that systematically removed and predicted each data point of the indicators in the endogenous constructs. The prediction error of the path model for the construct was then obtained by comparing the original values with the predictions. This prediction error was used to compute the Q^2 value for assessing predictive relevance. If the value of Q^2 was greater than zero, the path model was considered to have predictive relevance to the endogenous construct. Conversely, a Q^2 value of zero or less indicated a lack of predictive relevance.

Step 6: The q^2 effect size was utilised to assess how much an exogenous construct contributed to the Q^2 value of an endogenous latent variable. The q^2 effect size was calculated for the Q^2 values, and it is similar to the f^2 effect size used for the R^2 values. The critical values used to evaluate the q^2 effect size of a specific construct and its association with an endogenous construct were identical to those used for evaluating the f^2 effect size.

3.9.2.4 Mediation Analysis

The significance of the direct and indirect effects was determined by running mediation analyses in this study. To distinguish between different types

of mediation and non-mediation, the significance of model relationships and their relationship with each other was considered. Bootstrapping was used instead of the Sobel test, which was found to be unsuitable in a PLS-SEM context, to examine the mediating effect. The bootstrapping approach was chosen because it did not make any assumptions about the shape of the variable distribution or the sampling distribution of the statistics. Therefore, it was deemed very suitable in a PLS-SEM context and was carried out using the SmartPLS 4 software. Additionally, the indirect effect produced greater levels of statistical power when bootstrapping was employed in comparison to the Sobel test. All standard model evaluation criteria, such as reliability, convergent and discriminant validity, multicollinearity, R^2 , etc. were taken into account when assessing the mediation model in this study.

3.9.2.5 Moderation Analysis

This study defined moderation as a scenario where a third variable influenced the strength or direction of the relationship between two constructs. The two-stage approach was preferred because the main objective purpose of the study was to examine whether the moderator (Institutional Support) had a significant influence on the relationship between student satisfaction and retention. This approach was deemed more appropriate than the orthogonalisation approach or the product indicator approach, as it resulted in higher statistical power.

Moreover, the measurement and structural model evaluation criteria discussed earlier were also applied to this moderator model. The moderator variable needed to meet all the relevant criteria for reliability and validity when evaluating the reflective measurement model. However, there was no such requirement for the interaction term as it was assessed with a single item. It was also crucial to consider the standard criteria for evaluating the structural model. The f^2 effect size of the interaction effect was given special consideration in the context of moderation. The f^2 effect size represented the contribution of moderation to the explanation of the endogenous latent variable. Furthermore, it could be concluded that the moderating variable had a significant moderating effect on the relationship if there was a significant effect of the interaction term on the endogenous construct.

3.10 Chapter Summary

This chapter explores the various research designs employed in the study, including quantitative, descriptive, explanatory, correlational, and cross-sectional survey designs. The study utilised primary data collection methods. The sample design section delves into the target population, sampling frame, sampling location, sampling elements, sampling technique, and sampling size. An online questionnaire served as the research instrument, with pre-testing and a pilot study conducted to ensure its effectiveness. The origin of constructs and the respective scales of measurement were shown in the part of constructs measurement. Data collection procedures were described as well. Finally, the

chapter outlines the descriptive and inferential analysis methods used in the subsequent chapter to test the hypotheses.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.0 Introduction

This chapter presented a detailed analysis of the collected data using the SPSS and SmartPLS software. The chapter began by providing information on the response rates and the profile of the respondents. It then conducted preliminary assessments. Subsequently, the measurement model was assessed for reliability and validity, followed by the evaluation of the structural model. Mediating and moderating effects were examined as well. By following this structured approach, the chapter aimed to present a comprehensive analysis of the data and provide meaningful insights into the relationships among the variables in the research model.

4.1 Response Rates

Table 4.1 shows that the researcher distributed a total of 770 online questionnaires to targeted students from the eight selected private universities, all of whom had experienced online learning before. Initially, 410

questionnaires were distributed online, while an additional 360 questionnaires were distributed physically to expedite the data collection process. Out of the 465 responses received, 34 incomplete survey forms were removed from the dataset before analysis, resulting in 431 complete and usable responses that met the minimum sample size requirement of 384 as determined in Chapter 3. According to M. Wu et al. (2022), the average response rate for online surveys in the education-related field was 44%. Therefore, the response rate of 56% in this study could be considered sufficient.

Table 4.1: Response Rates for Each University

Private Universities	Targeted Samples	Number of Questionnaires Distributed	Number of Questionnaires Returned	Valid Responses	Response Rates (%)
1. Taylor's University	39	80	45	42	52.5
2. UCSI University	43	90	49	48	53.3
3. Management and Science University (MSU)	64	100	68	59	59.0
4. Universiti Tenaga Nasional (UNITEN)	22	50	37	30	60.0
5. Sunway University	29	50	33	32	64.0
6. Universiti Tunku Abdul Rahman (UTAR)	74	180	90	81	45.0
7. Universiti Kuala Lumpur (UniKL)	81	130	94	91	70.0
8. Multimedia University (MMU)	48	90	49	48	53.3
Total	400	770	465	431	56.0

4.2 Preliminary Assessments

4.2.1 Multivariate Outlier Handling

During the data analysis phase, the identification and handling of outliers were crucial. The Mahalanobis distance was employed to detect multivariate outliers in a study consisting of 431 cases. The dependent variable in this study was SR, while the remaining variables (TC, OCC, SCC, SCI, SRLC,

SS, and IS) were considered independent variables. The Mahalanobis distance was evaluated using the chi-square (χ^2) distribution with degrees of freedom equal to the number of independent variables, which in this case was seven. A conservative significance level of $p < .001$ for the χ^2 value was chosen to identify outliers (Tabachnick & Fidell, 2013). Based on the critical χ^2 value at an alpha level of 0.001 for 7 degrees of freedom (24.322, as per Appendix D), any case with a Mahalanobis distance greater than $\chi^2_7 = 24.322$ was considered a multivariate outlier. Among the variables in the dataset, Table 4.2 illustrates those cases 53, 195, 140, 365, 310, 246, 229, 351, 390, 46, 130, and 193 were identified as outliers with $p < .001$. These 12 outliers were subsequently removed, leaving a total of 419 cases for further analysis.

Table 4.2: Multivariate Outliers (Mahalanobis Distances)

	Case Number	Mahal. Distances	p-values
1	53	42.744	.00000
2	195	37.132	.00000
3	140	28.639	.00017
4	365	28.383	.00019
5	310	28.081	.00021
6	246	27.492	.00027
7	229	26.024	.00050
8	351	26.005	.00050
9	390	25.786	.00055
10	46	25.510	.00062
11	130	25.462	.00063
12	193	25.229	.00069
13	205	24.276	.00102
14	331	23.194	.00158
15	99	22.739	.00189
16	173	22.487	.00209
20	194	22.137	.00241
18	385	21.856	.00269
19	27	21.065	.00368
20	223	20.642	.00434

The Mahalanobis distance statistics for the identified outliers are displayed in Table 4.2, showing the top 20 cases with the highest Mahalanobis distance values in descending order. The table includes the case numbers and the corresponding Mahalanobis distance values, providing insight into the extent of deviation from the overall pattern of the data.

4.2.2 Normality Analysis

As recommended by Hair et al. (2017), while PLS-SEM does not require normality assumptions, it is still crucial to examine the distribution of variables in order to obtain more reliable results. According to the rule of thumb (Hair et al., 2022), Table 4.3 displays the overall kurtosis and skewness values for all items, which fell within the acceptable range of -2 to $+2$. Notably, the excess kurtosis and skewness values for most items were relatively close to zero, suggesting that the response distributions for each item were approximately normal.

Table 4.3: Normality Analysis for Items

Constructs	Items	Excess Kurtosis	Skewness
Technical Competencies	TC1	0.031	-0.537
	TC2	-0.242	-0.477
	TC3	0.215	-0.807
	TC4	-0.209	-0.410
	TC5	0.235	-0.615
	TC6	-0.086	-0.482
	TC7	-0.086	-0.547
Online Communication Competencies	OCC1	0.196	-0.706
	OCC2	-0.439	-0.486
	OCC3	-0.007	-0.545
	OCC4	-0.296	-0.482
	OCC5	-0.470	-0.324

Table 4.3 continued: Normality Analysis for Items

Social Competencies with Classmates	SCC1	-0.781	-0.366
	SCC2	-0.362	-0.509
	SCC3	0.219	-0.643
	SCC4	0.191	-0.670
	SCC5	-0.011	-0.610
Social Competencies with Instructors	SCI1	-0.169	-0.548
	SCI2	0.145	-0.576
	SCI3	-0.117	-0.400
	SCI4	-0.496	-0.337
	SCI5	0.191	-0.614
Self-Regulated Learning Competencies	SRLC1	0.006	-0.475
	SRLC2	1.889	-1.113
	SRLC3	0.146	-0.605
	SRLC4	0.146	-0.542
	SRLC5	0.348	-0.631
	SRLC6	0.196	-0.632
Student Satisfaction	SS1	0.153	-0.652
	SS2	-0.016	-0.491
	SS3	0.100	-0.600
	SS4	0.060	-0.554
	SS5	0.216	-0.614
	SS6	0.248	-0.654
	SS7	-0.520	-0.484
Institutional Support	IS1	0.045	-0.638
	IS2	-0.360	-0.491
	IS3	-0.380	-0.417
	IS4	-0.204	-0.467
	IS5	0.115	-0.679
	IS6	0.271	-0.660
	IS7	0.044	-0.491
Student Retention	SR1	-0.038	-0.531
	SR2	0.696	-0.988
	SR3	1.220	-1.025
	SR4	1.265	-1.043
	SR5	1.674	-1.266
	SR6	1.519	-1.374

4.2.3 Assessment of Common Method Bias

Kock's (2015) common method bias test, which utilises the full collinearity test procedure, was performed to assess the presence of common method bias in the study. The results of this assessment are presented in Table 4.10, revealing that all the constructs had VIF values below the recommended threshold of 3.3. The VIF values below this threshold indicated that there was no evidence of common method biases in the current study. The absence of common method biases implied that the observed relationships between the constructs in this study were more likely driven by the actual underlying phenomena rather than being influenced by measurement errors. This strengthened the confidence in the study's results and enhanced the credibility of the conclusions drawn from the data analysis.

4.3 Respondents' Profile

The profile of the respondents is shown in Table 4.4. The respondents consisted of 63.7% of females and the remaining were males. Moreover, most of the respondents were 19 to 22 years old (76.8%). In terms of the private higher education institutions, 21.2% of respondents studied UniKL, followed by 18.6% at UTAR, 13.6% at MSU, 10.7% at USCI, 11.5% at MMU, 9.8% at Taylor's, 7.4% at Sunway, and 7.2% at UNITEN. The majority of the respondents were taking Bachelor's degrees (82.6%). Despite the limited number of doctoral degree students in the study, their inclusion provided a unique perspective and offers preliminary insights into the experiences and

challenges faced by postgraduate students in online learning environments. While the small sample size of doctoral degree students may limit generalisability, their participation allows for an in-depth exploration of their experiences with online learning readiness and its impact on satisfaction and retention. Furthermore, 27.2% of respondents had 12 to 17 months of an online learning experience, followed by 23.9% having 18 to 24 months, 20.3% having 6 to 11 months, 17.7% having more than 24 months, and 11.0% having less than 6 months. Most of the respondents had good (42.5%) and fair (37.9%) Internet connectivity in their study area.

Table 4.4: Respondents' Profile

Variables	Items	Frequency (N=419)	Percentage (%)
Gender	Male	152	36.3
	Female	267	63.7
Age	18 years old and below	11	2.6
	19 – 22 years old	322	76.8
	23 – 26 years old	77	18.4
	27 – 30 years old	6	1.4
	31 years old and above	3	0.7
Private higher education institution	Taylor's University	41	9.8
	UCSI University	45	10.7
	Management and Science University (MSU)	57	13.6
	Universiti Tenaga Nasional (UNITEN)	30	7.2
	Sunway University	31	7.4
	Universiti Tunku Abdul Rahman (UTAR)	78	18.6
	Universiti Kuala Lumpur (UniKL)	89	21.2
	Multimedia University (MMU)	48	11.5
Level of study	Foundation	20	4.8
	Diploma	32	7.6
	Bachelor's degree	346	82.6
	Master's degree	19	4.5
	Doctoral degree	2	0.5

Table 4.4 continued: Respondents' Profile

Online learning experience	< 6 months	46	11.0
	6 – 11 months	85	20.3
	12 – 17 months	114	27.2
	18 – 24 months	100	23.9
	> 24 months	74	17.7
Internet connectivity	Excellent	40	9.5
	Fair	159	37.9
	Good	178	42.5
	Poor	34	8.1
	Very poor	8	1.9

4.4 Descriptive Statistics

Prior to the evaluation of measurement models, the descriptive statistics of the data such as mean, median, and standard deviation were generated and are presented in Table 4.5.

