THE EFFECT OF ONLINE LEARNING ON STUDENT ENGAGEMENT: A STUDY CONDUCTED WITH RESPECT TO MALAYSIAN UNIVERSITY STUDENTS

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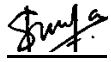FACULTY OF BUSINESS AND FINANCE

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Declaration

We hear by declare that:

1) This undergraduate FYP is the end result of our own work, and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other universities, or other institutes of learning.

3) Equal contribution has been made by each group member in completing the FYP.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Preface

It is compulsory to carry out this Final Year Project(FYP) in order to accomplish our study in the course, Bachelor Degree of Business Administration (Hons). The topic of this research project is "The Effect of Online Learning on Student Engagement: A Study Conducted with Respect to Malaysian University Students". The focal point of this topic is to determine the significant online factors that have an effect on student engagement.

Moreover, online learning has become more prominent in the wake of the pandemic. Currently, the education system throughout the world has changed due to the global health crisis. The sudden transition from on campus to online learning has given a notable impact on student engagement. This research paper will provide better understanding on the online factors that have an effect on student engagement. In short, this research project will help the students and lecturers to enhance the student engagement during online classes.

ABSTRACT

Despite the existence of online learning systems since the early 1990s, it only gained popularity and attention in the Malaysian education system in the wake of the pandemic in early 2020. Online learning has especially posed critical challenges for university students in Malaysia. The objective of this study is to investigate and analyse the online learning factors that affect the engagement level among Malaysian university students. In this research, independent variables (User-friendliness, Course design, Availability of resources, and Digital literacy) are being studied for their significance in student engagement.

Three public and three private universities institutions in Malaysia were given a total of 389 sets of questionnaire forms. All of the IVs have a positive corelation with the dependent variable, student engagement, according to the findings of the Person's correlation coefficient. All IVs, with the exception of user-friendliness, have a clear correlation with the dependant variable according to the analysis of multiple regression.

For future research on this topic, it is recommended to expand the population of data by reaching out to more local universities or targeting overseas institutions. Adding on, future researchers should focus on other IVs that have a stronger determinant level of student engagement.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

For the growth of people, institutions and nations, education is of utmost importance (Elumalai, Shankar, Kalaichelvi, John, Menon, Alqahtani, Abumelha, 2020). It is a mechanism that aids in the development of relationships among contexts around the world. The outcome of the educational system serves as the primary determinant of teaching quality. As a result, the system of education must be transparent in order for students to comprehend the lectures notes. Since students are the last users of the product(education), viable tools must be assessed from their viewpoint. Higher education of high quality is required for the growth of knowledge and skills. The visual course materials and the unseen conveyance of the students' components make up the educational effectiveness. All developing nations must assure that the learning system is of high quality in order to prepare pupils for a world of competition. Additionally, educational institutions must place emphasis in getting their students involved in research, creativity and innovation in addition to teaching them. Educational institutions must provide a fun learning environment and collaborate closely with industries to bring cutting-edge concepts to the ever-changing world. Hence, online learning has become a turning point in most countries' education systems, especially in Malaysia (Elumalai et al., 2020).

Malaysia's education system is divided into various tiers. From January through November, the school year is in session. According to Nick Clark (2014), subjects are frequently taught over the course of semesters rather than years in higher education. Some universities provide a third semester that lasts 8-12 weeks, enabling students to finish their studies more quickly. Malaysia's school system is structured into four segments: elementary, secondary, pre-university, enrollment, and higher education. The academic system is organized as (6+3+2+2), with six years of made mandatory elementary education starting at the young age of seven, three years of junior high school, two years of upper secondary school, and two years of senior high school(pre-university). The SPM(*Sijil Pelajaran Malaysia*)

determines a person's eligibility for pre-university education. The Lower Sixth Form and Upper Sixth Form comprise a two-year cycle known as Form 6. It is offered by national secondary schools, technical secondary schools, form six or pre-university institutions, Islamic schools and some universities. The matriculation cycle, which consists of two semesters, lasts just for one year. The objective is to prepare upper secondary school graduates with the necessary credentials for admission to top-tier schools depending on their SPM scores. Based on their SPM results, three groups of students are constructed: technical, accounting, and scientific. Malaysia aims to become a high-income country by 2020, as part of the government's 'Vision 2020' strategy.

On the other hand, the COVID-19 pandemic is currently on the grounds for all countries to switch to an online study mode. COVID-19 had an impact on 191 countries out of a total of 195 countries (UNESCO, 2020). According to Elumalai et al.,(2020), there are over 25,000 universities in the world, each with a unique character that may amaze anyone. Around 429 universities around the world were closed down and the physical learning mode was replaced with online lectures and online learning (UNESCO, 2020). COVID-19 has shifted the educational landscape completely. Achieving the institutions' and peoples' overall goals in the midst of this global epidemic is difficult for lecturers and students. According to Elumalai et al., the Centers for Disease Control and Prevention(CDC, 2020) issues recommendations for a differentiated instructional methodology of expressing assignments and projects to students in March 2020 (2020).

As a result, the educational system has experienced significant changes, with a significant growth in the employment of technology for distance teaching and learning, which will be referred to as "online teaching and learning" in this study. The hasty transition to online teaching and learning has presented challenges for both lecturers and students. According to Elumalai et al., (2020), due to the change to online learning, many teenagers and young people experience high levels of stress and anxiety, which can cause a variety of psychosocial problems. Not all teenagers can profit from these new learning environments, and some individuals just struggle to stay motivated and interested in their studies (UNESCO, 2020). Indeed, according to Eccles (1997) cited in Elumalai et al.,(2020) adolescence is a particularly dangerous period for commitment.

A new era of academia called as "online learning" has also been ushered in as a result of the COVID-19 epidemic's effects on the entire educational system, especially colleges. Online classrooms and portals that give students access to courses outside of the classroom are examples of electronic technology-assisted learning, or "online learning" Elumalai et al.,(2020) citing Ngamporn kai & Adams, (2016). Academics are embracing this era of online learning despite the challenges that lecturers and students face while adopting it by offering electronics and internet connections to ensure that online learning system runs smoothly, according to Kuhad (2020) referenced in Elumalai et al., (2020). According to Stone (2020), cited in Elumalai et al., ZOOM, Google Classroom, Moodle, and Blackboard are popular digital lecture hall programmes that perform a significant role in the transition from physical classroom setting to online learning systems (2020). Computer science, communication networks, and communication technologies have all been used to modernise outmoded educational platforms. As a consequence of the expansion of online learning, individuals' learning methods have changed. Online learning, unlike traditional classroom learning, takes place in a data center environment.

Additionally, there are certain advantages to these transformations, such as the internet's adaptability, portability, and simplicity in the procurement, retention, conveyance, and availability of data, Hao Li, Min Hu (2017). By offering extensive online learning materials, a variety of online learning tools, a large online learning environment, and a diversity of information retrieval and communication methods, it can assist students in overcoming space-time limitations. As a result, according to Min Hu et al.,(2017), online learning has recently become a major mode of instruction. Students can choose relevant learning information based on their current level and dynamically change their learning progress in the online learning method because there are no hard prerequisites for students' age, academic background, or needs to take place. Online learning is critical for student involvement. According to Min Hu et al., (2017) student engagement is defined as a student's level of interaction with others and the amount and quality of involvement in and effort put toward activities that contribute to perseverance and graduation.

Furthermore, scholars in the educational setting, such as Fatawi, Degeng, Setyosari, Ulfa, and Hirashima, have paid close attention to student engagement in the learning

process (2020). Many technologies are currently being used in online learning to help students improve their engagement, retention, and comprehension. Behavioral, emotional, and cognitive dimensions all contribute to student engagement. In actuality, the synthesis of these three is continuously interconnected within the individual Fatawi et al., (2004) citing Fredricks, Blumenfeld, & Paris, (2020).

This comprises students' attention and effort in participating in the learning process, being involved with learning objects directly, having the confidence to ask questions in class, and devoting time to accessing learning materials, according to Fatawi et al., (2020). Additionally, cognitive engagement encompasses concentration, expansion, justification, self-controlled interest, and emotional investment in learning. While signs of emotional enagagment include tension, boredom, joy, interest, enthusiasm, and connection between students Henrie, Halverson, & Graham, (2015), cited in Fatawi et al., (2020). This research will examine the effects of online learning on student engagement among Malaysian university students.

Chapter 1 will discuss the research background, problem statement, research objective, research question, hypothesis of the study, significance of the research, and conclusion.

1.1 Research Background

Education is an essential element in human civilization to date. According to Bahasoan, Ayuandiani, Mukhram, and Rahmat (2020), education is a foundation for human beings to reach any stage in their lives. In this sense, an educational system is essentially a structure made up of different parts that enables population education. This system includes, among others, teachers, universities, libraries, and schools. In the early stages, people were using a very traditional way to educate each other. No matter what era the people are living in, education is always there to play its role but just in different ways Bahason et al., (2020). As technology has developed in many ways, the education system has also faced a lot of changes. First and foremost, everything started from writing and learning using stones and it developed into papers and was further improvised to the classroom and lastly to the

online platform. All these changes happened based on developments across the world.

The concept of online education has been around since the 1960s, but it did not fully take off until the internet and the web were developed. According to Shivangi Dhawan (2020), who has been tracking the development of online learning since the early 2000s, there has been an increase in the study of internet technology that serves as its foundation. Since then, academics from all around the world have evaluated and assessed the systems for online learning and provided suggestions for how to best improve it. The new coronavirus outbreak in 2019 served as a catalyst for increased awareness and use of online learning. According to Shivangi Dhawan (2020), one of the main forces influencing the academic field is online learning. It has played a crucial role in ensuring that teaching and learning have continued throughout the COVID-19 outbreak. As we mentioned earlier, many other countries also shifted their education system from physical classes to online learning. For example, in March 2020, Australian institutions switched to online teaching and learning in response to regional boundaries on interpersonal relationships caused by the COVID-19 pandemic (Don Carter and Linda Lorenza, 2021).

Moreover, the transition from on-campus to online education was hurried. Since some academic institutions now decided to offer tuition and via digital sites, but many did not, students had to become familiar to a distinctly new types of education when all of the lesson plan was provided online. Given that these "virtual educational dictators" are anticipated to last for a few moments, the primary sector must evaluate the outcomes and accomplishment or inability of this transformation in delivery mode (Don Carter and Linda Lorenza, 2021). A very well online learning experience differs from emergency online teaching (EOT), which is offered in response to crises such as COVID-19. While some universities decided to stop charging for classes, others decided to switch to some type of "online" instruction that was carefully labelled as remote teaching in an emergency. Linda Lorenza and Don Carter (2021) emphasise the importance of a student's sense of identity in such an environment, an element that is definitely missing because once learns engage away from a physical setting. Students' adaptive behaviors both good and bad in response to learning situations show how motivated they are to learn. Contrary to self-handcapping and other unhealthy behaviors, planning, task

management and tenacity are regarded as constructive or adaptive behaviours , according to Linda Lorenza and Don Carter (2021).

Furthermore, we were able to find that this sudden change in the education system has a big impact on student engagement. Student engagement in online learning refers to how students feel, behave and think when utilising an online learning platform to learn. It includes behavioural, cognitive, and emotional engagement, (Bolliger and Martin, 2018). Student engagement is online learning entails how learners feel, behave, and think while starting to learn on an online course. It consists of behavioural, cognitive, and emotional involvement (Bolliger and Martin, 2018). Student engagement in distance courses includes not simply the individual beahviour of perusing course content, posing questions, engaging in instructional games, and completing assignments, but also the mental function of learners' cognitive load and entrepreneurial spirit when come to choosing and finding on the basis content and resources, as well as the sentimental effectiveness of students' satisfaction with their accommodations. The behavioural participation of learners is essential in online learning. Since it is hard to define satisfactorily and therefore can properly reflect the students' efforts, students' perspective, regulatory oversight, and moral support in their own educational process, including hard work planning, systems focus, and emotional states, must be thought about (Bolliger and Martin, 2018). Students must be fully involved in their online learning, including the amount of quality of engagement, information exchange with other people and self-aware learning, support and guidance from others, as well as personality and self-control (Bolliger and Martin, 2018).