The mean scores for the TC construct range from 3.847 to 4.265, which suggested that the respondents had a generally positive attitude towards technology and their ability to use it for online learning. The item with the highest mean scores was TC3 (“I am confident in using the Internet to search for online learning information”), which suggested that the respondents were highly confident in their ability to use the internet for online learning purposes. On the other hand, the item with the lowest mean score was TC7 (“I keep myself updated on the latest developments in digital technologies for online learning”), which suggested that the respondents might not be actively seeking out information about new developments in technology for online learning.

The mean scores for the OCC construct were relatively low, ranging from 3.683 to 3.950. This suggested that the respondents were not entirely comfortable with communicating and expressing themselves online. Specifically, respondents were more comfortable responding to others online (OCC1) and less comfortable asking questions during online learning discussions (OCC5). This could imply that the respondents might need further support and guidance to develop their online communication skills and confidence.

The SCC construct had a gradually increasing mean score from SCC1 to SCC5. This indicated that respondents had a relatively low level of agreement with SCC1, which pertained to building bonds with classmates via online discussions, and a higher level of agreement with SCC5, which pertained to responding to classmates online in a timely manner. The highest mean score was for SCC4, which pertained to seeking assistance from classmates online if necessary. This suggested that respondents were more comfortable with seeking help from classmates online rather than building social connections with them. Overall, the SCC construct showed that respondents were generally comfortable with communicating and participating with classmates electronically, but might not prioritise building social connections with them.

The mean score for the SCI construct ranged from 3.561 to 3.921, which suggested that the respondents had moderate to high agreement with the statements. The highest mean score was for SCI5, indicating that the respondents were more likely to express their opinions to their instructors in a

respectful manner during online courses. This could be a positive sign for instructors who value open communication and student engagement. On the other hand, the lowest mean score was for SCI4, suggesting that the respondents found it challenging to share their concerns about their online learning progress with the instructor. This may require further investigation to identify the reasons behind this and develop appropriate strategies to improve communication between students and instructors.

The mean score for the SRLC construct ranged from 3.611 to 4.107. SRLC2 had the highest mean score of 4.107, indicating that respondents strongly agreed that they chose a study spot to avoid too much distraction. SRLC1, SRLC3, SRLC4, SRLC5, and SRLC6 had mean scores ranging from 3.611 to 3.969, indicating that respondents had a moderate level of agreement towards setting short-term and long-term learning goals, preparing discussion materials, allocating extra studying time for online courses, seeking help from knowledgeable individuals, and summarising online course contents to revise.

The mean scores for the SS construct were above average, ranging from 3.632 to 3.826. The respondents agreed highly with the statement of SS5 that they were satisfied with the given level of self-directness in online learning. This indicated that the respondents found the degree of autonomy in their learning experience to be satisfactory, potentially influencing their overall satisfaction with online learning. The mean scores of other statements were also relatively high, indicating that the respondents generally felt satisfied with the online discussions, quality of interaction, collaboration, assignment explanation,

and overall performance in their online courses. The mean score for SS7, which asked about satisfaction with online learning compared to face-to-face sessions, may provide insights into the respondents' overall preference for online learning.

Based on the mean scores for IS construct, the respondents agreed very much with IS1 and IS5, indicating that the university provided web-based information geared toward the needs of online learning and online access to the library's electronic resources, respectively. These results suggested that the respondents found the university's support for online learning through web-based information and access to the library's electronic resources to be satisfactory. Besides, the mean score for IS2 was relatively low, which may suggest that the university needs to improve its financial support for online programmes to better support students.

The SR construct, which focused on student retention, yielded high mean scores across all items. This indicates that the respondents displayed a strong level of commitment toward remaining enrolled and completing their studies at the university. Among the individual items, SR6 received the highest mean score of 4.477, suggesting that the respondents placed significant importance on graduating from the university. On the other hand, SR1 had the lowest mean score of 3.740, indicating slightly lower confidence in overcoming obstacles while studying online. However, overall, the high mean scores reflected a positive outlook toward continued enrolment and successful completion of studies at the university.

Table 4.5: Descriptive Statistics for Items

Constructs	Items	Minimum	Maximum	Mean	Median	Standard Deviation
Technical Competencies	TC1	1	5	4.079	4	0.776
	TC2	1	5	4.143	4	0.756
	TC3	1	5	4.265	4	0.775
	TC4	1	5	3.993	4	0.816
	TC5	1	5	4.088	4	0.796
	TC6	1	5	3.905	4	0.826
	TC7	1	5	3.847	4	0.912
Online Communication Competencies	OCC1	1	5	3.950	4	0.929
	OCC2	1	5	3.828	4	0.981
	OCC3	1	5	3.819	4	0.953
	OCC4	1	5	3.714	4	1.013
	OCC5	1	5	3.683	4	0.958
Social Competencies with Classmates	SCC1	1	5	3.511	4	1.140
	SCC2	1	5	3.621	4	1.071
	SCC3	1	5	3.795	4	0.948
	SCC4	1	5	3.983	4	0.886
	SCC5	1	5	3.907	4	0.926
Social Competencies with Instructors	SCI1	1	5	3.890	4	0.923
	SCI2	1	5	3.811	4	0.909
	SCI3	1	5	3.628	4	0.937
	SCI4	1	5	3.561	4	1.017
	SCI5	1	5	3.921	4	0.861
Self-Regulated Learning Competencies	SRLC1	1	5	3.611	4	0.967
	SRLC2	1	5	4.107	4	0.852
	SRLC3	1	5	3.737	4	0.978
	SRLC4	1	5	3.687	4	0.942
	SRLC5	1	5	3.969	4	0.836
	SRLC6	1	5	3.840	4	0.927
Student Satisfaction	SS1	1	5	3.780	4	0.969
	SS2	1	5	3.673	4	0.960
	SS3	1	5	3.742	4	0.965
	SS4	1	5	3.823	4	0.918
	SS5	1	5	3.826	4	0.906
	SS6	1	5	3.814	4	0.947
	SS7	1	5	3.632	4	1.094
Institutional Support	IS1	1	5	3.993	4	0.881
	IS2	1	5	3.496	4	1.117
	IS3	1	5	3.831	4	0.933
	IS4	1	5	3.764	4	0.972
	IS5	1	5	4.050	4	0.885
	IS6	1	5	3.907	4	0.908
	IS7	1	5	3.697	4	0.953

Table 4.5 continued: Descriptive Statistics for Items

Student Retention	SR1	1	5	3.740	4	0.941
	SR2	1	5	4.260	4	0.836
	SR3	1	5	4.229	4	0.832
	SR4	1	5	4.177	4	0.872
	SR5	1	5	4.298	5	0.863
	SR6	1	5	4.477	5	0.764

4.5 Measurement Model Assessment

In this study, the measurement model was visually represented using path diagrams in SmartPLS to illustrate the theoretical relationships between constructs and their observed indicators in a structural equation model (Ringle et al., 2022). Latent variables and observed indicators were connected through specified paths to represent the measurement model, while relationships between latent variables were defined as structural paths to form the structural model. The following sections of the study provided interpretations of the results derived from the model analysis.

4.5.1 Internal Consistency Reliability

The initial step in evaluating a measurement model typically involves assessing its internal consistency reliability. Traditionally, Cronbach's alpha has been the go-to criterion for this purpose according to Hair et al. (2017). However, Cronbach's alpha is known to produce low-reliability values, while composite reliability (CR) tends to overestimate internal consistency reliability, producing relatively higher estimates. Thus, both criteria should be considered and reported. The true reliability of measures' internal consistency reliability is

typically situated between Cronbach’s alpha (the lower bound) and CR (the upper bound). Table 4.6 presents Cronbach’s alpha and CR values for each construct, and all values surpassed the suggested threshold of 0.70, indicating that all constructs had internal consistency.

The high-reliability values (above 0.90) of the constructs in this study can be justified for several reasons. Firstly, the constructs used in this study were derived from past studies where some constructs also exhibited reliability values above 0.90 (Barnard et al., 2009; Bolliger & Halupa, 2012; Cho & Cho, 2017; Kang & Im, 2013; Kuo, Walker, Schroder, et al., 2014; Shen et al., 2013; X. Wang et al., 2021). This indicated that such high reliability was common in the research domain, establishing a precedent for accepting these values as valid indicators of internal consistency. Secondly, the questionnaire items underwent rigorous revision (refer to Appendix B) based on expert feedback, improving their clarity and relevance. The higher reliability coefficients obtained can be seen as evidence that the revised items effectively captured the intended constructs.

Table 4.6: Internal Consistency Reliability

Constructs	Cronbach’s Alpha	Composite Reliability
TC	0.880	0.906
OCC	0.905	0.930
SCC	0.896	0.923
SCI	0.881	0.914
SRLC	0.846	0.887
SS	0.924	0.939
IS	0.906	0.925
SR	0.878	0.907

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention

4.5.2 Convergent Validity

Convergent validity measures how closely a measure is related to other measures in the same construct. In order for a construct to be considered valid, it must explain at least 50% of the variance in each indicator (Hair et al., 2017). This means that the variance that is shared between the construct and its indicators should be more than the variance caused by measurement error. An indicator's outer loading should be greater than 0.708, which is the square root of 0.50, in order to be considered acceptable. A loading of 0.70 is generally considered acceptable. Indicators with outer loadings between 0.40 and 0.70 may also be acceptable if the CR is larger than 0.70 and the AVE value is greater than 0.50. The AVE is another measure used to evaluate convergent validity on the construct level. It represents the proportion of variance captured by a construct from its indicators, which should be higher than the proportion of variance captured by measurement error. AVE is computed by taking the average of the squared loadings of each indicator on its corresponding construct. A value of 0.5 or greater is generally considered to indicate good convergent validity (Hair et al., 2017). Table 4.7 shows the outer loadings of indicators and the AVE values of the constructs. Most of the indicators exhibited a sufficient level of indicator reliability with outer loadings above 0.70, except for TC4 and SR1 recorded 0.698 and 0.666 respectively. However, these items were maintained since the CR and AVE were meeting the desired level (Hair et al., 2017). Besides, all constructs explained more than half of the variance of their indicators with AVE values greater than 0.5, indicating high levels of convergent validity for all measures.

Table 4.7: Indicator Reliability and AVE

Constructs	Items	Outer Loadings	AVE
Technical Competencies	TC1	0.739	0.581
	TC2	0.799	
	TC3	0.791	
	TC4	0.682	
	TC5	0.794	
	TC6	0.773	
	TC7	0.750	
Online Communication Competencies	OCC1	0.830	0.726
	OCC2	0.871	
	OCC3	0.883	
	OCC4	0.875	
	OCC5	0.799	
Social Competencies with Classmates	SCC1	0.836	0.706
	SCC2	0.869	
	SCC3	0.869	
	SCC4	0.808	
	SCC5	0.816	
Social Competencies with Instructors	SCI1	0.816	0.680
	SCI2	0.873	
	SCI3	0.881	
	SCI4	0.825	
	SCI5	0.719	
Self-Regulated Learning Competencies	SRLC1	0.729	0.566
	SRLC2	0.715	
	SRLC3	0.766	
	SRLC4	0.799	
	SRLC5	0.727	
	SRLC6	0.774	
Student Satisfaction	OLS1	0.846	0.686
	OLS2	0.867	
	OLS3	0.875	
	OLS4	0.777	
	OLS5	0.819	
	OLS6	0.804	
	OLS7	0.807	
Institutional Support	IS1	0.780	0.639
	IS2	0.703	
	IS3	0.828	
	IS4	0.837	
	IS5	0.795	
	IS6	0.830	
	IS7	0.814	
Student Retention	SR1	0.660	0.621
	SR2	0.842	
	SR3	0.847	
	SR4	0.769	
	SR5	0.804	
	SR6	0.791	

4.5.3 Discriminant Validity

The concept of discriminant validity is concerned with how well a construct differs from other constructs that are theoretically expected to be different from it (Hair et al., 2017). It is used to confirm that the construct is not just a variation of another construct. The Fornell and Larcker criterion is a widely used method for assessing discriminant validity in SEM. It compares the square root of the AVE for each construct with the correlations between that construct and other constructs in the model. Discriminant validity is confirmed if the square root of the AVE for each construct is more than its correlation with other constructs (Hair et al., 2017). Table 4.8 shows that discriminant validity was established based on Fornell and Larcker criterion because the square roots of each construct's AVE were more than the inter-correlations with other constructs.

Table 4.8: Discriminant validity (Fornell and Larcker Criterion)

	TC	OCC	SCC	SCI	SRLC	SS	IS	SR
TC	0.762							
OCC	0.561	0.852						
SCC	0.592	0.704	0.840					
SCI	0.568	0.732	0.745	0.825				
SRLC	0.560	0.546	0.653	0.630	0.752			
SS	0.591	0.659	0.720	0.737	0.649	0.828		
IS	0.556	0.446	0.562	0.555	0.557	0.619	0.800	
SR	0.579	0.440	0.510	0.496	0.465	0.532	0.594	0.788

Note. The diagonal values (in bold) refer to the square root of AVE, TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention

Another method to evaluate discriminant validity is to use the Heterotrait-Monotrait Ratio of Correlations (HTMT), which compares the correlations between different constructs to the correlations of each construct

with itself. To support discriminant validity, the HTMT ratio should be less than 0.85. This method is considered more reliable than the Fornell-Larcker criterion in identifying potential issues with discriminant validity (Henseler et al., 2015). Table 4.9 shows that discriminant validity was established using the HTMT approach because the HTMT values were lower than 0.85.