1.3 Problem Statement

Educational standards fluctuate widely between nations and have experienced profound shifts over the years. Furthermore, we fixate on higher education in Malaysia in this study because universities have undergone significant modifications in recent years. Since the 1990s higher education institutions in Malaysia have included online learning in their curriculum, according to Hussin (2009), as cited in Selvanathan, Hussin, Azazi (2020). Nevertheless, there seem to be continuing concerns about the quality of online learning versus face-to-face

guidance, according to Panyajamorn (2018), as cited in Selvanathan et al., (2020). Despite the fact that the college shutdown and travel restrictions had an effect on traditional schooling, students started to turn to online learning as the preferred route for maintaining their education. The Malaysian government required that students come back to their home states to accomplish their online learning by April 2020 ('*Pelajar IPT'*, 2020).

Subsequently, students encounter several obstacles or problems due to online learning in various aspects. First and foremost, students' difficulties in adapting to a new learning style. When the physical learning technique was replaced with online learning, students had trouble adapting to it, (Coman, Tiru, Schmitz, Stanciu, Bularca, 2020). For students and lecturers who have only ever experienced traditional school environments, though, this arrangement may be uncomfortable.

When students switch from traditional classroom lectures and physical classtoom setting to computer-based learning in an online classroom, their learning experiences are significantly altered, according to Auto-Domi, B., draft-Yankson, P., Addo, C., and Bimpeh, G. K. (2021). Secondly, students confront challenges when trying to attend their online programs in a classroom setting. According to government regulations, students must stay at home to attend their online classes (Min Hu and Hao Li, 2017). Unfortunately, the lecturers cannot expect every student to have a conducive study environment at their hometown residence. According to the statistics, 80% of students do not have an appropriate setting to attend their online lessons. According to a study, students are often distracted when practicing online learning at home. For example, most students do not even have a designated study area at home. So, for students who live with quite a lot of family members and don't have access to a study area, staying focused during class and in their home learning environment will always be a challenge (Min Hu and Hao Li, 2017).

Furthermore, one of the challenges generated by online learning is student motivation. According to recent studies, university students in online learning courses outperform the students that are enrolled in traditional classrooms. As a result, it is critical to have an education system that can quickly adjust to technological, social, cultural, and political changes. The use of technology in the classroom does not ensure that students will be motivated. Online learning has

resulted in a decrease in the intimacy of student-lecturer connection (M. Samir Abou El-Seoud et al., 2014).

Lecturers must transform the classroom into a virtual environment. Furthermore, pupils will have more flexibility when it comes to online learning. The majority of students took the flexibility for granted, and as a result, they lacked the incentive to concentrate on their online lectures (Claudiu Coman, Laurent, Gabriel T, Luiza Meses,Schmitz ,Carmen Stanciu and Maria Cristina Bularca, 2020). Most of them are now attending their online classes as usual, but the issue is that they are not paying attention in class. It has become reasonably representative for students to follow their lessons while physically removing themselves from their laptops or other resources used to attend their classes. The primary cause for this is that pupils lack the enthusiasm to participate in online classes (Claudiu Coman et al., 2020).

On the other hand, students are having difficulty completing their group work. Students are expected to join a group with classmates they have never met in person when it comes to group projects (Ahmed Hassanien, 2006). As a result, students select their group mates randomly from among their classmates. Even though students have access to online platforms for conducting group discussions, they still have difficulty completing their meetings and finishing their assignments on time. This is because they have a lot of "free riders" in their groups (Ahmed Hassanien, 2006). Some pupils are not as dedicated to their studies as others. As a result, the productivity of the pupils' tasks will be affected when they work as a group. Since the students are already stressed from their studies, having a group mate who fails to contribute to the assignment will add to their stress. This is one of the disadvantages of pupils selecting group mates via the internet (Ahmed Hassanien, 2006). To summarize, students who take online programs face several significant challenges. This will have an impact on the student's overall academic involvement.

1.3 Research Objective

1.3.1 General Objective
1) To determine the effects of online learning on student engagement among Malaysian university students.

1.3.2 Specific Objective

1) To determine the significant relationship between user-friendliness of online learning platforms and student engagement.
2) To determine the significant relationship between course design and student engagement.
3) To determine the significant relationship between the availability of resources and student engagement.
4) To determine the significant relationship between digital literacy and student engagement.

1.4 Research Questions

a. Is there any significant relationship between user-friendliness of online learning platforms and student engagement in online learning?
b. Is there any significant relationship between course design and student engagement in online learning?
c. Is there any significant relationship between the availability of resources and student engagement in online learning?
d. Is there any significant relationship between digital literacy and student engagement in online learning?

1.5 Hypothesis of the Study

H1: There is a significant relationship between the user-friendliness of online learning platforms and student engagement.

H2: There is a significant relationship between course design and student engagement.

H3: There is a significant relationship between the availability of resources and student engagement.

H4: There is a significant relationship between digital literacy and student engagement.

H5: The four independent variables (user-friendliness, course design, availability of resources, and digital literacy) are significant in explaining the variance in student engagement.

1.6 Significance of the Study

According to past researchers, there are many factors affecting student engagement in educational institutions. This research paper mainly focuses on the online factors that affect student engagement of the students in Malaysian Universities. Based on our research, the factors that affect student engagement are user-friendliness, course design, availability of resources, and digital literacy. The focus of this thesis is to determine whether these four variables are related to student engagement in Malaysian universities.

This study would be very helpful for society to understand more about the effect of online learning on student engagement. Although online learning was already implemented a few years ago, it is not very well known among the public. Moreover, there is very little past research that has been conducted on this topic. Due to that, if society wants to know more about online learning, they might not be able to get more resources to get a clear understanding of this new way of learning. With this, we believe that our study can contribute more information about online learning to society. In addition, according to Di Xu and Jaggars (2013), information on whether course subjects are well-suited to online learning might assist universities in better allocating resources for online course creation. The above research will assist potential researchers fill a knowledge gap in the educational field by providing more data on student engagement in online learning.

Furthermore, students went through a lot of problems when the education system changed to online learning on a sudden note. As we mentioned earlier, students struggled to adapt to the new way of learning as they are familiar with it in the early stages of implementation. Research papers like this could help students educate themselves on more techniques on how they can practice online learning to continue their studies. In addition, during this online learning students are lacking the motivation to attend their classes online. Since they have more flexibility in this learning method, some of the students are taking the flexibility for granted. The students should know how to use their flexibility wisely and stay motivated. In this research paper, we discuss more on student engagement and motivation which

could be more helpful for the students to boost their motivation to attend their classes.

Moreover, it is important for a student to have a good relationship with their lecturers. Conversely, we found that the students are having problems communicating with their lecturers during online learning lessons. There is miscommunication between students and lecturers during this new way of learning. In online classroom settings, students are particularly susceptible to distractions, which can lead to miscommunication and misinterpretation to any given issue, halting the flow of information.

Aside from that, this research will help policymakers (Ministry of Education Malaysia). Legislators will have more data and a greater knowledge of the variables that encourage student engagement in online learning. The course design, for example, and the availability of resources are independent variables in this study. If course design is a significant variables in effecting student engagement, policy makers could implement policies to improve the course design and thus raise student engagement in universities in their different nations. The same is true for resource availability; legislators can enhance the availability of resource for academic institutions or major universities at their optimal level in order to improve students' academic results if resource availability has a substantial impact on student engagement in online learning.

Finally, this study also contributes more knowledge for us and other researchers as well. When we were conducting this study, we were able to get more new information about the education system not only in Malaysia but also in other countries. In this study we have conducted a survey to learn about the perspective of students from various universities in Malaysia. To conduct the survey, we used various methods to reach out to the respondents and with that we gained a lot of experience and we were able to collaborate with other University students as well. To summarize, this study is not only significant for society as a whole, but students and future researchers also benefit from it.

1.7 Conclusion

Briefly put, the role of this chapter is determining the relationship of online learning towards student engagement in Malaysian university. In this research, student

engagement is the dependent variable and independent variables include user-friendliness, course design, availability of resources and digital literacy. The reason for choosing user friendliness, and course design is because past research has shown that these variables have a substantial impact on student engagement; they are considered independent variables. In addition, some of the outcomes shows a different study of the availability of resources that affect student engagement in different countries. Thus, the purpose of digital literacy is to determine if it is important or inconsequential in relation to Malaysian university's students. The goal of this study is to see if the independent variables have a significant relationship towards student engagement among Malaysian university students. Eventually, these reasons and outcomes will be emphasized in following chapters.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter will provide a full summary of prior research studies that were conducted on the field of the topic chosen for this research paper. The main conclusions, findings, and methodological concerns pertaining to the information from the thesis summary are to be cited in this chapter. The importance of this chapter is to define and restrict the research, situate the study in a historical context, minimize superfluous repetition, assess promising research methodologies, link the findings to past knowledge, and recommend more research.

2.1 Underlying Theories

2.1.1 Self – Determination Theory

The term "self-determination" refers to a broad concept that encompasses both human motivation and personality. Self-determination theory is a broad motivation theory that seeks to explain the dynamics of human desires, motivations, and well-being in the context of their immediate social environment Deci & Ryan (1985), cited in Chiu, T. K. (2022). Besides, Deci and Ryan (1985), cited in Deci, E. L., & Ryan, R. M., (2012) describe self-determination as a feature of human functioning that entails the feeling of choice. In social contexts, SDT distinguishes between autonomous and controlled motivation, it is a theory of human motivation and personality that is empirically supported. SDT separates motivation into autonomous and controlled forms, in contrast to most theories that consider motivation as a single notion, Deci & Ryan (1985), cited in Chiu, T. K. (2022).

This theory might be utilized to integrate online learning issues as a theoretical framework. As a driver of motivation, SDT looks at autonomy, relatedness, and competence. Each person has three psychological demands that influence their autonomy (the need to feel self-governed and endorsed), relatedness (the need to feel linked, loved, and engaged with), and competence (the need to feel successful and competent). The three ideas correspond to aspects of online education such as flexible learning. When these three psychological needs are satisfied, people feel more psychologically healthy, otherwise, they feel more fragmented, lonely, and receptive when their needs are not met. Students are encouraged to pursue their academic goals when a variety of incentives are provided (Hsu et al., 2019).

Several contextual supports, including teacher and peer support, influence student motivation and engagement. T. K. Chiu (2015) cited Lietaert et al (2022). Contextual assistance is essential for online students, who require assistance from professors, students, administrators, and technical support specialists. In previous studies, self-determination theory was shown to predict a variety of learning outcomes, including performance, persistence, and course satisfaction. T. K. Chiu cited Deci and Ryan (1985). (2022). Self-determination theory offers the capacity to solve barriers to learning such as dropout rates in the context of online learning. In addition, lecturers use a variety of online learning resources. From the standpoint of SDT, when a person's basic psychological needs are met, their behavioural

intentions toward learning become more obvious. (Wang, M., Wang, M., Cui, Y., & Zhang, H., 2021).

Self-determination theory has a substantial impact on student engagement, which is followed by four independent variables: user-friendliness, course design, resource accessibility, and digital literacy. To achieve engagement in online learning, SDT theory is essential to all these factors. Fostering a variety of incentives provides students with the motivation they require to be enthusiastic about their academic pursuits. Student engagement has often been regarded because of motivational processes (Reeve, 2013). Consequently, it falls under the scope of SDT. SDT is now being used and verified in the field of online learning to examine students' motivating demands for digital resources Chang et al., (2017); Hew & Kadir, (2017). In other words, a person tends to become self-determined while engaging in regular activities and feeling a sense of agency (perceiving alternatives in a circumstance), competence (having the confidence to do a task), and relatedness (engaging with others). Many researchers conclude that the demand for online courses grows and attrition rates continue to be high, SDT may be implemented and expanded to online learning settings. SDT is currently used in a variety of contexts, including the workplace, industry, and education, as one of the "most empirically verified incentive theories" (Sun et al., 2019).