Table 4.9: Discriminant validity (HTMT)

	TC	OCC	SCC	SCI	SRLC	SS	IS	SR
TC								
OCC	0.625							
SCC	0.663	0.782						
SCI	0.638	0.819	0.838					
SRLC	0.647	0.622	0.749	0.733				
SS	0.643	0.718	0.789	0.812	0.728			
IS	0.609	0.491	0.623	0.622	0.635	0.680		
SR	0.647	0.470	0.546	0.529	0.514	0.551	0.627	

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention

4.6 Structural Model Assessment

Once the reliability and validity of the constructs' measures were established, the subsequent step was to assess the structural model's outcomes. This analysis comprised examining the model's ability to make predictions and the interrelationships between the constructs. The procedure entailed checking for collinearity problems, evaluating the significance and relevance of the relationships, and determining the R² level, f² effect size, predictive relevance Q², and q² effect size.

4.6.1 Collinearity Assessment

One commonly used measure to detect collinearity is the VIF values of all sets of predictor constructs in the structural model. When the VIF value exceeds 5, it indicates a problematic level of collinearity (Hair et al., 2017). In this study, Table 4.10 presents the VIF values of all combinations of endogenous constructs and corresponding exogenous constructs. Collinearity was assessed for two sets of predictor constructs. The first set included TC, OCC, SCC, SCI, and SRLC as predictors of SS. The second set included SS, IS, and IS×SS as predictors of SR. The results showed that the VIF values of all exogenous constructs were less than 5, indicating that there was no significant problem of collinearity among them. Therefore, the study can proceed with reporting the results.

Table 4.10: Collinearity Test

Exogenous Constructs	Endogenous Constructs	VIF
TC	SS	1.774
OCC		2.526
SCC		2.935
SCI		2.975
SRLC		2.006
SS	SR	1.635
IS		1.628
IS×SS		1.029

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, IS×SS=Interaction Term

4.6.2 Structural Model Path Coefficients

This step involved estimating and evaluating the structural model path coefficients to test the hypothesised relationships and assess the relevance of

significant relationships between variables. The path coefficient (β) represents the direction and strength of the relationship between variables. The results of the hypotheses testing, including path coefficients, t-values, and p-values, are summarised in Table 4.11. These results were obtained through a bootstrapping procedure. H1 evaluated whether TC significantly and positively affected SS. The results displayed that TC had a positive and significant impact on SS ($\beta = .120$; $t = 3.030$; $p = .002$). Thus, H1 was supported. Besides, H2 evaluates whether OCC significantly and positively affected SS. The results disclosed that OCC had a positive and significant impact on SS ($\beta = .111$; $t = 2.092$; $p = .04$), supporting H2. H3 evaluates whether SCC significantly and positively affected SS. The results disclosed that SCC had a positive and significant impact of SS ($\beta = .223$; $t = 3.520$; $p < .001$), supporting H3. H4 evaluates whether SCI significantly and positively affected SS. The results disclosed that SCI had a positive and significant impact on SS ($\beta = .306$; $t = 4.899$; $p < .001$), supporting H4. H5 evaluates whether SRLC significantly and positively impacted SS. The results disclosed that SRLC had a positive and significant impact on SS ($\beta = .185$; $t = 3.853$; $p < .001$), supporting H5. SCI stood out as the strongest predictor of SS in this study as the path coefficient (.304) was the highest. Lastly, H6 evaluates whether SS significantly and positively affected SR. The results displayed that SS had a positive and significant impact on SR ($\beta = 0.259$; $t = 4.295$; $p < .001$). Thus, H6 was supported.

Table 4.11: Results of Structural Equation Modelling

Hypotheses	Path Coefficients (β)	t-values	p-values	Results
H1: TC->SS	0.120	3.030	0.002	Significant
H2: OCC->SS	0.111	2.092	0.036	Significant
H3: SCC->SS	0.223	3.520	0.000	Significant
H4: SCI->SS	0.306	4.899	0.000	Significant
H5: SRLC->SS	0.185	3.853	0.000	Significant
H6: SS->SR	0.259	4.295	0.000	Significant

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, SR=Student Retention

4.6.3 Coefficient of Determination (R^2 Value)

To determine the predictive power of a model, the coefficient of determination (R^2 value) was used. It was obtained by squaring the correlation between the predicted and actual values of an endogenous construct (Hair et al., 2017). This coefficient reflected how much of the variance in the endogenous construct can be explained by the exogenous constructs that were connected to it. Ranging from 0 to 1, larger values of R^2 mean higher accuracy in predictions. However, the interpretation of R^2 values may vary based on the complexity of the model and the research field. Typically, R^2 values of 0.25, 0.50, and 0.75 for endogenous constructs are considered weak, moderate, and substantial, respectively (Hair et al., 2017). Table 4.12 shows the R^2 values of the endogenous constructs (SS and SR). According to the guidelines, the R^2 value of SS (0.649) was moderate, while the R^2 value of SR (0.399) was weak. This suggested that the exogenous constructs in the model explained a moderate amount of variance in SS and a weak amount of variance in SR.

Table 4.12: R² Values

Exogenous Constructs	Endogenous Constructs	R ²
TC OCC SCC SCI SRLC	SS	0.649
SS IS IS×SS	SR	0.399

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, IS×SS=Interaction Term

4.6.4: Effect Size f²

The f² measure has become increasingly important in research and is recommended by journal editors and reviewers. The f² values indicate the change in the R² value when a specific exogenous construct is removed from the model, indicating the impact of that construct on the endogenous constructs. The f² effect size is grouped as small (0.02), medium (0.15), or large (0.35) based on Cohen's (1988) criteria. Values lower than 0.02 suggest that there is no effect (Hair et al., 2017). Table 4.13 presents the f² values, which measured the effect size of the exogenous constructs on the endogenous constructs. The results indicated that TC, SCC, SCI, and SRLC had small effect sizes (0.023, 0.049, 0.090, and 0.047, respectively) on SS, meaning they contributed to a relatively small amount of variability in SS. On the other hand, OCC had no effect on SS. Besides, SS had also a small effect (0.069) on SR, while IS had a medium effect (0.184) on SR. However, the interaction term (IS×SS) had no effect size on SR.

Table 4.13: f^2 Values

Exogenous Constructs	Endogenous Constructs	f^2
TC	SS	0.023
OCC		0.014
SCC		0.049
SCI		0.090
SRLC		0.047
SS	SR	0.069
IS		0.184
IS×SS		0.005

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, IS×SS=Interaction Term

4.6.5: Blindfolding and Predictive Relevance Q^2

Q^2 value is a metric that is utilised to assess the model's ability to predict data that was not included in the model's estimation, thus measuring its predictive relevance for out-of-sample data. The Q^2 is calculated using cross-validation redundancy techniques such as blindfolding, where a portion of the data is excluded during the model estimation process and then used to predict the omitted data. A Q^2 value greater than zero indicates some level of predictive relevance for a given endogenous construct (Hair et al., 2017). The Q^2 values for both endogenous constructs (SS and SR) are presented in Table 4.14 and were significantly higher than zero. Specifically, SS had the highest Q^2 value (0.439), followed by SR (0.215). These findings strongly supported the predictive relevance of the model for the endogenous constructs.

Table 4.14: Predictive Relevance Q^2 Values

Exogenous Constructs	Endogenous Constructs	Q^2
TC OCC SCC SCI SRLC	SS	0.439
SS IS IS×SS	SR	0.215

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, IS×SS=Interaction Term

4.6.6: Effect Size q^2

The q^2 effect size is a method to compare the relative contribution of predictive relevance among different exogenous constructs to an endogenous latent variable. This approach is comparable to the f^2 effect size method used to evaluate R^2 values. A q^2 value of 0.02, 0.15, or 0.35 indicates a small, medium, or large predictive relevance of an exogenous construct for a particular endogenous construct (Hair et al., 2017). The q^2 values cannot be directly obtained from the SmartPLS software and must be calculated manually. To compute the q^2 value of an endogenous latent variable, the Q^2_{included} and Q^2_{excluded} values were needed. The Q^2_{included} values were available from the previous blindfolding estimation, as shown in Table 4.14. The Q^2_{excluded} value can be obtained by reestimating the model after removing a particular predecessor of the endogenous latent variable. For instance, when SCI was removed from the path model, the Q^2 value of SS dropped from 0.439 (Q^2_{included}) to 0.417 (Q^2_{excluded}). The q^2 effect size of SCI on SS can be calculated using the formula below with these two values as inputs:

$$q^2_{SCI \rightarrow SS} = \frac{Q^2_{included} - Q^2_{excluded}}{1 - Q^2_{included}} = \frac{0.439 - 0.417}{1 - 0.439} = 0.039$$

In accordance with the guidelines, the q^2 effect size for this particular relationship can be categorised as small. Table 4.15 presents a synopsis of all the relationships in the model's q^2 effect sizes. The findings showed that SCC, SCI, and SRLC had small predictive relevance for SS, whereas TC and OCC had no predictive relevance for SS.

Besides, due to the interdependence of the constructs in the model, it was not possible to compute the updated Q^2 values for the remaining constructs when SS or IS was removed. This limitation arises from the nature of the interaction term $IS \times SS$, which becomes invalid when one of its constituent constructs is removed from the model. As a result, the specific predictive relevance of the remaining constructs (SS, IS, $IS \times SS$) in relation to SR could not be directly assessed.

Table 4.15: Computation of q^2 Values

Exogenous Constructs	Endogenous Constructs	$Q^2_{included}$	$Q^2_{excluded}$	q^2
TC	SS	0.439	0.433	0.011
OCC	SS	0.439	0.436	0.005
SCC	SS	0.439	0.427	0.021
SCI	SS	0.439	0.417	0.039
SRLC	SS	0.439	0.428	0.020
SS	SR	0.215		
IS	SR	0.215		
$IS \times SS$	SR	0.215		

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, $IS \times SS$ =Interaction Term

4.7 Mediating Effects

This study ran a mediation analysis to determine the mediating effects of SS on the relationships between five dimensions of student online learning readiness (i.e., TC, OCC, SCC, SCI, and SRLC) and student retention. Table 4.16 displays the mediation results. This study followed Zhao et al.'s (2010) mediation analysis procedure to test the type of mediation.

Firstly, H7a evaluated if SS mediated the relationship between TC and SR. The results indicated a significant indirect effect of TC on SR ($\beta = .031$; $t = 2.397$; $p = .02$). With the inclusion of SS in the model, TC had a substantial ($\beta = .303$) and significant ($t = 4.697$; $p < .001$) effect on SR. Thus, SS was considered a partial mediator of the relationship between TC and SR, as evidenced by significant direct and indirect effects. The type of partial mediation was confirmed by calculating the product of the direct and indirect effects, which turned out to be positive since both were positive (i.e., $0.303 \times 0.031 = 0.009$). Therefore, the results supported H7a, indicating that SS partially mediated the relationship from TC to SR as complementary partial mediation.

Secondly, H7b evaluated if SS mediated the relationship between OCC and SR. The results showed an insignificant indirect effect of OCC on SR ($\beta = .029$, $t = 1.880$, $p = .06$), indicating that SS did not function as a mediator in this relationship. The direct effect ($\beta = .001$, $t = .009$, $p = .99$) was also nonsignificant (no-effect nonmediation), which suggested that the conceptual

framework was flawed. Thus, H7b was not supported, and the researcher needs to revisit the theoretical framework and re-evaluate the path model setup.

Thirdly, H7c evaluated if SS mediated the relationship between SCC and SR. The results revealed a significant indirect effect of SCC on SR ($\beta = .058$, $t = 2.651$, $p = .008$). With the inclusion of SS in the model, the relationship from SCC to SR was weak ($\beta = .053$) and statistically nonsignificant ($t = 0.847$; $p = .40$). Thus, H7c was supported as SS fully mediated the SCC to SR relationship.

Fourthly, H7d evaluated if SS mediated the relationship between SCI and SR. The results revealed a significant indirect effect of SCI on SR ($\beta = 0.080$, $t = 3.032$, $p = .002$). With the inclusion of SS in the model, the relationship from SCI to SR was weak ($\beta = .045$) and statistically nonsignificant ($t = 0.695$; $p = .49$). Thus, H7d was supported as SS fully mediated the SCI to SR relationship.

Lastly, H7e evaluated if SS mediated the relationship between SRLC and SR. The results revealed a significant indirect effect of SRLC on SR ($\beta = .047$, $t = 3.030$, $p = .002$). With the inclusion of SS in the model, the relationship from SRLC to SR was weak ($\beta = .011$) and statistically nonsignificant ($t = 0.120$; $p = .90$). Thus, H7e was supported as SS fully mediated the SRLC to SR relationship.