According to several studies, SDT may be a useful framework for addressing motivation in an online learning environment. The theory allows researchers to investigate the mechanisms through which contextual elements, such as lecturer behavior or engagement, boost or decrease online learners' motivation. The SDT also aids instructional designers and instructors in identifying improved online learner support tactics (Chen, K. C., & Jang, S. J., 2010).

2.1.2 Self – Efficacy Theory

According to Bandura (1977), cited in Hong, J. C., Liu, X., Cao, W., Tai, K. H., and Zhao, L., people will exert effort and persevere when faced with obstacles based on assessments of their efficacy (2022). A person's self-efficacy is their belief in their own ability to succeed. People will try to do what they believe they can do and will

choose activities based on their perceptions of their efficacy. Self-efficacy has been linked to adversity and stress resilience, superior lifestyle choices, improved work performance, and academic success.

Self-efficacy can have an effect on performance (Morfoot & Stanley, 2018). The concept of self-efficacy is central to the social cognitive learning theory. Self-efficacy is a person's ability to control their thoughts, feelings, or behaviours. This ability enables them to comprehend how the therapy may affect the expected learning outcomes. Students' adaptability is critical in online learning because they must use a variety of educational support technologies, become accustomed to learning on their own, and struggle to communicate directly with instructors and peers. As a result, students must have a high level of self-efficacy to maintain their participation in the learning process under challenging conditions. Academic self-efficacy influences students' likelihood of success in online learning (Saefudin et al., 2021). Moreover, high self-efficacy boost the students' confident level and enhance the ability to plan and complete the tasks required to achieve results, even if the difficulty level is high (Seto et al., 2020).

Academic self-efficacy boosts student involvement. According to one study, self-efficacy is significantly related to behavioural engagement (Chang & Chien, 2015). Furthermore, student participation is critical for academic success. It assesses how actively students participate in their formal education, including the amount of time, effort, and dedication students devote to coursework and other educational obligations.

Students' active participation and high levels of engagement are required for successful online learning, which will have an impact on their academic performance. It will be difficult for students to perform daily tasks if they are not focused while studying. Thus, self-efficacy is defined as a person's belief in their own ability to complete a task, which is critical in the practise of online learning. Self-efficacy boosts students' academic confidence, encouraging them to participate more actively in online learning activities and form positive connections with others in the virtual learning environment (Saefudin & Yusoff, 2021).

Self-efficacy theory (perceived capacities to learn or execute tasks at predetermined levels) is a fundamental cognitive characteristic that influences motivation and engagement. Students with high self-efficacy are more motivated and enthusiastic about their studies. Students who believe that they are effective learners but believe

their development is slow will devise a new method and seek assistance to engage and improve in their studies (Schunk & Mullen, 2012). Students' self-efficacy improves their confidence in their academic abilities, which leads to increased engagement in online learning activities and favourable attitudes toward the virtual learning environment.

Computer self-efficacy (CSE), internet and information-seeking self-efficacy (ISE), and learning management systems (LMS) self-efficacy are the three areas of self-efficacy in online learning (Calaguas, N. P., & Consunji, P. M. P., 2022). Many studies have found that students with prior computer experience or skills have higher computer self-efficacy when pursuing other types of remote learning courses. Users with high CSE are more likely to believe that using computers will benefit them and that using computers for a variety of tasks will boost their self-efficacy. Furthermore, students with higher CSE engaged in learning processes more readily and spent more time using virtual learning platforms. The ability to use a CSE demonstrates confidence in one's ability to use computers and other ancillary or tangential technical toolsThis assurance is limited to the extended, self-directed application of these abilities to more difficult activities rather than just the basic, tool-required skills (such starting a programme or printing a file) Alqurashi, (2016) cited in Calaguas, N. P., & Consunji, P. M. P. (2022).

Our study's four IVs are user-friendliness, course design, resource accessibility, and digital literacy. Because these factors have a significant impact on how students perceive online learning, self-efficacy theory is critical for both student engagement and the four IVs. User-friendliness, course design, resource accessibility, and digital literacy all have a significant impact on students' perceptions of virtual learning. Students' mindsets also play a significant role in this perception. In this study, self-efficacy is the mentality that shapes the natural behavior of students who are driven by an innate desire to engage in an activity for their own intrinsic delight. It is a conviction that one can study or perform at a specific level in order to accomplish certain goals. In online learning situations, self-efficacy has been shown to be a significant predictor of successful outcomes and increased satisfaction. (Yong, S. M., & Thi, L. S., 2022).

Interest, value, utility, and a favourable emotional reaction are all notions related to self-efficacy. These self-efficacy traits revealed that there was a connection between academic performance and self-efficacy. Students' self-efficacy increases when

they can participate more readily in educational activities and actively encourage learning. Only enough efficiency is required for effective learning to encourage participation in current and future online activities.

2.2 Review of Literature

2.2.1 Student Engagement (Dependent Variable)

Student engagement is defined as the quantity and quality of effort that a student is willing to exert towards the activities conducted in their classes. It measures the degree to which a student has developed social connections within the course activities, instructors, and peers. Student engagement, defined as students' active participation in educationally effective activities and their dedication to learning, is a critical step toward highly desired educational outcomes such as academic success (Chiu, T. K., 2022).

When students display active participation and dedication toward educational activities and learning goals, it is deemed as a critical pathway to achieving highly valued educational outcomes such as academic accomplishments Christenson et al. (2012), cited in Chiu, T. K. (2022). Students that are engaged find learning enjoyable and meaningful, and they devote time and effort to it. Students will feel more academically competent and connected if they engage in high-quality activities and achieve academic achievement. As a result, students will engage more favourably with both their classmates and the teachers of their courses. Disengaged students, in contrast, are passive, exhibit poor academic performance, and experience feelings of loneliness, resentment, and inadequacy Skinner & Pitzer (2012), cited in Chiu, T. K. (2022).

In order to achieve outstanding learning outcomes, student engagement is also characterized as active participation in the educational process, both within and beyond the classroom. The term "student engagement" refers to the time and effort that students actively invest in educational activities Kuh (2003), cited in Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (Salas-Pilco et al. (2022), citing Krause and Coates (2008), define student engagement as the extent to which students participate in instructional activities associated with excellent learning outcomes.

Furthermore, Fredricks et al. (2004), cited in Salas-Pilco et al., (2022) describes student engagement as a multidimensional construct with a large potential that consists of three components. In short, engagement can be defined as a meta construct. Therefore, engagement should be maintained specifically for work where multiple components are present.

The three components that comprise the multidimensional construct of student engagement are behavioural, cognitive, and emotional involvement Reeve, (2013), cited in Chiu, T. K. (2022). Behavioural engagement is defined as a level of participation, effort, intensity, or perseverance in educational activities (Chiu, T. K., 2022). Another body of literature divides behavioural involvement into three categories: student attendance in class, behavioural incidents, and participation in educational activities. Conversely, the indicators of low behavioral engagement are skipping class and breaking the rules (King, 2020).

The next definition of cognitive engagement is the extent to which students are prepared and equipped to take responsibility for their own learning. When students complete learning activities, cognitive engagement relates to how much mental effort they put into applying advanced learning techniques as opposed to simple ones (Chiu, T. K., 2022). The effort demonstrated by students to assimilate new knowledge into familiar study patterns and steer their comprehension from a study utilising cognitive and metacognitive methods are examples of intellectual effort expended in learning tasks. Students' motivation to learn, effort to understand, self-regulated learning, self-efficacy, perceived ability, critical thinking and reflection, additional effort to learn more, and capacity to understand complex concepts are all linked to cognitive engagement (Salas-Pilco et al., 2022). Cognitive engagement is defined as problem-solving flexibility, hard work in finishing the task and coping well in the event of failure.

The term "emotional involvement" refers to how students feel about their instructor, peers, the learning process, their coursework, and their sense, of course, belonging Fredricks, (2011), cited in Özhan, Ş. Ç., & Kocadere, S. A. (2020). The caliber of the connections made with classmates, professors, and other students, as well as the course material and learning activities, demonstrate this participation. Emotional engagement helps students create a sense of bonding with their course and influence their willingness to perform well Fredricks et al., (2004), cited in Salas-Pilco et al., (2022). Emotional involvement may be shown in the learner's attention, love,

enthusiasm, happiness, and delight toward the learning surroundings (Özhan, Ş. Ç., & Kocadere, S. A., 2020). A key driver of motivation and achievement in the completion of a task is emotional engagement Shernoff & Hoogstra, (2001), cited in Özhan, Ş. Ç., & Kocadere, S. A. (2020).

Bradford and Wyatt (2010) discovered that in online university-level courses, a high level of communication forms provided by a learning environment can help students engage more. Student engagement has the ability to improve performance, retention, and persistence Bergdahl et al., (2020); Bond, (2020), cited in Khlaif et al., (2021). Student engagement is an important influential factor in reducing the dropout rate in the institution and improving student performance Fraysier et al (2020), cited in Khlaif et al, (2021).

2.2.2 Independent Variable

There must be social interaction between students and lecturers to improve the quality of online learning. Online learning may be beneficial if there is significant engagement and regular practice. Controlling this process is more challenging than it is with conventional techniques. Educators must utilize technology wisely to promote student engagement in order to fully exploit the power of information technology (IT) as a catalyst for producing successful candidates in universities Ehrmann, (2004) cited in Lambert et al., (2010). However, the adoption of IT in the education system through online learning has also resulted in many issues. Especially after the recent shift from physical to online learning following the pandemic, these issues have been further magnified. In this case, the most common online learning issues discussed by several authors are user-friendliness, course design, availability of resources, and digital literacy.

2.2.2.1 Independent Variable 1: User friendliness

University students and lecturers are key users involved in the usage of online learning platforms (Ifijeh, Osinulu, Esse, Odeshi & Fagbohun, 2015). The top 5 online educational platforms or learning activities among students based on the frequency of use are online educational platforms (Canvas, Blackboard, etc.),

communication tools (Zoom, Teams, Google), social media platforms (TikTok, Twitter, Facebook, etc.), asynchronous videos (assigned or taped by instructors) and synchronous class sessions (live class). Online learning platforms such as LMS (Learning Management System) are effective in creating synchronized communications among students and instructors for online courses, Junior & Marquesi, 2009 as cited in Rawashdeh, Mohammed, Arab, Alara & Al-Rawachded, (2021). According to Rahrouh, Taleb & Mohamed (2018) cited in Rawashded et al., (2021) online learning platforms such as LMS are effective, feasible, manageable, and reliable for institutions. Universities have financially invested in the acquisition, installation, and management of online learning platforms in order to facilitate and enhance online learning and teaching (Ifijeh et al., 2015).

According to Davis (1989), cited in Huang (2021), the Technology Acceptance Model (TAM) helps to understand the external factors that influence students' acceptance of new technology that is implemented in their learning. Based on the TAM, perceived usefulness and perceived ease of use are 2 key factors that influence students' behavioural intention towards online learning technology, Davis, (1989), cited in Huang, (2021). Theory of Reasoned Action (TRA) goes hand in hand with TAM to understand students' acceptance of technology, Fishbein & Ajzen, (1975), Davis, (1989) cited in Huang, (2021). "Perceived ease of use" in other words "user-friendliness" is a factor that explains to what degree students believe new technology is easy for them to use and learn (Huang, 2021). When a student believes that a new technological product/system is easy to use, then they will adopt a positive attitude towards employing that product/system in their learning and as a result, they will be willing to continue its usage (Huang, 2021). "User-friendliness" explains the degree to which the user of the online learning platforms considers the educational technology to be user-friendly based on their prior experience or continued usage of the platform (Choa, P. Y., Ahmad, R., Yahaya, K. H., Mohd Fauzi, N. A., Yunos, M. Y. S., & Abidin, R., 2017).
The students who consider the online learning platform useful and easy to use are more inclined to adopt a positive attitude towards online learning and hence increasing their intention to use the online learning platform again on a daily basis. Even though students respond positively to online learning, several challenges may have an effect on the successful implementation of online learning in higher

education. For example, issues such as access, navigation, and technical glitches have a tendency to disrupt the student's learning process and cause frustration and disengagement in the learning environment (McGuinness, C., & Fulton, C., 2019). The functions of an online learning system should be constructed with flexible access in order to promote user friendliness for students (Nguyen, Pham & Hoang, 2020). According to Nguyen et al., (2020), the quality of the online learning system is determined through functionality aspects such as usability, availability, response time, probability of glitch in the software system, consistency of user interface and response rates in interactive systems. These aspects of an online learning system affect user-friendliness from the perspective of students. Furthermore, Nguyen et al., (2020) argue that students become confident in utilising technology systems in their learning when it gives them freedom and comfort in usage. Nguyen et al., (2020) agree with Huang (2021) with respect to students' behavioural intention toward the online learning system that is affected by their attitude towards the system.

According to Ho & Kuo (2010), as cited in Omar, Hassan & Atan, (2012), the attitude of the students plays a significant role in the feasibility of online learning. When students are not deterred by the complexity of the online learning platforms, they tend to be more satisfied with the effectiveness of the online learning platforms Piccoli et al., (2001) as cited in Omar et al., (2012). Hence, it is important that students develop a positive attitude towards online learning platforms. If the online learning system is user-friendly, then students will have a greater intention to use the system, Pituch & Lee, (2006) cited in Omar et al., (2012). To make sure students adopt a positive attitude towards the online learning system, Oh & Lim (2005) cited in Omar et al., (2012) suggest that institutions need to facilitate students to help them adapt to the online learning environment.

2.2.2.2 Independent Variable 2: Course Design

The concept and philosophy for developing a greater cognitive atmosphere for students is known as course design. Students can access knowledge, acquire skills, and practice elevated amounts of cognition by intentional and organized exposure to educational methods, educational processes, and engagement. According to L. Dee Fink (2010), the goal of course design is to provide students with more learning

opportunities in an environment that respects and supports their intellectual development. Students are more likely to participate and be proactive when the course content is engaging, which influences learning results. The design of the online learning course includes the structure, interface, testing, assessment, and forums for instructor-to-learner dialogue. A strong course design will draw students in and make it easier for them to study in online classrooms (L. Dee Fink, 2010). Furthermore, according to L. Dee Fink, (2010) emphasized that the organisation and information of segments of educational material are included in interactive learning content. In addition, the online learning content contains supplemental tools to assist students to understand the subject more clearly and deeply. Efficient course design is based on the fact that the programs themself are the cornerstone of education (L. Dee Fink, 2010). Several students will be able to engage in richer life lessons that support successful learning if the design is effective. The concept of great course design is respected at Capital University, and all of the aspects of a course are determined. Coursework must set the backbone of student learning, whether it is in education in general or program-specific instruction. As a result of excellent course design, our program should have a beneficial impact on students and provide the desired outcomes (L. Dee Fink, 2010).

Figure 1 depicts the overall organisation of course designs. The achievement of planned student goals should be the result of optimal student learning, which should occur in tandem with programme identification and successful course design.
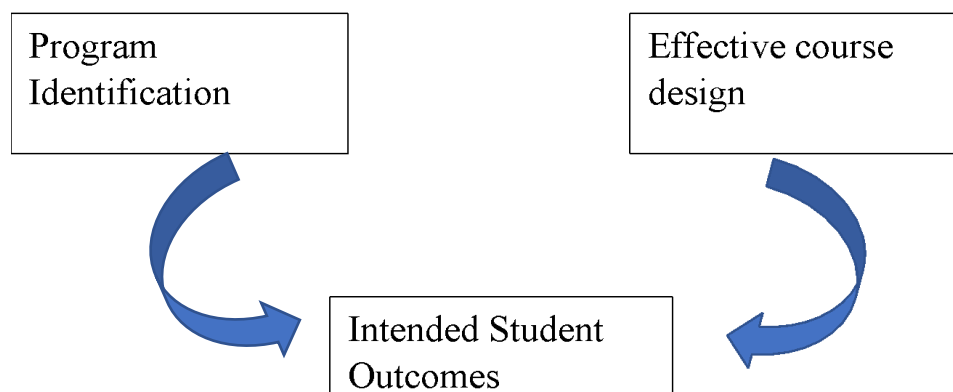
Figure 1

Course activities and assessments, for example, are linked to active learning, student cooperation, different learning styles, time on task, and optimism. The number of professional commitments they accepted or declined before the beginning of the semester typically reflects the amount of student faculty engagement and the forthrightness with which they receive feedback on assignments. The method that the course contents are delivered should be well-structured, predictable, and varied, Shea et al., 2021 cited in Garrels, V., & Zemliansky, P. (2022).

To teach effectively, one may be skilled in course design as well as teacher-student relationships. However, the capacity to plan courses well is frequently the most limiting component of these two tasks. The majority of the teachers have little or no experience designing courses. Furthermore, research on college teaching and learning has spawned new ideas regarding course design during the previous two decades, thus "raising the bar" in terms of what is achievable. Researchers in education and other relevant sectors should keep examining the effects of the design of online courses on student engagement, motivation, and learning in order to promote the shift from technology-based to design-based thinking (Garrels, V., & Zemliansky, P., 2022).

Based on the research conducted by Mehta, Lim, Rajan, Easter, (2017), the author emphasised that the course design is one of the most important aspects of an efficient online world. Instructors must be willing to devote a significant amount of time and effort to creating an online course. Most instructors who would be conducting hybrid courses during the first time assume to have to completely rewrite their courses in order to make them suitable for online learning (Mehta et al., 2017). Because online learning is more than just publishing lectures online, letting students go through them, and then evaluating what they know through quizzes and examinations, teachers must comprehend the teaching material they wish to teach in order to construct efficient courses.

Furthermore, the teacher is responsible for developing the course's learning method, architecture, multimedia elements, and evaluation. The teacher must consider the course education objectives before creating learning activities and lessons that will engage students and encourage engagement. According to Schneider and Preckel (2017) cited in Garrels, V., & Zemliansky, P. (2022), giving students group assignments where they must work together to complete the job and where each

student has specific duties is an efficient way to boost learning results. According to our experience, selecting appropriate assignments may also improve the group work's overall process quality.

According to Garrison, Anderson, & Archer (2000) cited in Gray & DiLoreto (2016), they define course structure as the development and design of course resources, course curriculum, course schedule and overall planning of the course. In order for students to obtain academic success, Gray et al., (2016) argue that institutions need to provide course details such as expectations for assignments, due dates, coursework guidelines, assessment rubrics and also resources to accommodate their learning process. The course infrastructure, or in other words course design should be well-organized and user-friendly with clear details about student learning objectives from the course Eom et al., (2006) cited in Gray et al., (2016).

2.2.2.3 Independent Variable 3: Availability of resources

Learning resources are defined as information that might be utilised to aid learners in accessing, recording, and processing learning materials. There are several learning materials available, each with its own set of characteristics. First, resources might vary depending on where they are located. External resources, such as lecturers, books, and calculators, are available to the student, but internal resources, like as past knowledge, are also available, Arvaja, Salovaara, Häkkinen, & Järvelä, (2007); Fischer & Mandl, (2005). Second, learning resources can differ in the functions they provide. Some resources, like books, the Internet, and videos, serve as information repositories, whilst others, such as calculators and visualisation tools, function as cognitive tools that aid learners in processing information. Within information resources, further distinctions are possible such as primary and secondary resources (Jeong, H., & Hmelo-Silver, C. E., 2010).

In an online educational context, an online learning resource is a resource that is available on the Internet. It might be HTML documents, such as course objectives, assignments, lecture notes or responses to chapter questions. Interactive exercises or tests, audio or video classes, or documents with links to other websites might all be examples. In online courses, instructional resources also play an important role in boosting student engagement. To encourage students' engagement and maximise

learning, the instructors used a variety of tools and activities, such as audio or video lectures, online discussion forums, live webcasts, video-integrated quizzes, standalone quizzed, weekly and monthly assignments, course readings, and links to other helpful resources (Hew, K. F., 2016).

Many university students still lack the basic skills and knowledge needed to assist themselves in online learning, which may have an impact on student engagement in their studies. Many students were made aware of the drawbacks of emergency remote education, including its lack of resources, poor quality of teaching and learning, unfavourable home learning environment, inadequate internet access, problems with mental health, and little exposure to online learning. Teachers confront comparable obstacles, but they also have to deal with increased workloads, especially when they transition all face-to-face learning materials to the online environment (Fung, C. Y., Su, S. I., Perry, E. J., & Garcia, M. B., 2022).

Furthermore, although lecturers have expert power because of their expertise, students receive expert knowledge from their lecturers as well as the online learning resources they use outside of the classroom. Students can enhance their knowledge and get better results by using internet tools for studying (Asdaque et al., 2010). Students' knowledge received via online resources may be equivalent to that offered by their lecturers, which may include material from well-known scholars, professionals, or experts. It is crucial to determine if this shift in information sources reflects a shift in the cognitive gap between students and lecturers (Alshahrani, S., Ahmed, E., & Ward, R., 2017). Students would have a clear understanding of what they are expected to complete in the course if course resources were provided. Students who are interested in a topic can also use supplementary course materials to learn more about it (Chiu, T. K., 2021).

The relevance of varied resources in enhancing student performance and satisfaction is confirmed by the efficacy of resources in an online learning environment. Much research has looked at the influence of support services on course content learning results. During the learning process, helpful tutors and clear learning materials are critical variables in increasing student engagement and course completion rates. The researcher found that the time spend talking with instructors has a significant, though negative, impact on the students' grades in core courses, which suggests a need for increased instructional support by those students who have difficulty with course materials (He, H., Zheng, Q., Di, D., & Dong, B., 2019).

Students may utilise good resources to anchor their learning, analyse their understanding from a variety of angles, link related concepts, and bridge the gap between their theoretical understanding and practical knowledge. Almajali, D., Al-Okaily, M., Barakat, S., Al-Zegaier, H., & Dahalin, Z. M. (2022) stated that senior and graduate students had very good opinions of online education. Additionally, the majority of the respondents acknowledged watching instructional videos on YouTube or reading blogs on architecture, and they dedicated a significant amount of time to those two activities. The availability of resources promoted this utilisation.

2.2.2.4 Independent Variable 4: Digital Literacy

The phrase "digital literacy" was presented in Paul Glister's Digital Literacy book in 1997, in which the author defines it as "the capacity to comprehend, appreciate, and utilise information in diverse formats delivered by a computer." Furthermore, the capacity to assess and comprehend data is critical. What counts is that one develops fundamental abilities of thinking and competencies through digital literacy, without which one would be unable to orient and accomplish activities in an interactive environment.

The phrase "digital literacy" has been broadened to cover all the specialised skills and competencies required for searching, locating, assessing, and handling electronic information. Due to the influence of social media, digital literacy today encompasses a wide variety of abilities, from posting items on Facebook to submitting material to YouTube. We need a few key digital literacy abilities to accomplish our goals and go about our daily lives, especially in the linked, online world we currently live in. With the global economy and computer technology, digital literacy is a possible competency to actualize teachers' professional growth in online learning communities (Li, M., & Yu, Z., 2022).

When it comes to defining digital literacy, some writers think that it is a linkage between skills and competences required for efficient use of the internet and digital technology (Shopova, 2014). According to Helsper et al. (2020) through chances for social interaction and professional growth, as well as possible protection against the negative effects of potential online risk events on well-being, digital literacy serves as an important resource for wellbeing across a variety of spheres of life.