Table 4.16: Mediation Results

Paths	Direct Effects			Hypotheses	Indirect Effects			Results
	β	t-values	p-values		β	t-values	p-values	
TC->SR	0.303	4.697	0.000	H7a: TC->SS->SR	0.031	2.397	0.017	Complementary (Partial mediation)
OCC->SR	0.001	0.009	0.993	H7b: OCC->SS->SR	0.029	1.880	0.060	No effect (No mediation)
SCC->SR	0.053	0.847	0.397	H7c: SCC->SS->SR	0.058	2.651	0.008	Indirect-only (Full mediation)
SCI->SR	0.045	0.695	0.487	H7d: SCI->SS->SR	0.080	3.032	0.002	Indirect-only (Full mediation)
SRLC->SR	0.011	0.120	0.902	H7e: SRLC->SS->SR	0.047	3.030	0.002	Indirect-only (Full mediation)

Note. TC=Technical Competencies, OCC=Online Communication Competencies, SCC=Social Competencies with Classmates, SCI=Social Competencies with Instructors, SRLC=Self-Regulated Learning Competencies, SS=Student Satisfaction, SR=Student Retention

4.8 Moderating Effects

This study also ran a moderating analysis to determine the moderating effect of institutional support on the relationship between student satisfaction and student retention. The moderator variable (IS) met all the relative criteria for reliability and validity assessment as shown in previous section 4.5, but such criteria were not required for the interaction term (IS×SS).

The results of the moderation analysis are presented in Table 4.17. H8 evaluated if the relationship between SS and SR was stronger in the presence of IS. The path coefficient for SS -> SR is 0.259, indicating a significant positive relationship between SS and SR ($t = 4.295$, $p < .001$). Similarly, the path coefficient for IS -> SR is 0.430, indicating a significant positive relationship between IS and SR ($t = 7.160$, $p < .001$). For the moderation effect (H8), represented by IS×SS -> SR, the path coefficient is -0.051, which is not statistically significant ($t = 1.008$, $p = 0.31$). This suggested that the interaction between IS and SS did not significantly affect SR. Thus, H8 was not supported.

Table 4.17: Moderation Results

Paths	Path Coefficients (β)	t-values	p-values
SS -> SR	0.259	4.295	0.000
IS -> SR	0.430	7.160	0.000
H8: IS \times SS -> SR	-0.051	1.008	0.313

Note. SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, IS \times SS=Interaction Term

To ensure the comprehensiveness of the results, the study also examined the f^2 effect size of the moderator. Table 4.18 shows the f^2 effect size of the interaction term (IS \times SS) on the endogenous latent variable (SR). According to Kenny's (2018) suggestions, 0.005, 0.01, and 0.025 are more realistic benchmarks for small, medium, and large effect sizes in moderation analysis, respectively. The f^2 effect size of the interaction term was 0.005 in this study, indicating a small effect.

Table 4.18: f^2 Effect Size of Interaction Term

	SR
IS \times SS	0.005

Note. SS=Student Satisfaction, IS=Institutional Support, SR=Student Retention, IS \times SS=Interaction Term

4.9 Chapter Summary

In conclusion, Chapter 4 has provided a thorough analysis of the study's results. The findings were presented through relevant statistics, tables, and figures in alignment with the research objectives and research questions. The results indicated that 10 out of 12 hypotheses were supported. Further discussions on the implications and interpretations of these results were presented in the subsequent chapter.

CHAPTER 5

DISCUSSION, IMPLICATIONS, LIMITATIONS, AND CONCLUSIONS

5.0 Introduction

In the concluding chapter, a discussion of the hypotheses was presented based on the study findings. Theoretical and practical implications of the study were also explored, along with the identification of study limitations and suggestions for future research. Finally, a conclusion was included to provide a concise summary of the study's key points and emphasised its overall contribution to the field.

5.1 Summary of Research Findings

The research questions and results of its corresponding hypotheses are summarised below:

RQ (1) *Do student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) have positive relationships with student satisfaction?*

	Hypotheses	Results
H1	There is a significant and positive relationship between technical competencies and student satisfaction.	Supported
H2	There is a significant and positive relationship between online communication competencies and student satisfaction.	Supported
H3	There is a significant and positive relationship between social competencies with classmates and student satisfaction.	Supported
H4	There is a significant and positive relationship between social competencies with instructors and student satisfaction.	Supported
H5	There is a significant and positive relationship between self-regulated learning competencies and student satisfaction.	Supported

RQ (2) *Does student satisfaction have a positive relationship with student retention for online learning?*

	Hypothesis	Result
H6	There is a significant and positive relationship between student satisfaction and student retention.	Supported

RQ (3) *Does student satisfaction mediate the relationships between student online learning readiness (technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies) and student retention?*

	Hypotheses	Results
H7a	There is a mediating effect of student satisfaction on the relationship between technical competencies and student retention.	Supported
H7b	There is a mediating effect of student satisfaction on the relationship between online communication competencies and student retention.	Not supported
H7c	There is a mediating effect of student satisfaction on the relationship between social competencies with classmates and student retention.	Supported
H7d	There is a mediating effect of student satisfaction on the relationship between social competencies with instructors and student retention.	Supported
H7e	There is a mediating effect of student satisfaction on the relationship between self-regulated learning competencies and student retention.	Supported

RQ (4) Does institutional support moderate the relationship between student satisfaction and student retention for online learning?

	Hypothesis	Results
H8	The relationship between student satisfaction and student retention will be stronger when institutional support is present.	Not supported

5.1.1 Technical Competencies and Student Satisfaction

The study's results indicated that TC was a significant predictor that positively impacted SS. It implied that students who possessed greater levels of technical competencies were more likely to report satisfaction with their online educational experience. The current finding is in agreement with previous research, including studies conducted by Aldhahi et al. (2022) and Wei and Chou (2020). Technical competencies are extremely important for distance education students (Kırmızı, 2015). The use of online learning platforms and

Internet tools is necessary for all learning activities in the context of online learning. Therefore, students who are proficient in using technology for learning may have an advantage in performing well in online courses. The result supported the idea that technical competencies are important for academic success (Al-Hariri & Al-Hattami, 2016) and can contribute to overall satisfaction with an online learning experience. This could be because being confident in managing online learning software and platforms allows students to navigate through different LMSs, access course materials, and communicate effectively with instructors and classmates. Similarly, being confident in using the Internet to search for online learning information helps students find relevant resources to support their learning. Students who can use digital technologies to team up with others and learn effectively are better equipped to collaborate with their peers and engage with the course content. Students who can overcome the problems that arise from the digital technologies used in online learning are better able to navigate technical issues and continue their learning despite challenges. When students have these technical competencies, they are better prepared to handle the demands of online learning and may be more successful academically. Additionally, having technical competencies can help students feel more comfortable and confident in their capacity to engage with the course content and interact with their peers, which can contribute to their overall satisfaction with the online learning experience.

5.1.2 Online Communication Competencies and Student Satisfaction

In this study, OCC was a significant predictor that positively impacted SS. It indicated that students who can effectively communicate with others in an online learning context were more likely to have a positive learning experience and feel satisfied with their learning. The results of this study align with the findings of previous research conducted by Kırmızı (2015) and Yılmaz (2017), who discovered that online communication self-efficacy is an important predictor of student satisfaction and learning outcomes. Kırmızı (2015) found positive and significant correlations between online communication self-efficacy and learning satisfaction. Yılmaz (2017) found that online communication self-efficacy was an important predictor of student satisfaction in flipped classroom model of instruction. Thus, having online communication competencies is essential for students to succeed in online learning, as emphasised by Rafique et al. (2021). This could be because students who are skilled at providing constructive feedback through online communication may offer valuable insights to their classmates and instructors, promoting a positive and collaborative learning environment. When students feel that they can express themselves freely and authentically through online communication, they may likely to feel a sense of belonging and satisfaction with the learning experience. A student who is comfortable expressing their opinions and responding to others through online communication may engage in meaningful and productive discussions with their classmates and instructors. Similarly, students who are comfortable asking questions and responding to others through

online communication may benefit from the knowledge and perspectives of their classmates and instructors, which can enrich their learning experience.

5.1.3 Social Competencies with Classmates and Student Satisfaction

The research findings indicated that SCC significantly and positively affected SS, with students who can positively and collaboratively with their classmates more likely to report a positive experience with online learning. These results are in agreement with previous studies by Fredericksen et al. (2019), Kuo, Walker, Belland, et al. (2014), and Shen et al. (2013), who also found that interaction with classmates is an important element in students' online learning experience. Fredericksen et al. (2019) showed that higher levels of interaction with classmates led to higher levels of perceived learning. Kuo, Walker, Belland, et al. (2014) found that learner-learner interaction was a significant predictor of student satisfaction, while Shen et al. (2013) found that students' self-efficacy in interacting with classmates for social and academic purposes in an online course were significant predictors of learning satisfaction. For example, if a student feels that they can participate actively in online discussions with their classmates, it may create a sense of community and engagement in the course. Similarly, if a student feels that they can communicate with their classmates regarding the course content through various electronic means, it may help to facilitate learning and understanding of the material. Furthermore, if a student feels that they can build bonding with their classmates via online discussions, it may help to create a supportive learning environment and a sense of belonging. Additionally, if a student feels

that they can seek assistance from their classmates online if necessary or respond to their classmates in a timely manner, it may help to create a sense of collaboration and teamwork among students. The comparatively lower effect of social competencies with classmates on satisfaction could be attributed to the fact that the course is delivered online, which restricts the chances for students to engage with one another (Parahoo et al., 2015). This may be because students are often not as dependent on their classmates for feedback and support, and may have less interaction with them compared to their instructors. However, it is still significant for students to have strong social competencies with classmates in order to collaborate effectively and create a positive learning community. Boyd et al. (2020) found that feeling of belonging, feeling connected and having a good bond with others better predicted satisfaction with the college experience.

5.1.4 Social Competencies with Instructors and Student Satisfaction

SCI stood out as the strongest predictor of SS in this study. This suggested that having a positive relationship with instructors was crucial to students' overall satisfaction with online learning. The present study's finding aligns with the results of earlier research conducted by Cho and Cho (2017), Kuo, Walker, Belland, et al. (2014), and Shen et al. (2013) who found similar results. Cho and Cho (2017) discovered that self-regulation in student-teacher interactions in online courses was positively associated with course satisfaction. Kuo, Walker, Belland, et al. (2014) identified that learner-instructor interaction was a noteworthy predictor of student satisfaction, while Shen et al. (2013)

discovered that interactions with instructors, classmates, and course content were associated with greater satisfaction with online learning. This study also found that social competencies with instructors were a stronger predictor of satisfaction than social competencies with classmates, consistent with Shen et al.'s (2013) findings. Strauß and Rummel (2020) stated that a possible explanation for the correlation between online interaction and positive outcomes in education was that interacting with others online enhances a sense of social presence. This refers to the perception that students have of being in contact with actual individuals, even though they are not physically present. As a result, social presence can increase satisfaction and encourage students to remain enrolled in online courses (Levy, 2007; Richardson et al., 2017). Fredericksen et al. (2019) also showed that interaction with instructors was a significant element for students to perceive learning in online courses. Students who cannot reach their instructors felt they learnt less and were dissatisfied with their courses. For example, if a student feels that they can share their thoughts with their instructors when their explanation is different from their standpoint, it may lead to a greater sense of engagement and motivation in the course. Similarly, if a student feels that they can freely discuss their online learning activities with their instructor or share their concerns about their online learning progress, it may create a more supportive learning environment and help to address any challenges or difficulties they may be facing. In addition, if students feel that they can easily ask questions and get answers from their instructor regarding online learning content or express their opinions in a respectful manner during an online course, it may help to create a sense of connection and collaboration between the instructor and the student. This may help to build a

positive relationship between the student and the instructor, which can ultimately lead to a more positive online learning experience.

5.1.5 Self-Regulated Learning Competencies and Student Satisfaction

Based on the research findings, SRLC was a significant predictor that positively influenced SS. It indicated that students with self-regulated learning competencies took control of their learning process and were proactive in achieving their learning goals, which ultimately led to higher satisfaction with online learning. This finding reached a consensus with several previous studies which also indicated SRLC as a predictor of SS (Ejubović & Puška, 2019; Landrum, 2020; C. L. Lim et al., 2020; C.-H. Wang et al., 2013; Zalli et al., 2019). The findings indicated that students' self-regulated learning competencies were critical for determining their satisfaction with online learning. This could be because by allocating extra studying time for online courses, students may ensure that they have sufficient time to complete their online learning activities and assignments. Summarising the online course contents may help students to revise and consolidate their learning. Preparing discussion materials before joining the chat room may ensure that students are ready to actively engage in online discussions. Seeking help from knowledgeable individuals may help students to clarify course content and overcome learning difficulties. Choosing a spot where there are fewer distractions may help students to focus better on their online learning tasks. Setting short-term and long-term learning goals can help students to stay motivated and organised in their online learning activities.

5.1.6 Student Satisfaction and Student Retention

According to this study, SS was a significant predictor that positively influenced SR. The finding implied that students who were satisfied with their online learning experience were more likely to persist and complete their studies. The results were consistent with previous research by Dhaqane and Afrah (2016), L. N. Q. Hung (2021), and Schreiner (2009). Dhaqane and Afrah (2016) found that when students were satisfied with their learning experience, it not only promoted academic achievement but also increased the likelihood of their retention in the program. According to L. N. Q. Hung (2021), being satisfied with online learning was a strong predictor of a student's intention to continue studying online in the future. Schreiner (2009) also found that the satisfaction indicators significantly improved the accuracy of predicting student retention the following year. One possible explanation for this is that when students are satisfied with their online learning experience, they may feel more engaged, motivated, and supported in their learning experience. This, in turn, can lead to better academic outcomes such as higher grades. It is intuitive that higher academic performance would lead to improved retention and learning outcomes (Martirosyan et al., 2014). Moreover, when students feel satisfied with the quality of their online learning experience, they are more likely to develop a positive attitude towards online learning, which can increase their likelihood of persisting in their studies. This is supported by the findings of Levy (2007) who claimed that students' satisfaction with e-learning was a crucial factor in the decisions of students to drop out of online learning courses. For example, students who are satisfied with the collaboration and activities during online

courses may feel that they are part of a supportive and engaging learning community. When they feel that they can interact effectively with their classmates and instructors, they may be more likely to continue studying and participating in the course. Additionally, when students are satisfied with the quality of interaction among all the course parties involved, they may feel that their needs and concerns are being addressed effectively. This may create a positive learning environment and increase the likelihood that they will stay engaged and motivated to continue their studies. When students feel satisfied with their performance from online courses, it can lead to increased motivation and confidence in their abilities, which can in turn lead to a higher likelihood of continuing to enrol in and complete online courses.

5.1.7 Mediation Effect of Student Satisfaction

The research findings provided empirical support for the idea that student satisfaction played a mediating role in the retention model. In particular, SS mediated the relationship between TC and SR, SCC and SR, SCI, and SR, and SRLC and SR. This result suggested that technical competencies, such as the ability to manage online learning software/platforms and search for online learning information, can indirectly influence student retention through their impact on online learning satisfaction. The technical competencies influence the students' satisfaction with online learning experiences (Aldhahi et al., 2022). When students feel satisfied with the online learning experience, they are more likely to continue their studies and complete the online course (L. N. Q. Hung, 2021). The result also suggested that students' social competencies with

classmates, such as the ability to communicate with classmates about the course content and seek assistance from classmates, can indirectly influence student retention through their impact on online learning satisfaction. Also, students' social competencies with instructors, such as the ability to communicate effectively with instructors and seek support when needed, can indirectly influence student retention through their impact on online learning satisfaction. The social competencies with classmates and instructors influence students' satisfaction with online learning experiences (Shen et al., 2013). When students feel that they have a positive and supportive relationship with their classmates and instructors in the online learning environment, they are more likely to feel satisfied with the learning experience and continue their studies. Furthermore, the result also suggests that self-regulated learning competencies, such as the ability to set goals, manage time, and monitor one's own learning, can indirectly influence student retention through their impact on online learning satisfaction. Students' use of self-regulated learning strategies online helps them be more satisfied with the online learning platform (Landrum, 2020). When students feel that they have the skills and resources to manage their own learning effectively in the online environment, they are more likely to be satisfied with their learning experience and to complete their studies.

On the other hand, online communication competencies may indirectly influence student retention through their impact on online learning satisfaction. Nonetheless, this study did not find any evidence to support this hypothesis as SS did not mediate the relationship between OCC and SR. One possibility is that online communication competencies may not be as important for student

retention as other factors, such as technical competencies or social competencies. While having strong online communication skills can certainly enhance the online learning experience, it may not be enough to keep students engaged and motivated to continue with their studies. Another possibility is that there may be other factors that mediate the relationship between online communication competencies and student retention and these factors were not measured in the study. For example, it is possible that online communication competencies may indirectly impact student retention through their influence on other variables, such as self-regulated learning skills or motivation to learn.

5.1.8 Moderating Effect of Institutional Support

In this study, the variable IS was examined as a moderator expected to influence the relationship between SS and SR. Specifically, it was hypothesised that higher perceived institutional support would enhance the association between student satisfaction and student retention. Surprisingly, the findings revealed that IS did not have a significant impact on this relationship. As a result, H8 was not supported in this study. However, this study also found that institutional support had a significant positive relationship with student retention, despite not having a significant effect on the relationship between student satisfaction and retention. Thus, this study concludes that institutional support independently influenced student retention. In other words, institutional support played a vital role in promoting student retention, but it did not necessarily strengthen the connection between student satisfaction and retention.

However, these findings do not imply that institutional support is not essential or should be ignored. Rather, they suggest that the relationship between satisfaction and retention is more nuanced than initially expected, and the role of institutional support in online learning needs to be further investigated. Institutional support is designed to enhance the quality of the online learning experience and provide additional resources and support to students. Institutional support may provide a safety net or a support system for students who are struggling, but it may not necessarily increase satisfaction with the online learning experience. Students may continue their studies simply because they feel that they have invested time and effort into the programme (Tight, 2020), or because they have a sense of accomplishment (Yang et al., 2017).

The lack of a significant effect of institutional support on the relationship between student satisfaction and student retention suggests another possible explanation. It is plausible that when online students have access to institutional support, they may tend to rely more on these support systems rather than their own motivation and satisfaction with the online learning experience. This reliance on institutional support could potentially overshadow the influence of student satisfaction on retention. For instance, if a student encounters dissatisfaction with certain aspects of the online learning experience but knows they can depend on institutional support to resolve the issue, they may be less motivated to actively seek solutions independently or take responsibility for their own learning. Consequently, this over-reliance on

institutional support may weaken the relationship between online learning satisfaction and student retention.

Besides, the presence of institutional support, such as financial aid or online library resources, may provide an alternative source of satisfaction and support for students that could substitute or replace the satisfaction derived from online learning itself. For example, if students are struggling to pay for their online courses, receiving financial aid from the university may alleviate some of their stress and improve their overall satisfaction with the university. However, if the students are highly satisfied with the financial aid they receive, they may prioritise the financial support over their overall satisfaction with the online courses. As a result, the influence of student satisfaction on retention may be diminished or insignificant in the presence of strong satisfaction with financial aid.

Similarly, access to a university's online library resources can greatly assist students in completing assignments and conducting research. Yet, if the students are satisfied with the quality and availability of these resources, they may become less motivated to continue with the online courses if they believe they can obtain similar levels of support and resources elsewhere without taking the online courses.

To summarise, institutional support provides alternative sources of satisfaction and support that can independently impact student retention,

potentially overshadowing the relationship between student satisfaction with online learning and their decision to continue with the courses.

5.2 Implications of the Study

Theoretical implications of the study refer to the contributions made to the existing body of knowledge on online learning. The practical implications, on the other hand, refer to the potential applications of the study's findings in the real world. There are some possible implications of this study.

5.2.1 Theoretical Implications

This study has important theoretical implications related to Tinto's (1975) Student Integration Model (SIM), which is a framework for understanding student retention in the context of online learning. The findings of this study shed light on how SIM can be applied to online learning readiness in Malaysian private HEIs and identify specific factors that affect student satisfaction and retention. These insights can assist these institutions in designing interventions and support systems to enhance student outcomes.

One of the key theoretical implications of this study is the confirmation of the importance of the various dimensions of online learning readiness in facilitating student integration and satisfaction, which in turn, impact retention. The study found that technical competencies, online communication competencies, social competencies with classmates, social competencies with

instructors, and self-regulated learning competencies were positively related to student satisfaction, which in turn, impacted student retention. This provides empirical support for the SIM, which asserts that social integration and academic integration are key factors in student persistence and retention in higher education, and suggests that these dimensions should be considered in the context of online learning readiness.

Another theoretical implication of this study is the identification of the mediating role of student satisfaction in the relationship between online learning readiness and retention. The findings help to enhance the understanding of the mediating processes involved. Specifically, the study revealed that student satisfaction mediated the relationship between technical competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies, and retention. This finding supports the notion that student satisfaction is an essential component of student retention and suggests that institutions should focus on developing strategies to enhance student satisfaction levels, particularly in the context of online learning readiness, to enhance student retention.

Additionally, this study highlights the significance of examining the moderation effect in research on student satisfaction and retention in the online learning environment within higher education. The study's findings suggest that institutional support did not affect the relationship between student satisfaction and retention in online learning. However, the study did reveal a significant positive relationship between institutional support and student retention.

Consequently, institutions should continue to provide adequate support to students in developing their online learning competencies and addressing the challenges they may encounter. This study also underscores the necessity for a comprehensive understanding of the various forms of institutional support and their potential interactions with other factors that can impact student outcomes.

5.2.2 Implications for Higher Education Institutions

Regarding online learning, the outcomes of this research hold significant ramifications not only for the private universities that were investigated in this study but also for other HEIs in Malaysia, both governmental and private, as well as neighboring countries. Replicating this study can help these HEIs understand their students' online learning readiness and can lead to the development of effective strategies for improving online learning experiences for students, which in turn enhance student retention. The findings suggest that institutions should focus on enhancing students' online learning readiness, satisfaction, and ultimately retention, by developing targeted interventions to enhance the technical, communication, social, and self-regulated learning competencies of students.

Firstly, institutions should focus on developing technical competencies among students. The study found that technical competencies had a significant and positive relationship with student satisfaction, which in turn had a significant and positive relationship with student retention. Ensuring that students have the necessary technical competencies is crucial for institutions to

support their success in online courses. To achieve this, institutions can provide students with an orientation to technology tools and resources they will use in their online coursework, such as tutorials on specific software programmes, an overview of online collaboration tools, and a walkthrough of the Learning Management System (LMS) (McGowan, 2018). Technology training opportunities such as workshops, training sessions, or online resources can also be provided to help students learn how to use technology effectively for their coursework and future careers. Setting up a technical support centre or help desk to help students overcome technology-related challenges they face while taking online courses is also essential (Netanda et al., 2017). Additionally, institutions must regularly assess and update their technology infrastructure and resources to ensure students have access to the latest tools and technologies (García-Morales et al., 2021). By implementing these strategies, institutions can enhance the technical competencies of online students and prepare them for success in online learning. This will not only enhance their satisfaction with their online learning experience but also increase their likelihood of continuing their studies.

Secondly, institutions should focus on developing communication competencies among students. The study found that online communication competencies had a significant and positive relationship with student satisfaction, which in turn had a significant and positive relationship with student retention. Thus, institutions should provide opportunities for students to develop their online communication competencies. This could involve incorporating small group discussions, group projects, and peer feedback activities into the curriculum (Akcaoglu & Lee, 2016; Martin & Bolliger, 2018;

Zacharis, 2009). Instructors should provide guidance and training on effective online communication, such as how to give constructive feedback or engage in respectful debate with peers. Besides, instructors should encourage students to use clear and concise language in their written and oral communications and promote active listening behaviour. By implementing these strategies, online students can develop strong online communication competencies and become more confident and effective communicators in the online learning environment.

Thirdly, institutions should focus on developing social competencies among students. The study found that social competencies with classmates and instructors had a significant and positive relationship with student satisfaction, which in turn had a significant and positive relationship with student retention. According to Tinto (1998), a lack of connection and belonging in an online course is a crucial factor that contributes to lower retention rates in online formats. To address this issue, institutions must make an effort to cultivate a sense of community among their online students and provide support to enhance their sense of belonging in each online course. To enhance students' social competencies in online classes, institutions can implement various interventions. These may include providing opportunities for online collaboration and interaction through virtual group assignments, using icebreakers and team-building activities, organising virtual social events and gatherings (Martin & Bolliger, 2018), encouraging students to express their thoughts, opinions, and experiences (Aldosari et al., 2022), allowing students to connect with classmates and instructors through video conferencing, instant messaging, and other virtual communication tools (García-Morales et al., 2021). Implementing

these interventions can help online students develop and improve their social competencies, fostering positive and productive relationships in the online learning environment.

Fourthly, institutions should focus on developing self-regulated learning competencies among students. The study found that self-regulated learning competencies had a significant and positive relationship with student satisfaction, which in turn had a significant and positive relationship with student retention. Instructors should promote self-regulated learning among online students by encouraging them to set realistic, attainable, and specific goals for their learning to stay motivated. After setting the goals, instructors can regularly review the goals to help students stay on track and adjust the goals as needed. Instructors can also encourage online students to create a dedicated and organised physical workspace that helps them stay focused and motivated. Additionally, instructors can provide clear instructions and expectations for assignments to help students stay on track, provide reminders and due dates for assignments to help students manage their time effectively, encourage students to seek assistance when required to help them overcome challenges and accomplish their learning objectives, and provide consistent and timely feedback on students' progress to help students understand their strengths and areas for improvement (Martin & Bolliger, 2018; Wandler & Imbriale, 2017). By incorporating these strategies, online students can take good control of their education, experience higher levels of satisfaction with their online learning experience, and increase the likelihood of continuing their studies.