Digital literacy includes digital skills as a significant component. Learners can grasp the extent of information channels and resources, acquire trust in the correctness, dependability, and clarity of the information they receive, and greater control of their own learning as a result of the development of a variety of abilities. It should be highlighted that digital literacy includes more sophisticated critical and evaluative abilities that are frequently mentioned in media literacy literature in addition to computer skills ((Vissenberg, J., d'Haenens, L., & Livingstone, S., 2022).

In recent years, digital literacy research has emphasised the need of going beyond basic abilities in accessing documentation and digital literacy resources and tools to establishing techniques for making effective and essential use of these resources (Shopova, 2014). As a result, the majority of scholars regard literacy as a continuum, with successive phases where fundamental abilities are merely the first step. Increasing degrees of cognitive ability to apply the literacy in issue to the activities such as learning, producing, and expressing creative ideas are found at the upper end of the continuum, which includes topics views, as well as social and cultural influences (Ala-Mutka, 2010).

When creating the concept of digital competence Ferrari, (2012), it became clear that digital literacy included all the set skills and abilities necessary for Internet literacy, ICT literacy, information literacy, and media literacy was insufficient. After that, elements come into the framework of digital literacy and contribute to the development of a framework that defines the vision of modern literacy such as lifestyle, work environment nowadays. Ferrari (2012) provides a detailed definition of digital literacy that encompasses skills, attitudes, and skills for obtaining, accessing, retrieving, saving, and organising information. The concentration is to utilise technology and media in an analytical, innovative, adaptable, and responsible manner to solve problems and develop new knowledge (Shopova, 2014).

The overlap of the idea of information literacy's inclusion in digital literacy frameworks demonstrates the difficulty in integrating digital literacy, information literacy, data literacy, media literacy, and other types of literacy. Alexander et al. (2017), for example, define digital literacies as a combination of information and media literacy. They acknowledge that information literacy, defined as "critically locating, assessing, and utilising digital resources," is a nearly universal component of digital literacy frameworks, but they only list it as one component (2017).

Mackey and Jacobson's (2011) definition includes digital literacy, media literacy, visual literacy, and information technology fluency. This framework, according to Mackey and Jacobson, "challenges traditional skills-based approaches to information literacy by recognising linked literacy types and embracing modern technology" (2011). According to Mackey and Jacobson, traditional definitions of information literacy tend to emphasise skills such as finding and analysing information while ignoring complex engagement with issues such as individual privacy, information ethics, and information exchange in participatory settings (Feerrar, 2019).

Similarly, when it comes to accessing and using digital technologies, digital literacy is frequently reduced to skills-based methods. Traditional methods to information literacy and digital literacy that are based on skills, Mackey, and Jacobson's remark, tend to oversimplify their reach. More expansive conceptions of both literacies benefit from overlapping competence areas relating to creative, critical thinking, and ethical reasoning. Examining related literacies and reflecting on literacy is beneficial to those establishing digital literacy programs or other literacy-related activities (Feerrar, 2019).

Calvani et al. (2009) cited in Arona, et al., (2022) found that digital literacy is a non-quantifiable mix of power and competence, but allows for greater flexibility in data analysis, selection, and critical evaluation, while also individual liberty and respect and understanding for rights and duties are being raised. It shows that digital literacy is not necessary to follow the procedure or limited to certain jobs.

2.3 Proposed Conceptual Framework

INDEPENDENT VARIABLE

DEPENDENT VARIABLE
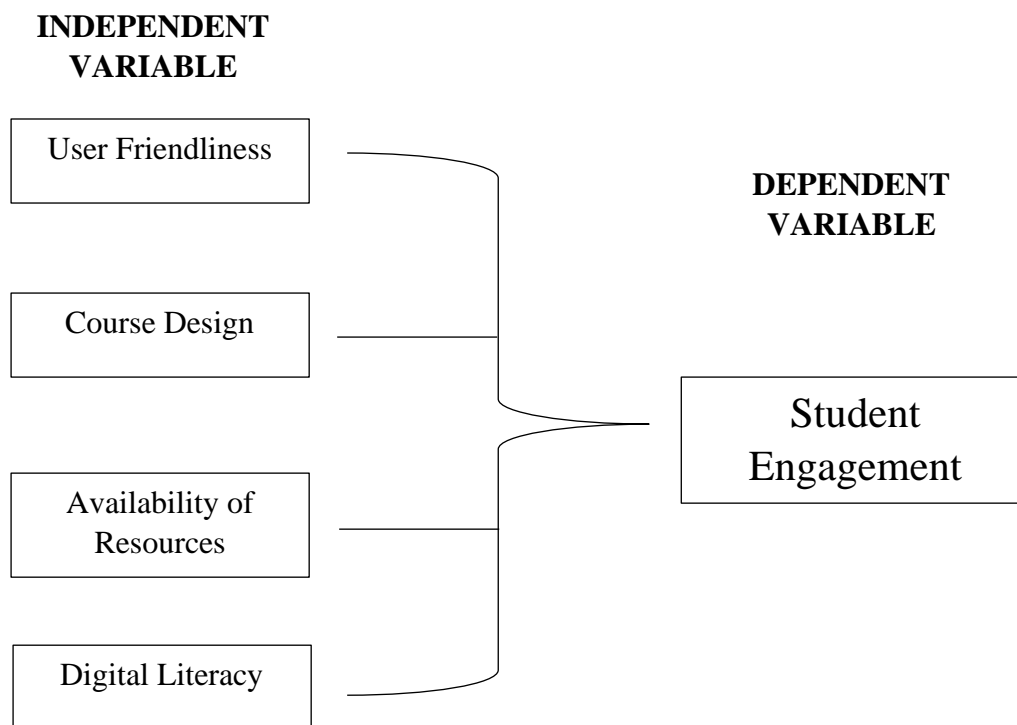
Figure 2

User friendliness is the first IV. This variable is determined based on ease of IT operations, convenience in user experience and proficiency in IT (Pham, Le & Do, 2021). Online learning platforms such as Microsoft teams, Zoom, Google meets are designed for knowledge sharing and learning. User-friendliness, accessibility to online learning platforms, and the transmission speed of online media and technology devices are important for a smooth and consistent learning process for the students (Phan, Le & Do., 2021). Installation and operation of online learning applications and software should be easy to use Ching-Ter et al., (2017); Kimathi & Zhang, (2019) cited in Elumalai et al., (2020). Institutions need to make sure technological platforms used in the online learning environment are user-friendly, so students are able to achieve their course learning outcomes (Goh et al., 2017) cited in Elumalai et al., (2020). According to Chen, Lambert & Guidry (2010), academic institutions need to readily provide personal assistance for university students who are facing technical difficulties while using online platforms. This

helps to develop readiness and confidence among students towards adopting the new online learning system (Al Kumaim et al., 2021).

Course design is the second IV. The IV refers to the quality of online course materials provided by the university to aid student learning. Well-structured and appealing online learning course content and design engage students to facilitate their learning process, Oh et al., (2019) cited in Elumalai et al., (2020). Engaging course content attracts participation and proactiveness of students (Pham, Le & Do, 2021). The content of the course includes structure and content of study materials such as slides, and tutorial worksheets. Course design includes the structure of course works provided, the percentage of each component, etc. Engaging course design that is appropriate for a student's understanding and competence level will promote their engagement. Besides, Al-Kumaim et al., (2021), discuss the importance of designing an attractive online curriculum to gain student attention and participation during the learning process. Administrators should be actively involved in the preparation and management of the online program in order to ensure students receive quality learning experience Strike, (2018) as cited in Elumalai, (2020).

Availability of resources is 3rd IV. In order to successfully adopt an online learning system, online learning resources such as laptops, mobiles and tablets should be available for students. Administration of university needs to make sure the transition from physical learning to online learning is smooth for students. Students who do not have access to technological learning devices are at a disadvantage compared to students who have access to these materials (Werang & Leba, 2022). Poor access to technological tools such as computers, smartphones and internet access affects student engagement in online learning (Werang & Leba, 2022). Adding on to that, internet access is an important feature in the online learning system. Werang & Leba (2022) discuss that internet connectivity impacts the participation of students in online learning classes. Issues such as poor internet connection and internet disruption has deterred university students from effectively engaging in their online learning platforms. In order to make sure students receive their learning resources, members from the university administration need to provide clear instructions on how the students can access their online learning resources, Chen, Lambert & Guidry, (2010). Khlaif, Salha & Kouraichi (2021) have stated about the issue of digital inequality, whereby some students do not have the

same access to digital learning resources as others. This creates a division in the online learning environment for students.

The fourth component of the IV is digital literacy. According to Al-Kumaim, Alhazmi, Mohammed, Gazem, Shabbir, and Fazea, institutions relied heavily on online learning platforms to teach university students during the peak of the COVID-19 pandemic (2021). According to Al Kumaim et al., digital literacy is the ability of a person to successfully communicate using technology abilities and transmit and receive information (2021). Werang and Leba (2022) concluded that the two main difficulties associated with technology experience are technological familiarity and technological competence. Warung and Leba (2022) divide "ease of use of technical tools" into two categories: technological skills and technological familiarity. Students cannot participate effectively in the online learning system unless they are familiar with and proficient with the platforms.

2.4 Hypothesis Development

The relationship between user friendliness of online learning platform and student engagement among Malaysian university students.

User friendliness is the first variable affecting student engagement. Online courses that are user-friendly are intuitive and highly engaging. Online students may obtain the information they require and then use their newly learned abilities in the actual world. The instructional design of the course should be user-friendly and specific about the learning goals of the students.

Henderson et al., (2015), cited in Ilin (2020) argues that the reason for failure in students' adaptation to online learning technology is that the online learning systems are not designed for the ease and comfort of the user rather the user is expected to adapt to the system. Sun & Wang (2014) cited in Lin (2022) have stated that by adopting a user-centered approach, technology can be personalised to the suitability of students and enhance their online learning experience. Llin (2022) confirmed in their finding that by making sure that the online learning platform is accessible through any device will promote student engagement through online learning platforms.

Author Deka (2021) has found in his research that the quality of the system has a positive relationship on student satisfaction towards online learning systems. Pham Le & Do (2021) agree that perceived user friendliness of online learning platforms has a positive effect on students' online learning outcomes. In Al-Kumaim et al., (2021)'s study they found a linkage between poor student mental health and student engagement, so they conclude that when students are unable to adapt to new online learning platforms, it has a negative impact on their mental health which contributes to poor student engagement. Technical support provided by university administrations to develop readiness among students to access online platforms will have a positive impact on student engagement Al-Kumaim et al., (2021). Khlaif, Salha & Kouraichi (2021) have also concluded in their study that technical support provided by institutions to ease the transition between physical and online learning has an impact on the student engagement towards online learning system.

However, Al-Maroof, Alnazzawi, Akour, Ayoubi, Alhumaid, AlAhbabi, Alnnaimi, Thabit, Alfaisal, Aburayya & Salloum (2021) conducted a study post-pandemic, in order to test whether students still prefer online learning when face-to-face classes are resumed. According to Maroof et al., (2021) when the technology system is classified as 'user-friendly', then the students' intention to use the system remains constant. If university students feel that the ease of online learning platforms usage has improved their engagement, satisfaction etc. towards their courses, they will continue to use them and incorporate online learning systems into their learning routine even after face-to-face classes have resumed. Maroof et al., (2021) found in their research that when the quality of online learning is improved and upgraded constantly for the 'user-friendliness' of students, this will have a positive impact on their perception towards the system. When the student's perception towards online learning systems is positive, their engagement towards the courses conducted in those online learning systems will be positive as well.

H1: User friendliness has a positive relationship with student engagement.
The relationship between course design and student engagement among Malaysian university students

Course design is the second variable affecting student engagement. According to Adeyinka & Mutula, (2010) cited in Mtebe & Raphael, (2018), course quality refers

to the degree to which the online learning content satisfies the needs of the students. In a study conducted by Deka, (2021) he concludes that course design and content have a positive relationship with student engagement. Study conducted by Khlaif, Salha & Kouraichi (2021) also confirm that quality on digital content prepared for the courses has a positive relationship with the engagement of students. Deka (2021) concluded in his research that course content and design have an effect on student engagement towards online learning systems.

According to Tualaulelei, Burke, Fanshawe, Cameron (2021) course design has a significant impact on generating and maintaining student interest, as well as on how well it supports learning. Educators have control over which online, intellectual, and material resources are used, Gedera, (2014) cited in Tualaulelei, et al., (2021), but how they are used is what adds to efficient student engagement. As Knight et al. (2014) cited in Tualaulelei et al., (2021) observe, 'Technology alone does not dictate practice; additionally, as with any instrument, its worth is defined not just by its design, but also by how it is used in context.' Educators must be familiar with technology, their students, discipline-specific information, and instructional design in order to build courses that enhance student engagement. The necessity of sponsored by the united growth in online educational practices is highlighted by the fact that university educators are normally experts in their subject material but may seem to have little experience as designers and administrators of courses online, Sun and Chen, (2016) cited in Tualaulelei et al., (2021), along with 'design thinking', Wrigley and Straker, (2017) cited in Tualaulelei et al., (2021) to re-envision online course design.

Furthermore, to support students' academic performance and ongoing learning, instructors should be clear about the course objectives for assignments, due dates, rules, assessment rubrics, and resources (Gray, J. A., & DiLoreto, M., 2016). Students pay attention and become much more engaged in the learning process and acquire more significant types of learning if they are able to do so. After the instructors have established significant learning objectives, they must select learning programs that will help students attain those objectives. Student satisfaction and learning are probably connected to students' assessments of the course's general usefulness. In other words, the more rational and well-organized the course design is, the more probable it is that students will be happy with the material they are studying. Course designers may be considered to give additional

training, assistance, and direction if teachers lack the technology expertise to create compelling courses (Gray, J. A., & DiLoreto, M., 2016).

The most common topic in the SSF was a greater sense of involvement and attention in the content, which was frequently coupled by a sense of relevance, Afshan Jafar (2016). This really is a recurring motif in the constructivist teaching field, Blinne (2013); Cordner et. al (2012); Hudd (2003); Mihans et al. (2008) cited in Afshan Jafar (2016). The course design is critical in keeping students interested and involved in the program, and that this class, because of the way it was planned and delivered, kept them engaged throughout the trimester (Afshan Jafar, 2016). All throughout the trimester, the course design kept the students engaged in a massive manner. Based on the survey done by Afshan Jafar (2016) encouraging students to create the course offered them a feeling of obligation for their learning and created an atmosphere for class participation and enthusiasm, as per the students.

As an online educator, you must create a learning atmosphere, enable social interaction, and project subject matter competence (Marsha Carr, 2014). Every one of those domains has the ability to promote students' attention, enthusiasm, and active learning participation. Online course design can be done in a variety of ways. The key is to recognise that, with the exception of content, online courses may not be designed in the same way as face-to-face courses. According to Dykman and Davis (2008) cited in Marsha Carr (2014), The whole first phase in learning online is to organise and plan thoroughly. Anderson, Rourke, Garrison, and Archer (2001) cited in Marsha Carr (2014) suggest a framework for describing the backdrop of instruction based on a system of analytical analysis and applied exploration that incorporates three aspects of teaching and learning: "cognitive presence, social presence, and teaching presence."

With proper planning, cognitive, social, and teaching presence can be incorporated into any course design. Material can be used to include cognitive engagement into the training (Marsha Carr, 2014). Engagement is typically determined via online course comment threads, but it can also be performed through correspondence, video, group discussions, and the usage of organizations in the course. Instructor exposure is achieved through a variety of means, including daily or weekly email announcements, content or assignment videos, content presentations, discussion groups, and private or current discussion board conversations. The success of online

interactions and student involvement continues to be dependent on the design of online courses (Marsha Carr, 2014).

H2: Online learning course design has a positive relationship with student engagement
The relationship between availability of resources and student engagement among Malaysian university students

Availability of resources is the third variable affecting student engagement. Khlaif et al., (2021) concluded in their study that lack of availability of technological devices has a negative student engagement in a remote learning environment. Lack of home equipment and resources and internet connection were issues to equitable and effective online learning (Bedenlier et al., 2020). Some students had to borrow resources and equipment from schools and other organisations, such as computers and internet access (Chiu, T. K., 2021).

The instructor provided tasks and activities that required access to broadband internet, however students stated that they were unable to complete their assignments and tasks because they lacked an internet connection or computer access (Bedenlier et al., 2020). Disengaged students said they lacked the cognitive ability to participate in online learning and felt inept (Bedenlier et al., 2020). The emergency online education has worsened the digital divide and made it more damaging than ever. It cannot be overstated how crucial it is to get students online during this challenging time. With the aid of quality technology and dependable internet connections, students can stay on top of their work and stay engaged with their professors and classmates, which fosters a notion of competence support (Chiu, T. K., et al.,2021).

Furthermore, learner-to-content engagement is the act of intellectually engaging with the subject, which can alter a learner's understanding and viewpoints. Student-to-content contact can occur when students watch instructional films, interact with multimedia, or look up information, according to Abrami, Bernard, Bures, Borokhovski, and Tamim (2011). Online students who want to engage critically with knowledge can choose between synchronous and asynchronous delivery methods (Banna et al., 2015).

To encourage student-to-content interaction, lecturers should make an effort to discover scholarly reading and interactive teaching resources, Abrami et al., 2011; Banna et al., 2011 (2015). Real-world implementation of projects that improve topic knowledge and critical thinking abilities is one strategy for encouraging learner-to-content engagement.

If lecturers want to increase student participation in their classes, they should be picky about the materials and content they use. Instead of simply providing a list of resources to online students, instructors should create realistic tasks that allow students to assess projects from various perspectives and motivate them to use relevant materials intelligently while doing so. Students reported that a variety of activities, such as course management system features, good communication, and course facilitation tactics, helped them feel involved, according to Dixson (2010).

H3: Availability of resources has a positive relationship with student engagement

The relationship between digital literacy and student engagement among Malaysian university students

Digital literacy is the fourth variable affecting student engagement. Students have a specific level of knowledge, mindsets, and skills that allow them to utilise the internet and related technologies, they are considered to be digitally savvy, Byungura et al., (2018) cited in Werang & Leba, (2022). Many authors agree that there is a positive relationship between digital literacy and student engagement.

According to Sadaf et al. (2017) stated that increased student involvement was another often-reported reason for integrating digital literacy into classes. It is possible to boost student engagement with topic learning by incorporating digital literacy into classrooms. Lecturers feel that using digital technologies to engage students in a variety of learning situations is a terrific approach to get them more interested Sadaf, (2017). Digital literacy allows for more connections between the actual world and the subject matter, as well as more opportunities for student interaction. The benefit of incorporating digital literacy into the lesson is that it may enliven students' interest in otherwise dull or boring subjects. According to Sadaf et al. (2017) stated that digital literacy is a method of involving students by establishing a link between their life, what they do, and the classroom environment.

Moreover, according to Howard et al. (2016) stated that the appropriate use of digital technology by students promotes student engagement and fosters a good attitude toward universities. Student engagement is an important factor in improving the student experience, increasing learning, and linking to effective learning results as a significant predictor of academic success. Student engagement was defined as "commitment, participation, or effortful involvement in learning" in the study (Henrie et al., 2015).

In short, student engagement examines a variety of aspects of course participation, including student engagement via skill practice in the class, emotional connection with the topic of levels of effectiveness in the class, and interactions with teachers and other students (Kim et al., 2018).

H4: Digital literacy has a positive relationship with student engagement

2.5 Chapter Summary

In conclusion, Chapter 2 has described how to review the literature and develop hypotheses. Numerous older publications and articles that addressed user friendliness, course design, resource accessibility, and digital literacy were discovered in literature reviews. The suggested conceptual framework is related to both the dependent variable and the independent variables. Additionally, the following chapter will cover data collection and analysis techniques.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

A survey design required to be used to gather data in order to meet the study objective. The research methodology is the main topic of this chapter. The tools and

procedures used to conduct this research are known as the research methodology. The approach utilized to analyze the data gathered during the research is covered in this chapter. In this chapter, the appropriate research procedures are therefore implemented. To address the primary research topics, this chapter is separated into several subsections, including data collection techniques, sample design, research design, research instrument, constructs measurement, data processing and data analysis.

3.1 Research Design

A research study's precise plan is known as its research design, Collis and Hussey, (2003). A research design is the specific goal established by the research question, as well as an affirmation and justification of the overall research methodology adopted for the given project. Quantitative research collects numerical data through questionnaires and presents it in quantitative formats like graphs or statistics, California, (2018). The study question and literature review were brought together by the use of the quantitative approach, which was intended to valuate the hypotheses and quantify data from the questionnaire. Since qualitative research is intended to identify trends in thoughts and attitudes as well as provide insight into issues, this study did not use the qualitative methodology. Exploratory research is study on an issue that hasn't yet been distinctly characterised.

A description of circumstance, a behaviour, or a phenomena is what is meant by descriptive study, To determine the size and type of causation relationship, causal research is done. This study employed descriptive research, which offers the chance to use quantitative data to look for the information and features of the demographic and research topic. To characteristics the state or characteristics of a phenomenon or event, descriptive quantitative design employs tests, surveys, interviews, and observations, Eggen, Kauchak, (2010). Furthermore, a survey is a kind of descriptive study according to, Gravetter, Forzano (2018). We used survey questionnaire to include the description of a particular group of people. The focal point of this research is to determine the effect of online learning on student engagement among Malaysian university student; thus, the research approach is a questionnaire.

3.2 Data Collection Method

Data collection is a technique of analysing and identifying from multiple sources in order to create a complete and reliable picture of the topic of study. Data collection is the practice of assembling, evaluating, and assessing appropriate observations for study purpose using founded an effective tool. Individuals and organisations can use data collection to address specific questions, analyse results, and estimate future likelihoods and developments (Rouse, 2019). Primary and secondary data can be sued to collect the data.

3.3.1 Primary Data

Besides the concept of primary data collection is the accumulation of the raw information gathered at the origin. Tests were done, questionnaires, and assessments, for example. This is a technique for collecting initial results collected by a researcher for a particular study purpose. It could be investigated further in two ways: qualitative analysis and quantitative data collection methods. The goal of primary data research is to gain a better understanding of the study issue and to make an informed evaluation of it by assembling first-hand relevant data.

The questionnaire survey method was used in this study. Questionnaires are a type of data collection tool that consists of a series of questionnaires and compels to elicit an answer from those who have received it. A questionnaire, also knows as an identity survey, is distributes to specific populations to collect data and information. The questionnaire was used in this study as it is cost-effective, time-saving, and easy to interpret.

The main objective of this study is to determine the effect of online learning on student engagement which is a study conducted with university students in Malaysia. Therefore, the questionnaire will be distributed among public and private university students in Malaysia through online platforms such as WhatsApp, Instagram, Facebook, and Microsoft teams. The questionnaire will be distributed via social media because it would be easy to share and engage with students. We used google form to develop our survey questionnaire and distribute them via WhatsApp, Instagram, and Facebook to the selected University students. Another

platform to share survey form is Microsoft Teams as all UTAR undergraduates have access to the application (Seow, S. J. 2021).

The questionnaire for this study was produced by adapting and then amending questionnaires from numerous related research publications. Utilizing well – developed questions from another researcher's questionnaire as opposed to creating one's own could result in a questionnaire that is more reliable when used to interview potential participants. It is well understood that the greater the measure's validity, the more accurately it can reflect a notion (Ong, B. A., Chang, S. W., Liew, Y. F., Tee, K. T., & Lo, W. E. L., 2011).