Lastly, in light of the finding that moderating variable (institutional support) did not have a significant impact on the relationship between student satisfaction and student retention, institutions need to recognise that student satisfaction and retention are multifaceted constructs influenced by various factors. While institutional support alone may not directly enhance the relationship between student satisfaction and retention, its significant positive relationship with student retention suggests that it plays an independent and crucial role in promoting student persistence. Therefore, institutions should strive to maintain and strengthen their institutional support structures to create an environment that fosters student success and encourages them to continue their educational journey. Moreover, institutions should recognise the value of providing comprehensive support systems to students, as it positively contributes to their likelihood of persisting and succeeding in their studies. This study emphasises the need for HEIs to continue investing in and improving their support services to effectively meet the diverse needs of their student population tools (Bağrıacık Yılmaz & Karataş, 2022). By doing so, institutions can better support student retention and create an environment that fosters student satisfaction and long-term academic achievement.

5.2.3 Implications for Policymakers

The findings of this research have significant implications for Malaysian policymakers and government officials concerning the adoption of online learning during the COVID-19 pandemic and beyond.

This study research highlights the importance of providing adequate support and resources to students to develop their online learning readiness. This includes not only technical competencies but also communication and social competencies with classmates and instructors, as well as self-regulated learning competencies. Therefore, policymakers should consider implementing policies that promote the development of students' online learning readiness, such as providing training and workshops for students to improve their technical, communication, social, and self-regulated learning competencies. This could be achieved through partnerships with HEIs, industry, and civil society organisations to provide students with access to relevant training and resources (Mian et al., 2020).

On top of that, this study emphasises the importance of student satisfaction in retaining students in HEIs. This suggests that policymakers should prioritise strategies to enhance student satisfaction in the online learning environment by investing in training programmes for educators. Policymakers must invest in training programmes for educators to effectively deliver online courses and create a positive online learning environment (Bağrıacık Yılmaz & Karataş, 2022). This investment will not only benefit students but will also enhance the quality of education being delivered in Malaysian HEIs. Policymakers should also provide funding and support for professional development programmes that help educators develop the necessary skills and competencies to create engaging and interactive online learning experiences (Kibaru, 2018). This includes training on effective communication and

collaboration strategies, as well as training on how to use online learning tools and platforms.

Another important policy consideration is the need to address the digital divide among students. While the COVID-19 pandemic has accelerated the shift toward online learning, it has also exposed the digital inequalities that exist in many societies, including Malaysia (Ismail et al., 2020). The Malaysian Communications and Multimedia Commission (MCMC) has been collaborating with service providers to invest in broadband infrastructure and implement national plans such as National Digital Network (Jendela) and MyDIGITAL to achieve 100% internet coverage in populated areas by 2025 (Malaysian Communications and Multimedia Commission, 2023). However, there are two important policy changes that are necessary for the plans to reach their targets. Firstly, Internet access should be considered a basic need, and the planning, deployment, and operation of digital infrastructure should be treated as a public utility. Secondly, complete approval from state and local authorities is essential for the development of digital infrastructure. Policymakers should also address the digital divide among students by ensuring all students have equitable access to resources and technology, including providing funding for technology purchases, supporting initiatives that provide Internet access to underserved communities, and ensuring that institutions have the necessary infrastructure to support online learning (García-Morales et al., 2021). They should also prioritise investments in infrastructure that can increase access to technology and high-speed Internet, ensuring that all students have the tools they need to

engage in online learning and develop necessary competencies (Sanders & Scanlon, 2021).

Finally, the study highlights the potential risks of high dropout rates and low enrolment as a result of online learning challenges, which may have long-term implications for the sustainability and competitiveness of Malaysian HEIs. Policymakers should prioritise strategies to address these challenges and promote the retention and success of students in online learning programmes, in order to ensure the long-term sustainability and competitiveness of Malaysian higher education. This may include investing in research and development to identify effective strategies for online learning, promoting collaboration and knowledge-sharing between institutions (Chedid et al., 2020), and ensuring that online learning policies and practices align with national and international standards and best practices (Robinson & Wizer, 2016).

5.2.4 Implications for Society

The results of this research have also important implications for society beyond the higher education sector. The study's contribution to society suggests that several implications can be drawn from the research findings.

Firstly, the study highlights the significance of technical, online communication, social, and self-regulated learning competencies for success in online learning environments. As such, individuals need to develop these competencies to thrive in the digital age. This suggests that students should be

encouraged to make the most of online learning opportunities and develop the necessary competencies to succeed in these environments. Moreover, employers may require to offer training and development opportunities to help their employees acquire these competencies, thereby increasing their competitiveness in the job market (Laguador, 2015).

Secondly, identifying the competencies necessary for success in online learning can contribute to the development of a more skilled and adaptable workforce in Malaysia. As the job market continues to evolve and become increasingly digital, graduates with a strong foundation in the technical competencies will be better equipped to navigate the changing landscape and excel in their respective professions (L. Li, 2022).

Thirdly, the positive relationship between student satisfaction and retention identified in this study has significant implications for students and employers alike. Satisfied students in online learning are more likely to persist and complete their degrees, which can lead to better job prospects and increased salaries. A recent study found that 87% of current and recent online learners attribute outcomes like salary increases or improved skills to their degrees. Moreover, over 80% recognised the importance of their degree in achieving their goals and securing better job opportunities (Capranos et al., 2022). For employers, a more educated and skilled workforce can lead to increased productivity and innovation, which can ultimately benefit society as a whole (Kampelmann et al., 2018).

Fourthly, the study's findings suggest that online learning has the potential to broaden access to higher education and provide more flexible and accessible learning opportunities to individuals who may face barriers to attending traditional face-to-face classes. Stakeholders in Malaysia may want to consider investing in the development of online learning programmes and supporting initiatives that increase access to higher education for all individuals, as this could lead to a more skilled and adaptable workforce and increased productivity, innovation, and competitiveness in various industries.

Finally, the study's findings emphasise the importance of promoting digital literacy among students, especially those from disadvantaged backgrounds, to ensure they have the necessary technical and online communication competencies to participate effectively in online learning (Z. Yu, 2022). Students with these competencies are more likely to be satisfied with their online learning experience and remain enrolled. Therefore, it is essential to provide targeted support and training to enhance students' digital literacy, ultimately improving their chances of success in online learning environments.

5.3 Limitations of the Study

While the study provides important insights into the relationships between online learning readiness, student satisfaction, institutional support, and student retention in Malaysian private HEIs, there are several limitations that should be acknowledged.

First of all, this study only focused on students from private HEIs in Malaysia who had experience with online learning. The study scope excluded students from public institutions, which could limit the generalisability of the findings to the wider higher education landscape in Malaysia. Notably, the inclusion of postgraduate students in the sample was limited, which may affect the comprehensive understanding of experiences related to online learning, particularly at advanced academic levels. Additionally, the study's findings were only specific to the Malaysian context and may have limited applicability to other contexts, such as countries with different educational systems or cultures.

Additionally, this study employed a combination of purposive and quota sampling methods to gather data from students across eight selected private universities in Malaysia. However, it is essential to recognise that these sampling techniques introduce the possibility of selection bias. Purposive sampling involved the intentional selection of participants based on specific characteristics deemed relevant to the research objectives. Quota sampling, used to ensure proportional representation across specified subgroups, may still introduce biases if the selection within the quotas lacks randomness. The combined use of these sampling methods may result in an overrepresentation or underrepresentation of certain characteristics within the sample, limiting the generalisability of the findings to a more extensive population.

The data collected in this study were based on self-reported surveys, which were subject to response bias and social desirability bias. The results may

be influenced by respondents' willingness to report their true feelings and experiences. For example, students may have been reluctant to report negative experiences or perceptions due to social desirability bias, which could affect the accuracy and reliability of the results.

The six-month duration of data collection, from May 2022 to November 2022, was essential to reach a sizable respondent pool. However, the extended timeframe may introduce a limitation. The dynamic nature of online learning, coupled with external influences, could result in changes in students' perceptions over time. Factors such as evolving policies or technological advancements might impact experiences differently across the data collection period. This limitation highlights the importance of considering potential shifts in students' feelings and experiences during the study timeframe.

The study was carried out solely using a quantitative approach. Other methods, such as interviews or focus groups, may provide additional insights into students' experiences and perceptions of online learning readiness, student satisfaction, institutional support, and student retention. This means that the study may have missed important nuances or details that could have been captured through other methods. The study also used a cross-sectional survey design, which limited the ability to establish causal relationships between variables. This means that the study cannot determine whether online learning readiness, institutional support, and student satisfaction are causes or effects of student retention.

Lastly, the study only examined factors that influence student satisfaction and retention at the time of research, such as technical competencies, online communication competencies, social competencies, and self-regulated learning competencies as discussed in the problem statement in chapter one. Other factors, such as their motivation and attitudes towards learning, or their broader personal and situational factors, may also play an important role in student satisfaction and retention but were not examined in this study. This means that the study may have overlooked important factors that could impact student retention.

Acknowledging these limitations, future research could build upon this study by addressing these limitations and expanding the scope to provide a more comprehensive understanding of the factors that influence student retention in online learning environments.

5.4 Recommendations for Future Research

The limitations of the present study suggested few potential areas for future research to enrich the present scope of the study. Firstly, future studies should strive to obtain a more diverse and representative sample of students. This should involve the inclusion of a larger sample of postgraduate students, students from both private and public institutions in Malaysia, and students from different cultural backgrounds. This would enhance the generalisability of the findings and contribute a more comprehensive understanding of the factors influencing student retention in higher education. Future studies could also

include multiple countries or regions to examine how the factors that influence student retention vary across different contexts.

To eliminate selection bias in future research, it is recommended to expand the number of research locations or universities. This expansion enables a more diverse and representative participant pool that encompasses universities of varying sizes, geographic locations, academic programmes, and relevant characteristics. By including multiple educational institutions, future researchers can gather insights from a broader range of student perspectives and experiences, effectively mitigating the limitation of selection bias associated with a limited number of universities. To supplement self-reported data, future research could be enhanced by incorporating objective measures of student performance and retention, such as grades and attendance records, as they can provide a more accurate representation of the relationship between the variables.

In addressing the extended data collection time, future research can consider optimising the data collection period to enhance the timeliness of capturing students' evolving perceptions. Shortening the duration to, for instance, three months could provide a more focused snapshot of online learning experiences, reducing the potential for variations due to external factors over an extended timeframe.

A mixed-methods approach incorporating both quantitative and qualitative data collection methods, such as interviews or focus groups, could be utilised to gain a more profound understanding of students' experiences and

perceptions. For example, qualitative data could be used to explore the nuances of students' experiences with online learning and to identify potential areas for improvement. Longitudinal designs could be used in future studies to establish causal relationships between variables and to track changes in students' online learning readiness, satisfaction, and retention over time. This would offer a more robust understanding of the factors influencing student retention in higher education.

Furthermore, future scholars can explore the impact of individual differences, such as motivation and attitudes towards learning, in the relationship between student online learning readiness, student satisfaction, and student retention. Additionally, studies could explore how these factors interact with each other to influence student retention.

In summary, the suggested future research aims to address the limitations of the present study by incorporating a more diverse sample of students, expanding the number of research locations or universities., utilising objective measures of student performance and retention, adopting a mixed-methods approach, implementing longitudinal designs, and exploring individual differences. By utilising these approaches, a deeper understanding of the factors impacting student retention in higher education can be achieved, thereby facilitating the creation of effective retention strategies.

5.5 Conclusion of the Study

The COVID-19 pandemic forced Malaysia HEIs to swiftly transition from traditional face-to-face instruction to online learning, ensuring continuous education during uncertain times. While private HEIs in Malaysia have played a crucial role in offering education prospects to ethnic minorities in Malaysia and establishing the country as a global higher education hub, the sudden shift to online learning has posed challenges for students and institutions. In response, this study aimed to examine the relationship between student online learning readiness, satisfaction, institutional support, and retention in Malaysian private HEIs, employing Tinto's Student Integration Model (SIM) as a theoretical framework.

The findings of this study revealed that technical competencies, online communication competencies, social competencies with classmates, social competencies with instructors, and self-regulated learning competencies were positively related to student satisfaction. Furthermore, student satisfaction was found to be positively correlated with student retention. These findings suggest that a student's readiness to learn online significantly affects their satisfaction with the online learning experience, which in turn influences their decision to remain enrolled in their courses.

Additionally, this study discovered that student satisfaction partially mediated the relationship between technical competencies and retention, while fully mediating the relationships between social competencies with classmates,

social competencies with instructors, and self-regulated learning competencies and retention. Interestingly, the findings of this study revealed that institutional support did not have a significant effect on the relationship between student satisfaction and retention, contradicting the initial hypothesis. However, a significant positive relationship was discovered between institutional support and student retention.

The implications of these findings suggest that enhancing students' technical, communication, and social competencies, as well as their ability to regulate their own learning, could lead to greater satisfaction and retention among online learners. Institutions should prioritise providing social support for students, fostering positive interactions with both classmates and instructors to enhance the overall learning experience. Policymakers should also consider allocating additional funding and resources for institutions to support students in developing these competencies.

While this study provides valuable insights into the importance of online learning readiness, satisfaction, and institutional support for student retention in private HEIs, particularly in the context of the COVID-19 pandemic, it is essential to acknowledge its limitations. The sample used in this study was not fully representative of the student population in Malaysia, as it exclusively comprised students from private institutions experienced in online learning. Future studies should incorporate a more diverse and representative sample, examining these relationships in different contexts.

The strength of this study lies in its focus on students who experienced online learning during the pandemic, capturing their readiness and experience at a crucial moment. The findings and recommendations hold relevance for the education sector in Malaysia and abroad, serving as a valuable reference and guidance for institutions and policymakers to improve students' readiness and satisfaction with online learning, reduce dropout rates, and enhance overall student retention. Moreover, the study's findings are not limited to the specific circumstances of the COVID-19 pandemic but have ongoing relevance in developing an adaptable and resilient education system that can respond to future challenges, thereby ensuring the continued success and growth of the education sector amidst uncertainty.

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APPENDICES

Appendix A: Survey Questionnaire Form



**UNIVERSITI TUNKU ABDUL RAHMAN (UTAR)
FACULTY OF BUSINESS AND FINANCE
MASTER OF PHILOSOPHY
ACADEMIC YEAR 2022/2023**

**Topic: The Influence of Online Learning Readiness on Student
Retention in Malaysian Private Higher Education Institutions**

Dear respondents,

My name is Khong Eng Mun, a postgraduate student who is pursuing a Master of Philosophy programme at University Tunku Abdul Rahman. Due to the COVID-19 pandemic, the Ministry of Higher Education has announced to all educational institutions to conduct online classes as an alternative source of learning. Online learning is a method of education whereby students learn in a fully virtual environment. The purpose of this study is to investigate students' online learning readiness and their retention in private higher education institutions. I appreciate your kind participation and support in order to complete my research study.

This research proposal has been approved by UTAR Scientific and Ethical Review Committee (U/SERC/66/2022). The information is solely for academic research purposes. If you have any enquiries regarding the questionnaire, please do not hesitate to contact me. Thank you.

Mobile Phone No.: 010-3856139

Email Address : engmunkhong98@1utar.my

Instructions to complete the questionnaire:

1. You will take approximately 10 to 15 minutes to complete this questionnaire.
2. Please answer ALL the items from the Three (3) sections involved in this questionnaire.
3. Personal Data Protection Statement

Please be informed that accordance with Personal Data Protection Act 2010 (“PDPA”) which came into force on 15 November 2013, University Tunku Abdul Rahman (“UTAR”) is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

Acknowledgement of Notice:

- I have been notified by you and I hereby understood, consented and agreed per UTAR notice.
- I disagree, my personal data will not be processed.

Section A: Screening Questions

Please click on the most appropriate answer for each of the following questions.

1. Are you currently studying at a private higher education institution (HEI) in Malaysia?

- ₁ Yes (Please proceed)
- ₂ No (End of questionnaire, thank you)

2. Have you experienced online learning before?

- ₁ Yes (Please proceed)
- ₂ No (End of questionnaire, thank you)

Section B: Demographic Profile

Please click on the most appropriate answer for each of the following questions.

1. Name of your university

- ₁ Asia Pasific University of Technology & Innovation (APU)
- ₂ Curtin University Malaysia
- ₃ International Centre for Education in Islamic Finance (INCEIF)
- ₄ Management and Science University (MSU)
- ₅ Manipal International University
- ₆ Multimedia University (MMU)
- ₇ SEGi University
- ₈ Sunway University
- ₉ Swinburne University of Technology Sarawak Campus
- ₁₀ Taylor's University
- ₁₁ The University of Nottingham Malaysia Campus (UNM)
- ₁₂ UCSI University
- ₁₃ Universiti of Kuala Lumpur (UniKL)
- ₁₄ Universiti Teknologi Petronas (UTP)
- ₁₅ Universiti Tenaga Nasional (UNITEN)
- ₁₆ Universiti Tun Abdul Razak (UNIRAZAK)
- ₁₇ Universiti Tunku Abdul Rahman (UTAR)
- ₁₈ None of the university (End of questionnaire, thank you)

2. Your online learning experience

- ₁ < 6 months
- ₂ 6 – 11 months
- ₃ 12 – 17 months
- ₄ 18 – 24 months
- ₅ > 24 months

3. Average hours spent on online learning per week

- ₁ < 10 hours
- ₂ 10 – 19 hours
- ₃ 20 – 29 hours
- ₄ > 29 hours

4. Device(s) used for online learning (You can choose more than ONE answer)

- ₁ Desktop
- ₂ Laptop
- ₃ Smart phone
- ₄ Tablet
- ₅ Others, please specify: _____

5. Internet connectivity in your study area

- ₁ Very poor
- ₂ Poor
- ₃ Fair
- ₄ Good
- ₅ Excellent

6. Gender

- ₁ Male
- ₂ Female

7. Age

- ₁ 18 years old and below
- ₂ 19 – 22 years old
- ₃ 23 – 26 years old
- ₄ 27 – 30 years old
- ₅ 31 years old and above

8. Ethnicity

- ₁ Malay
- ₂ Chinese
- ₃ Indian
- ₄ Others, please specify: _____

9. Type of student

- ₁ Local
- ₂ International

10. Mode of study

- ₁ Full-time mode
- ₂ Part-time mode

11. Level of study

- ₁ Foundation
- ₂ Diploma
- ₃ Advanced diploma
- ₄ Bachelor's degree
- ₅ Master's degree
- ₆ Doctoral degree
- ₇ Others, please specify: _____

12. Year(s) of study at your institution

- ₁ < 1 year
- ₂ 1 year
- ₃ 2 years
- ₄ 3 years
- ₅ 4 years
- ₆ > 4 years

13. Current CGPA

- ₁ < 2.0
- ₂ 2.0 – 2.49
- ₃ 2.5 – 2.99
- ₄ 3.0 – 3.49
- ₅ 3.5 – 4.00

14. Field of study

- ₁ General Programmes
 - ₁ Basic/broad, general programmes
 - ₂ Literacy and numeracy
 - ₃ Personal skills
- ₂ Education
- ₃ Arts & Humanities
 - ₁ Arts (e.g., Fine arts; Music and performing arts; Audio-visual techniques and media production; Design; Craft skills)
 - ₂ Humanities (e.g., Religion; Languages; History and archaeology; Philosophy and ethics; History, philosophy and related subjects)
- ₄ Social Sciences, Business & Law
 - ₁ Social and behavioural science (e.g., Psychology; Sociology and cultural studies; Political science and civics; Economics)
 - ₂ Journalism and information (e.g., Journalism and reporting; Library, information, archive)
 - ₃ Business and administration (e.g., Wholesale and retail sales; Marketing and advertising; Finance, banking, insurance; Accounting and taxation; Management and administration; Secretarial and office work; Working life)
 - ₄ Law (e.g., Syariah Law)

- ₅ Science, Mathematics & Computing
 - ₁ Life science (e.g., Biology and biochemistry; Environmental science)
 - ₂ Physical science (e.g., Physics; Chemistry; Earth science)
 - ₃ Mathematics and statistics
 - ₄ Computing (e.g., Computer science; Computer use)
- ₆ Engineering, Manufacturing & Construction
 - ₁ Engineering and engineering trades (e.g., Mechanics and metal work; Electricity and energy; Electronics and automation; Chemical and process; Motor vehicles, ships and aircraft; Civil engineering; Material engineering)
 - ₂ Manufacturing and processing (e.g., Food processing; Textiles, clothes, footwear and leather; Materials (wood, paper, plastic and glass); Mining and extraction; Applied science)
 - ₃ Architecture and building (e.g., Architecture and town planning; Building)
- ₇ Agriculture & Veterinary
 - ₁ Agriculture, forestry and fishery (e.g., Crop and livestock production; Horticulture; Forestry; Fisheries)
 - ₂ Veterinary
- ₈ Health & Welfare
 - ₁ Health (eg. Medicine; Medical services; Nursing and caring; Dental studies; Medical diagnostic and treatment technology; Therapy and rehabilitation; Pharmacy)
 - ₂ Social services (e.g., Child care and youth services; Social work and counselling)
- ₉ Services
 - ₁ Personal services (e.g., Hotel, restaurant and catering; Travel, tourism and leisure; Sports; Domestic services; Hair and beauty services)
 - ₂ Transport services
 - ₃ Environmental protection (e.g., Environmental protection technology; Natural environments and wildlife; Community sanitation services)
 - ₄ Security services (e.g., Protection of persons and property; Occupational health and safety; Military and defence)
- ₁₀ Others, please specify: _____

Section C:

Please click on the number that best reflects your level of agreement with the following statements from 1 to 5, where it indicates: 1= Strongly disagree; 2= Disagree; 3= Neutral; 4= Agree and 5 = Strongly agree.

Part 1: Technical Competencies

	Technical Competencies (The basis of knowledge, skills and attitudes in the use of technology)	SD	D	N	A	SA
TC1	I am confident in performing the basic functions of office suites (<i>e.g., MS Word, MS Excel, and MS PowerPoint, etc.</i>).	1	2	3	4	5
TC2	I am confident in managing online learning software/platforms (<i>e.g., Zoom, Google Classroom, and MS Teams, etc.</i>).	1	2	3	4	5
TC3	I am confident in using the Internet to search for online learning information (<i>e.g., Google, Microsoft Bing, Yahoo, etc.</i>).	1	2	3	4	5
TC4	I am aware of the legal and ethical issues with the use of digital technologies.	1	2	3	4	5
TC5	I can use digital technologies to team up with others and learn effectively.	1	2	3	4	5
TC6	I can overcome the problems that arise from the digital technologies used in online learning.	1	2	3	4	5
TC7	I keep myself updated on the latest developments in digital technologies for online learning.	1	2	3	4	5

Part 2: Online Communication Competencies

	Online Communication Competencies (Student's adaptation of a communication situation by demonstrating skills in appropriating communication knowledge relevant to the situation)	SD	D	N	A	SA
OCC 1	I am comfortable in responding to others via online.	1	2	3	4	5
OCC 2	I am able to express my opinion to others via online.	1	2	3	4	5
OCC 3	I can give constructive feedback to others via online.	1	2	3	4	5

OCC 4	I feel confident in expressing myself (both emotions and humour) via online.	1	2	3	4	5
OCC 5	I feel confident in posting/asking questions during online learning discussions.	1	2	3	4	5

Part 3: Social Competencies with Classmates

	Social Competencies with Classmates (The ability to handle social interactions with classmates effectively)	SD	D	N	A	SA
SCC 1	I can build bonding with my classmates via online discussions.	1	2	3	4	5
SCC 2	I can participate with my classmate actively during online discussions.	1	2	3	4	5
SCC 3	I can communicate with my classmates about the course content through different electronic means.	1	2	3	4	5
SCC 4	I can seek assistance from my classmates via online if necessary.	1	2	3	4	5
SCC 5	I respond to my classmates via online in a timely manner.	1	2	3	4	5

Part 4: Social Competencies with Instructor

	Social Competencies with Instructor (The ability to handle social interactions with instructor effectively)	SD	D	N	A	SA
SCI 1	I can easily ask questions and get answers from my instructor regarding online learning content (<i>e.g., instructional materials</i>).	1	2	3	4	5
SCI 2	I can freely discuss with my instructor about my online learning activities (<i>e.g., assignments, discussions and exams</i>).	1	2	3	4	5
SCI 3	I can share my thoughts with my instructor when his/her explanation is different from my standpoint.	1	2	3	4	5
SCI 4	I do not hesitate to share concerns about my online learning progress with my instructor.	1	2	3	4	5
SCI 5	I express my opinions to my instructor in a respectful manner during online course.	1	2	3	4	5

Part 5: Self-Regulated Learning Competencies

	Self-Regulated Learning Competencies (Student's competence to autonomously plan, execute, and evaluate the learning processes)	SD	D	N	A	SA
SRLC 1	I set short-term (daily/weekly) learning goals and long-term learning goals (monthly/semester/trimester) from time to time.	1	2	3	4	5
SRLC 2	I choose the spot where I want to study to avoid too much distraction.	1	2	3	4	5
SRLC 3	I prepare my discussion materials before joining the chat room for conversation.	1	2	3	4	5
SRLC 4	I allocate extra studying time for online courses as I know it is time demanding.	1	2	3	4	5
SRLC 5	I seek help from someone who is knowledgeable to understand course contents when necessary.	1	2	3	4	5
SRLC 6	I summarise the online course contents to revise what I have learned based on my understanding.	1	2	3	4	5