3.3.2 Secondary Data

Secondary data collection, on the other hand, is referred to as the compilation of second- hand data obtained by a person who is not the original user. The data collection process is already in operation, whether it is already published in books, journals, and online portals. In terms of convenience, it is much cheaper and simpler to purchase. All the secondary data will be used to build chapter 2 of this study as supporting evidence to show various facts, particularly in the literature review.

Comprehensive secondary research was done on this topic, which included the use of books, online publications, and academic papers authored by other researhers. This study also drew on information from the library's Final Year Projects and UTAR Institutional Repository, which were accomplished by prior UTAR undergraduates (Ong, B. A., Chang, S. W., Liew, Y. F., Tee, K. T., & Lo, W. E. L., 2011).

3.3 Sampling Design

3.3.1 Target Population

The term "target population" refers to all respondents who satisfy a specific requirement, such as for a research study (Alvi, 2016). To guarantee that the data is reliable and relevant to this study, the researchers have to confirm that respondents are from the correct target group. The major goal of this study, which was done with university students in Malaysia, was to investigate the consequence of online learning on student engagement. Based on their global ranking, the relevant target demographic will be the top three private and public universities in Malaysia that are most representative of the overall population. The rating is based on the Times Higher Education World University Rankings (2021). This ranking is used to assess the performance of the institution in four areas: teaching, research, knowledge transfer, and a more represented worldwide perspective. The top 3 public universities in Malaysia are Universiti Malaya(UM), Universiti Sains Malaysia(USM), and Universiti Teknologi Malaysia(UTM). Besides, the top 3 private universities are Universiti Teknologi Petronas(UTP), Universiti Tunku Abdul Rahman(UTAR), and Universiti Tenaga Nasional(UNITEN).

3.3.2 Sampling Frame and Sampling Location

The list of all the persons in the suitable demographic is referred to as a sampling frame. The sample frame, according to Hamed Taherdoost (2016), must be representative of the population. Therefore, university students from the top three private and public universities form the study's sample frame. Furthermore, this investigation is being done at the sample location. The study's target respondents are university students from the top three private and public universities in the country. Thus, the sampling location that was selected is the top 3 private and public universities which are located at Penang, Perak, Johor, and Selangor state in Malaysia.

3.3.3 Sampling Elements

Malaysian university students who pursue a foundation, diploma, bachelor's degree, master's degree, or PHD are the latest survey target respondents. This study's respondents should be of various genders, races, ages, religions, academic years, and faculty.

3.3.4 Sampling Technique

Basically, we considered two options in sampling methods. One is referred to as probability, while the other is referred to as non-probability sampling, both of which are used to research an entire population. For probability, there are four types of sampling: basic random, cluster, stratified, and systematic. There four categories in non-probability sampling which is a subjective procedure. Convenience, quota, judgement, and snowball sampling are all options. There is a greater emphasis on individual decisions to adopt the sample component. Cluster sampling is chosen in this research to identify the target respondents due to the large population of target respondents existing for this study. When the population is clustered properly, cluster sampling employs randomization. Thus, the sample accurately represents the features of the wider population that result in higher external validity.

3.3.5 Sampling Size

It is important to use the sample size to determine the total focal point population. Based on the statistics of public university population from the Ministry of Higher Education Malaysia(2021) it is stated that there are a total of 36,472 students enrolled at UM, 33,841 students enrolled at USM, and 32,279 students enrolled at UTM. Besides, according to each private university website, the population of students are 6,456 students at UTP, 21,000 students at UTAR, and 8,000 students at UNITEN. Researchers have made a decision to collect 192 sets of data from the

private universities in Malaysia. Besides, researchers will collect 192 sets of data from public universities in Malaysia. According to the krejcie and morgan table (2017), a total of 384 respondents need to be collected for this number of overall population data. 30 sets of pilot study questionnaires will be distributed in one day. Pilot tests assume that the survey questions are reliable and that we can easily make any changes or corrections before distributing them to our actual respondents. As a results, 384 surveys will be distributed to Malaysian students from the selected universities.

3.4 Research instrument

3.4.1 Questionnaire survey

The research instrument that was used was the questionnaire approach. A questionnaire was used since it allows for the fast collection of a large number of data. In addition, compared to other measuring tools, a questionnaire is a cost-effective tool since it offers a rather quick, easy, and efficient approach to get a large number of data from a big sample of respondents (Mcelod, 2014).

500 survey questionnaires were distributed and returned in about 6 weeks. The surveys returned consists of 195 sets of questionnaires from public universities and 194 sets of questionnaires from private universities. However, some surveys were not able to be accomplished, and others had unsupportable responses, such as outlier responses, that were removed from the general responses.

It is also important that the questionnaire layout is designed in a simple manner that is easy to understand. The language used, the arrangement of questions and the length of overall questionnaire has a correlation with the response rate. Hence when the layout is made simple and easy to read, respondents can easily comprehend and fill-up the questionnaire without taking too much time.

There are 3 parts in the questionnaire such as Section A, B, and C. The demographic profile questions which were designed using nominal and ordinal scale were asked in Section A. Section B and C consist of Likert scale questions. To ask respondents to rate their agreement with a series of statements about a subject, the Likert scale

measures attitudes by drawing on both the cognitive and affective aspects of attitudes. Likert scale questions have the advantage of allowing respondents to express varying degrees of opinion or perhaps none (neutral, for example), as opposed to simply a basic yes or no response (McLeod, 2008). We used 1 – 5 scale to measure the respondents' intentions where by 1 stands for strongly disagree, 2 stands for disagree, 3 stands for neutral, 4 stands for agree and lastly 5 stands for strongly agree.

3.4.2 Questionnaire Design

Section	Components/Variables
Section A	Demographic profile
Section B	Student Engagement
Section C	Online Learning Factors

Table 3.1: Questionnaire

Source: Questionnaire

The stated variables were used to identify the effect of online learning on student engagement from Malaysia's university students.

3.4.3 Pilot Study

In order to verify that all instructions and questions were clear and easy to understand, a pilot study or pre-test was carried out before a full survey was carried out. In addition, the purpose of the pilot research is to evaluate the questionnaires' consistency, validity, and reliability (Schade, 2015).

For the pilot test, 30 sets of questionnaires are prepared. The distribution of all 30 sets of questionnaires and the subsequent collection of the completed surveys took

up to one week. The targeted respondents were Malaysia's university students. The universities chosen are UTAR, UTP, UNITEN, USM, UM, and UTM.

Variables	Dimensions	Number of items	Coefficient Alpha
Dependent Variable (DV)	Student Engagement	9	0.876
Independent Variable (IV)	User Friendliness	6	0.841
	Course Design	6	0.835
	Availability of Resources	6	0.775
	Digital Literacy	6	0.744

Table 3.2: Reliability Analysis for Pilot Study

According to Table 3.2, user friendliness, course design, availability of resources and digital literacy with a coefficient alpha value 0.841, 0.835, 0.775, and 0.744 respectively. It showed all variables had fair and good reliability. Thus, this questionnaire is suitable to conduct a full study, since it is reliable in the reliability test of the questionnaire in this pilot study.

3.5 Construct of Measurement

3.5.1 Origins of Construct

Constructs	Adopted from
Section A: Demographic Profile	Nabil Hasan Al-Kumaim, Abdulsalam K. Alhazmi ,Fathey Mohammed , Nadhmi A. Gazem 4, Muhammad Salman Shabbir and Yousef Fazea (2021).
Section B: Student Engagement	Ladino Nocua, Andrea Catalina, Cruz Gonzalez, Joan Paola, Castiblanco Jimenez, Ivonne Angelica, Gomez Acevedo, Juan Sebastian, Marcolin, Federica, Vezzetti, Enrico(2021).

	Aisyah Nazamud-din, Muhammad Harriz Zaini & Nor Hilaliyah Mohd Jamil(2020). Hoi, Vo Ngoc; Le Hang, Ho(2021).
Section C:	
User-friendliness	Chun-Hsiung Huang(2021) Mohammed Arshad Khan,Vivek, Mohammed Kamalun Nabi, Maysoon Khojah and Muhammad Tahir (2021).
Course Design	Dazhi Yang(2017). Norah Almusharraf and Shabir Khahro(2016)
Availability of resources	John Mark R. Asio, Ediric D. Gadia, Erlinda C. Abarintos, Darwin P. Paguio, Melner Balce(2021). Jiahua Zhou and Qiping Zhang(2021). Khalid M. Alabdulwahhab, Syed Yousaf Kazmi, Waqas Sami , Khaled Nasser Almujel, Mohammed Hamed Alanazi, Khalid Falah Alanazi, Abdullah Meshal Moyana, Mohammad Shakil Ahmad, Tariq A. Alasbali, Fahd Al Alwadani(2021).
Digital Literacy	John Hannon and Brian D'Netto(2007). Jeong-Bae Son, Sang-Soon Park and Moonyoung Park(2017).

Table 3.3: Origins of Constructs

3.5.2 Scale Measurement
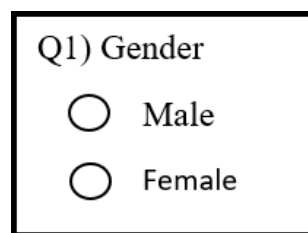
The scale of measurement used is crucial because it influences the accuracy of data processing. Nominal scale, ordinal scale, and interval scale are used instead of the ratio scaled, which is not used in our study. In the sections on student engagement, user-friendliness, course design, resource availability, and digital literacy, interval scales are used to collect data from respondents, whereas ordinal and nominal scales are used in the demographic profile to collect data from respondents.

3.5.2.1 Nominal Scale

Measures of variability are those that have a nominal scale. A nominal scale, according to Zikmund et al., (2010), assigns a value to an object for the purpose of categorisation or characterisation. Because no amounts are symbolised, the valuation can be an alphabet but does not have to be a number. In Section A of this study, two questions(Gender and Type of University) were employed to construct a nominal scale.

The example is shown below:

Figure 3.1: Example of Nominal Scale
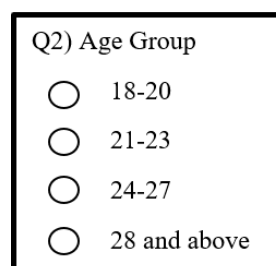
Source: Developed for the research

3.5.2.2 Ordinal Scale

According to Sekaran and Bougie (2010), an ordinal scale rank order the categories in a meaningful way in addition to categorizing variables in a way that indicates disparities between the various categories. Even though it is a ranking scale that does not account for the value of the difference between the ranks, an ordinal scale enables items to be categorised according to some theme they contain. In this research, 2 questions (Age and Level of study) have been used for ordinal scale in Section A.

The example is shown below:

Figure 3.2: Example of Ordinal Scale

Source: Developed for the research

3.5.2.3 Interval Scale

According to Zikmund et al., (2010), interval scales also have nominal and ordinal features can record data about different variants in construct amounts. On an interval scale, there is no such thing as a true zero. It enables us to perform definite algebraic calculations on the data collected from respondents. Interval scales compute the distance between any two points on the scale. The interval scale was used to prepare questions in Section B and C of the survey. The 5-Interval scales let the respondents to demonstrate how strongly they agree or disagree with the question. In this study, 33 questions on a Likert scale are utilised.

The example is shown below:

Figure 3.3: Example of Interval Scale

The agreement levels are:

(1) Strongly disagree

(2) Disagree

(3) Neutral

(4) Agree

(5) Strongly Agree

1) I take advantage of the key information given by my lecturer/tutor during online learning classes. (Ex: video suggestions to enhance understanding of content).

	1	2	3	4	5	
SD	○	○	○	○	○	SA

Source: Developed for the research

3.6 Data Processing

3.6.1 Data Checking

After receiving the completed questionnaires back from the respondents, the first step that must be taken is data verification. This step is necessary to make sure that the respondents have completed the questionnaires completely. Additionally, verifying the questionnaire is done to identify undesirable responses, which may include incomplete questionnaires or questionnaires that lead to unreliable results (Pink, 2010).