Part 6: Student Satisfaction

	Student Satisfaction (The favourability of a student's subjective evaluation of the various outcomes and experiences associated with education)	SD	D	N	A	SA
SS1	I am satisfied with the online study discussions/forums.	1	2	3	4	5
SS2	I am satisfied with the quality of interaction among all the course parties involved.	1	2	3	4	5
SS3	I am satisfied with the collaboration/activities during the online courses.	1	2	3	4	5
SS4	I am satisfied with the class assignments as it is clearly explained to me.	1	2	3	4	5
SS5	I am satisfied with the given level of self-directedness in online learning.	1	2	3	4	5
SS6	I am satisfied with my performance from online courses.	1	2	3	4	5
SS7	I am well satisfied with the online learning experience/courses as compared to face-to-face sessions.	1	2	3	4	5

Part 7: Institutional Supports

	Institutional Supports (The resources, opportunities, privileges, and services provided by the institution to students)	SD	D	N	A	SA
IS1	My university provides web-based information geared toward the needs of online learning.	1	2	3	4	5
IS2	My university provides the financial aids to support students for online programmes.	1	2	3	4	5
IS3	My university provides multiple communication options on online support services (<i>e.g., Hotlines, email, help desk, live chat, etc.</i>).	1	2	3	4	5
IS4	My university provides a technical support centre equipped with hardware, software and trained staff.	1	2	3	4	5
IS5	My university provides online access to the library's electronic resources.	1	2	3	4	5
IS6	My university has a procedure for receiving regular and objective feedback about their online courses.	1	2	3	4	5
IS7	My university responds to online inquiries and manages in a timely manner.	1	2	3	4	5

Part 8: Student Retention

	Student Retention (Students' continued study until successful completion)	SD	D	N	A	SA
SR1	I am confident that I can overcome any obstacles while studying online at my university.	1	2	3	4	5
SR2	I will finish my studies at my university no matter how difficult it may be.	1	2	3	4	5
SR3	I will certainly enrol for the next semester/trimester at my university until I graduate.	1	2	3	4	5
SR4	I am more likely to continue my studies at my university.	1	2	3	4	5
SR5	I will not quit my studies at my university.	1	2	3	4	5
SR6	It is important for me to graduate from my university.	1	2	3	4	5

Thank you for your participation in this survey

Appendix B: Revision of Questionnaire Items

Original Items	Revised Items
Technical Competencies:	
I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint).	I am confident in performing the basic functions of office suites (e.g., MS Word, MS Excel, and MS PowerPoint, etc.).
I feel confident in my knowledge and skills of how to manage software for online learning.	I am confident in managing online learning software/platforms (e.g., Zoom, Google Classroom, and MS Teams, etc.).
I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning.	I am confident in using the Internet to search for online learning information (e.g., Google, Microsoft Bing, Yahoo, etc.).
I am fully aware of the legal and ethical issues on the use of digital technologies.	I am aware of the legal and ethical issues with the use of digital technologies.
I am good at sharing and collaborating with others effectively in digital learning environments.	I can use digital technologies to team up with others and learn effectively.
I can find solutions to any challenges that emerge in digitally enhanced learning.	I can overcome the problems that arise from the digital technologies used in online learning.
I keep abreast of the latest developments of the digital technologies used for my work.	I keep myself updated on the latest developments in digital technologies for online learning.
Online Communication Competencies:	
I am comfortable responding to other people's ideas.	I am comfortable in responding to others via online.
I am able to express my opinion in texting so that others understand what I mean.	I am able to express my opinion to others via online.
I give constructive and proactive feedback to others even when I disagree.	I can give constructive feedback to others via online.
I feel confident in expressing myself (emotions and humor) through text.	I feel confident in expressing myself (both emotions and humour) via online.

I feel confident in posting questions in online discussions.	I feel confident in posting/asking questions during online learning discussions.
--	--

Social Competencies with Classmates:

Develop friendship with my classmates.	I can build bonding with my classmates via online discussions.
Actively participate in online discussions.	I can participate with my classmate actively during online discussions.
I communicated with my classmates about the course content through different electronic means, such as email, discussion boards, instant messaging tools, etc.	I can communicate with my classmates about the course content through different electronic means.
I seek assistance from other students if I need it.	I can seek assistance from my classmates via online if necessary.
I respond to other students in a timely manner.	I respond to my classmates via online in a timely manner.

Social Competencies with Instructor:

I can easily ask questions and get answers regarding learning content (e.g., instructional materials) to the instructor and get answers.	I can easily ask questions and get answers from my instructor regarding online learning content (e.g., instructional materials).
I freely discussed with the instructor about learning activities such as assignments, discussions and exams.	I can freely discuss with my instructor about my online learning activities (e.g., assignments, discussions and exams).
I can frankly tell my thoughts to the instructor when his/her explanation was different from my perspective	I can share my thoughts with my instructor when his/her explanation is different from my standpoint.
I do not hesitate to share concerns about my progress with the instructor.	I do not hesitate to share concerns about my online learning progress with my instructor.
I express my opinions to the instructor in a respectful manner in this online course.	I express my opinions to my instructor in a respectful manner during online course.

Self-Regulated Learning Competencies:

I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).	I set short-term (daily/weekly) learning goals and long-term learning goals (monthly/semester/trimester) from time to time.
I choose the location where I study to avoid too much distraction.	I choose the spot where I want to study to avoid too much distraction.
I prepare my questions before joining in the chat room and discussion.	I prepare my discussion materials before joining the chat room for conversation.
I allocate extra studying time for my online courses because I know it is time-demanding.	I allocate extra studying time for online courses as I know it is time demanding.
I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	I seek help from someone who is knowledgeable to understand course contents when necessary.
I summarize my learning in online courses to examine my understanding of what I have learned.	I summarise the online course contents to revise what I have learned based on my understanding.

Student Satisfaction:

I am satisfied with the use of “threaded” online discussions and/or forums.	I am satisfied with the online study discussions/forums.
I am satisfied with the quality of interaction between all involved parties.	I am satisfied with the quality of interaction among all the course parties involved.
I am dissatisfied with the process of collaboration activities during the course.	I am satisfied with the collaboration/activities during the online courses.
Class assignments were clearly communicated to me.	I am satisfied with the class assignments as it is clearly explained to me.
I am dissatisfied with the level of self-directedness I am given.	I am satisfied with the given level of self-directedness in online learning.
I am dissatisfied with my performance in this course.	I am satisfied with my performance from online courses.
Compared to other course settings, I am less satisfied with this learning experience.	I am well satisfied with the online learning experience/courses as compared to face-to-face sessions.

Institutional Support:

The college provides web-based information geared toward the needs of online and prospective online students, including expectations related to online courses, FAQs about the online program and common technical problems, explanations of online terminology, and easy-to-find information on support services and courses offered.	My university provides web-based information geared toward the needs of online learning.
The community college provides the financial resources necessary to support the technical infrastructure, training and support personnel, and full range of faculty and student support services required for online courses and programs.	My university provides the financial aids to support students for online programmes.
The college provides students with multiple communication options (telephone, email, US mail, etc.) for obtaining assistance and contacting support services.	My university provides multiple communication options on online support services (e.g., Hotlines, email, help desk, live chat, etc.).
The college provides a technical support center with hardware, software and trained staff to provide technological support for all students, faculty and staff members.	My university provides a technical support centre equipped with hardware, software and trained staff.
The college library provides electronic reserves in support of online programs and takes advantage of local and regional college partnerships to guarantee students the opportunity to access learning resources online.	My university provides online access to the library's electronic resources.
Faculty receive regular and objective feedback from students about their courses and instruction	My university has a procedure for receiving regular and objective feedback about their online courses.
Faculty respond to online student inquiries and manage grading of assignments and testing in a timely fashion.	My university responds to online inquiries and manages in a timely manner.

Student Retention:

I am confident that I can overcome obstacles encountered in the course of studying at KNOU.	I am confident that I can overcome any obstacles while studying online at my university.
I will finish my studies at KNOU no matter how difficult it may be.	I will finish my studies at my university no matter how difficult it may be.
I will certainly enroll for the next semester.	I will certainly enrol for the next semester/trimester at my university until I graduate.
I am not likely to continue my studies at KNOU.	I am more likely to continue my studies at my university.
I would like to quit my studies at KNOU.	I will not quit my studies at my university.
Graduating from KNOU is important to me.	It is important for me to graduate from my university.

Appendix C: Ethical Approval Letter



UNIVERSITI TUNKU ABDUL RAHMAN

Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/66/2022

4 April 2022

Ms Seow Ai Na
Department of Business
Faculty of Business and Finance
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak

Dear Ms Seow,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your research project (Master student's project) and are pleased to inform you that your application has been approved under Expedited Review.

The details of your research project are as follows:

Research Title	The Influence of Online Learning Readiness on Student Retention in Malaysian Private Higher Education Institutions
Investigator(s)	Ms Seow Ai Na Khong Eng Mun (UTAR Postgraduate Student)
Research Area	Social Sciences
Research Location	West Malaysia
No of Participants	380 participants (Age: 18 - 50)
Research Costs	Self-funded
Approval Validity	4 April 2022 - 3 April 2023

The conduct of this research is subject to the following:

- (1) The participants' informed consent be obtained prior to the commencement of the research,
- (2) Confidentiality of participants' personal data must be maintained,
- (3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines; and
- (4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 Fax: (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 Fax: (603) 9019 8868
Website: www.utar.edu.my



Should you collect personal data of participants in your study, please have the participants sign the attached Personal Data Protection Statement for your records.

The University wishes you all the best in your research.

Thank you.

Yours sincerely,



Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Business and Finance
 Director, Institute of Postgraduate Studies and Research



Appendix D: Chi-square (χ^2) Distribution Table

Chi-Square (χ^2) Distribution Table

df	α						
	0.250	0.100	0.050	0.025	0.010	0.005	0.001
1	1.32330	2.70554	3.84146	5.02389	6.6349	7.87944	10.828
2	2.77259	4.60517	5.99147	7.37776	9.21034	10.5966	13.816
3	4.10835	6.25139	7.81473	9.34840	11.3449	12.8381	16.266
4	5.38527	7.77944	9.48773	11.1433	13.2767	14.8602	18.467
5	6.62568	9.23635	11.0705	12.8325	15.0863	16.7496	20.515
6	7.84080	10.6446	12.5916	14.4494	16.8119	18.5476	22.458
7	9.03715	12.0170	14.0671	16.0128	18.4753	20.2777	24.322
8	10.2188	13.3616	15.5073	17.5346	20.0902	21.9550	26.125
9	11.3887	14.6837	16.9190	19.0228	21.6660	23.5893	27.877
10	12.5489	15.9871	18.3070	20.4831	23.2093	25.1882	29.588
11	13.7007	17.2750	19.6751	21.9200	24.7250	26.7569	31.264
12	14.8454	18.5494	21.0261	23.3367	26.2170	28.2995	32.909
13	15.9839	19.8119	22.3621	24.7356	27.6883	29.8194	34.528
14	17.1707	21.0642	23.6848	26.1190	29.1413	31.3193	36.123
15	18.2451	22.3072	24.9958	27.4884	30.5779	32.8013	37.697
16	19.3688	23.5418	26.2962	28.8454	31.9999	34.2672	39.252
17	20.4887	24.7690	27.5871	30.1910	33.4087	35.7185	40.790
18	21.6049	25.9894	28.8693	31.5264	34.8053	37.1564	42.312
19	22.7178	27.2036	30.1435	32.8523	36.1908	38.5822	43.820
20	23.8277	28.4120	31.4104	34.1696	37.5662	39.9968	45.315
21	24.9348	29.6151	32.6705	35.4789	38.9321	41.4010	46.797
22	26.0393	30.8133	33.9244	36.7807	40.2894	42.7956	48.268
23	27.1413	32.0069	35.1725	38.0757	41.6384	44.1813	49.728
24	28.2412	33.1963	36.4151	39.3641	42.9798	45.5585	51.179
25	29.3389	34.3816	37.6525	40.6465	44.3141	46.9278	52.620
26	30.4345	35.5631	38.8852	41.9232	45.6417	48.2899	54.052
27	31.5284	36.7412	40.1133	43.1944	46.963	49.6449	55.476
28	32.6205	37.9159	41.3372	44.4607	48.2782	50.9933	56.892
29	33.7109	39.0875	42.5569	45.7222	49.5879	52.3356	58.302
30	34.7998	40.2560	43.7729	46.9792	50.8922	53.6720	59.703
40	45.6160	51.8050	65.7585	59.3417	63.6907	66.7659	73.402
50	56.3336	63.1671	67.5048	71.4202	76.1539	79.4900	86.661
60	66.9814	74.3907	79.0819	83.2976	88.3794	91.9517	99.607
70	77.5766	85.5271	90.5312	95.0231	100.425	104.215	112.317
80	88.1303	96.5782	101.879	106.629	112.329	116.321	124.839
90	98.6499	107.565	113.145	118.136	124.116	128.299	137.208
100	109.141	118.498	124.342	129.561	135.807	140.169	149.449

Source: Adapted from Table 8 in *Biometrika Tables for Statisticians*, vol. 1, 3rd ed., edited by E. S. Pearson and H. O. Hartley (New York: Cambridge University Press, 1958).