3.6.2 Data Editing

Following that, the data is modified. The purpose of editing is to assess and modify the collected survey questions by attempting to correct respondents' unauthorised, contradictory, incoherent, and overlooked responses (Pink, 2010). In order to improve the accuracy of the information, we will select data based on the respondents' trends of replies to other questionnaire when partial survey results occur. As a result, in order to obtain accurate data, we must customise it.

3.6.3 Data Coding

The third step is to code the data. The goal of coding is to make it easier to manage large amounts of information. It is the process of allocating alpha and numeric codes to survey questions responses so that they can be listed in the record. Gender, for instance, will be code as 1=Male and 2=Female. We can simply search the data and enhance it accurateness.

3.6.4 Data Transcribing

The last step of the data processing involves uploading the data and entering it into a database using SPSS software after the coding phase is complete. Transcribing is done so that information may be utilized for additional analysis and made available to users or programmes (Pink, 2010).

3.7 Propose Data Analysis

Data analysis allows us to understand the data that we have gathered through the questionnaire. Data analysis will be conducted through the software SPSS. We will be conducting a thematic analysis to analyse the qualitative data. The descriptive data that is derived from the study will be assorted based on the means, standard deviations, and range derived for each variable that is being studied (Gray & DiLoreto, 2016).

3.7.1 Descriptive analysis

Descriptive statistics can be utilized to define the relationship between variables in a sample and summarize the data obtained in an organized manner (Kaur, Stolzfus & Yellapu, 2018). Descriptive analysis process of transformation of raw data into an organized form that will simplify the understanding and interpretation of the readers (Zikmund, n.d.). Data will be re-arranged, ordered, and manipulated to generate descriptive information (Zikmund, n.d.).

3.7.2 Scale measurement

3.7.2.1 Reliability test

The reliability test will assist us in determining how well a test evaluates without mistakes (Frazen, 2011). Test validity is a measure of how accurate construct are. The measure's reliability indicates how well the variable's measurement is

performed without bias or error. As a result, this experiment indicates that a coherent evaluation is made over time and among the different components of the instrument.

The Cronbach's alpha test is a popular reliability test. Cronbach's alpha has become one of the most commonly use statistics in research involving the development of tests and their application (Cortina, 1993 as cited in Taber, 2017). As a result, this test will be more appropriate for this study to ascertain the continuity and reliability of each variable. The range provide by the Cronbach's alpha test is shown in Table 3.4:

No.	Coefficient of Cronbach's alpha	Reliability level
1	More than 0.90	Excellent
2	0.80-0.89	Good
3	0.70-0.79	Acceptable
4	0.6-0.69	Questionable
5	0.5-0.59	Poor
6	Less than 0.59	Unacceptable

Table 3.4: The range of Cronbach's alpha

Source: Adopted from (Arof, Ismail & Saleh, 2018)

3.7.3 Inferential Analysis

3.7.3.1 Pearson Correlation Coefficient

The Pearson correlation coefficient(r) is used to determine the correlation between two quantitative variables (Allen, 2017). It helps us identify the degree to which the two variables coincide with each other (Allen, 2017). This is a form of inferential statistic that is often used when finding the correlation between two metric scales. This will help us determine the strength of our independent variables in conjunction with our dependent variable. In a study conducted by Kuzminykh, Ghita and Xiao (2021), they used Pearson correlation to evaluate the correlation between student engagement and academic performance in an online learning system. They justify using Pearson correlation because the correlation coefficient(r) helped them determine the strength and the direction of the correlation between their dependent and independent variables. So in this case, the most appropriate correlation technique to be used in our study will be the Pearson correlation coefficient. The values of correlation for each scale range is given in table 3.5:

Scale of correlation coefficient	Value/ strength
$0 < r <= 0.19$	Very low correlation
$0.2 <= r <= 0.39$	Low correlation
$0.4 <= r <= 0.59$	Moderate correlation
$0.6 <= r <= 0.79$	High correlation
$0.8 <= r <= 1.0$	Very high correlation

Table 3.5: Scale of Correlation Coefficient

Source: Adopted from (Zamani et al., 2020).

3.7.3.2 Multiple Regression Analysis

When examining the relationship between two or more independent variables and a binary dependent variable, multiple regression analysis is a versatile statistical technique, Salkind, (2010). When determining the link between variable, this type of inferential statistic is frequently used. In order to explore the quantitative impact that causative variable have upon the influencing variable, researchers must collect data from the underlying variables and use regression techniques. By evaluating the statistical significance of the link between the causative and influence variables, regression analysis also aids in the conduct of a more thorough investigation. In Chen, Lambert & Guidry (2010)'s study on how educational technology affects college student engagement, researchers used a multiple regression approach to look at the relationship between the numerous independent factors and one dependant factor(student engagement). Similarly, in our research a multiple regression analysis will help us determine the correlation between our 4 independent variables and a single interval-scaled dependent variable.

When number of theories can account for the connection between the dependent and independent variables, this approach is appropriate, Rubinfeld, (2000). In this study, self-determination theory and self – efficacy theory are used to determine the connection between variables that affect online learning and student engagement.

Multiple regression analysis helps to determining the relationship between variables, the size of the effect, and likelihood that an intermediate occurrence, Rubinfeld, (2000). This can be used in our study to ascertain regardless of whether online learning affects student engagement, how much it affects student engagement, and how student engagement might have been influenced in the absence of online learning.

Regression analysis is used by authors to investigate and explain the relationship between several aspects, Huang, (2021). Regression analysis is used in, Huang (2021)'s study on performance expectancy to online learning sites to examine the relationship between eight independent factors and one dependent variables.

3.8 Conclusion

An in-depth description of our research approach is provided in this chapter. Included in this are the sample strategy, data collection techniques, and data analysis. The information will be gathered from a wide group of target respondent using the questionnaire. We will use the Cronbach's Alpha test to get reliable measurement. Pearson Correlation Analysis and Multiple regression Analysis will be used to determine the connection between our dependent and independent variable(s).

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

An average of 389 sets of surveys were distributed to Malaysia's top three universities, both public and private, and 30 sets of questionnaires were used to conduct the testing. In this chapter, we will go over the entire study of the questionnaire's reliability test in detail, using SPSS software to analyse and interpret the data. There are two types of analyses performed: descriptive analysis and inferential analysis. Data from the respondent demographic profile, scale measurement and central tendency were all analysed using descriptive analysis. Pearson correlation and multiple regression analysis were performed as part of the inferential analysis. Finally, the chapter could very well conclude with a summary of Chapter 4.

4.1 Descriptive analysis

In this part, the five questions in the respondent's demographic profile will be analyzed. Those questions include university, gender, age, level of study, and type of university.

4.1.1 Respondents Demographic Profile

4.1.1.1 University

University	Frequency	Percentage	Cumulative Frequency	Cumulative Percent
UM	65	16.71	65	16.71
USM	65	16.71	130	33.42
UTM	65	16.71	195	50.13
UTAR	64	16.45	259	66.58
UTP	65	16.71	324	83.29
UNITEN	65	16.71	389	100

Table 4.1: Respondent's University

<u>Source</u>: Developed for the research
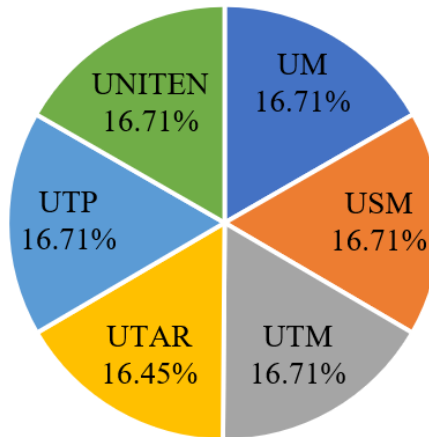
University

Source: Developed for the research

Table 4.1 and Figure 4.1 show the frequency and percentage of the universities from which the respondents originated from. From the results shown, 5 universities(UM, USM, UTM, UTP, and UNITEN) are having the same number of respondents which is 65. Each of the 5 universities contributes 16.71% to the total surveys received. Meanwhile, 64 respondents were obtained from 1 university(UTAR). So UTAR contributed 16.45% to the total surveys received.

4.1.1.2 Gender

Gender	Frequency	Percentage	Cumulative Frequency	Cumulative Percent
Male	210	53.98	210	53.98
Female	179	46.02	389	100

Table 4.2: Respondent's Gender

Source: Developed for the research

Figure 4.2: Respondent's Gender

Gender
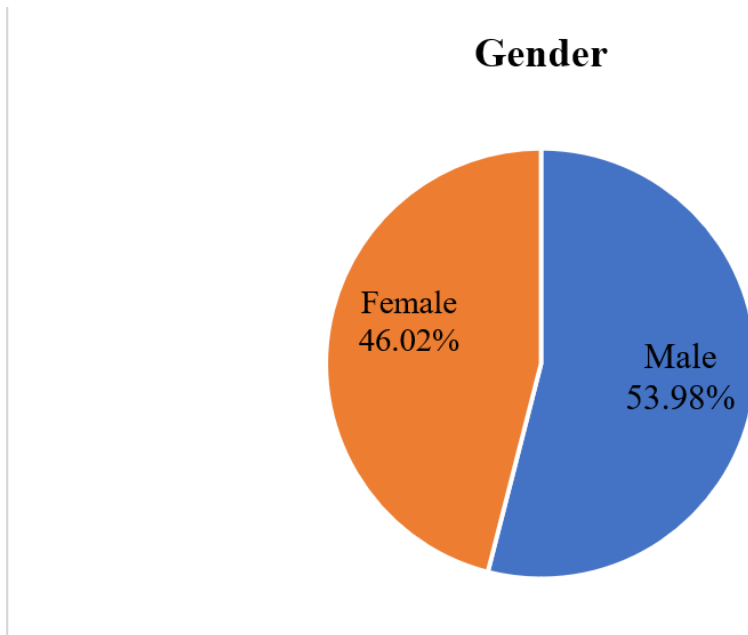
Source: Developed for the research

The pie chart depicts the number of male and female respondents to this questionnaire. There are 179 female respondents with a percentage of 46.02% and 210 male respondents with a percentage of 53.98%. male respondents outnumber female respondents by 7.96% in this study.

4.1.1.3 Age

Age	Frequency	Percentage	Cumulative Frequency	Cumulative Percent
18-20	89	22.88	89	22.88
21-23	223	57.33	312	80.21
24-27	56	14.40	368	94.61
28 and above	21	5.40	389	100

Table 4.3: Respondent's Age

Source: Developed for the research

Figure 4.3: Respondent's Age
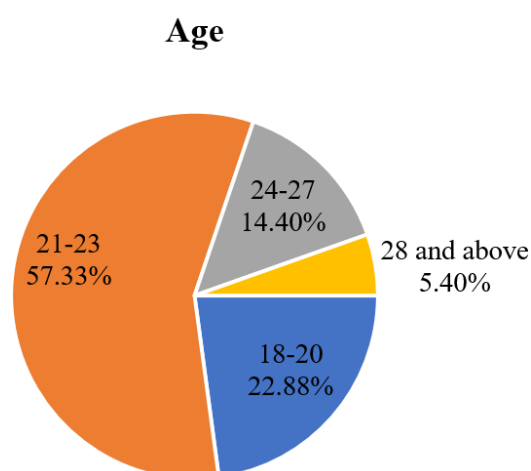
Source: Developed for the research

This pie chart shows the age of the respondents who completed this questionnaire. According to the pie chart, 89 respondents (22.88%) between the ages 18 and 20 participated in this questionnaire; 223 respondents (57.33%) between the ages of 21 and 23; 56 respondents (14.40%) between the ages of 24 and 27; and 21 respondents (5.40%) between the ages of 28 and above. On the whole, respondents ages 21 to 23 made up the majority of those who completed this questionnaire.

4.1.1.4 Level of Study

Level of Study	Frequency	Percentage	Cumulative Frequency	Cumulative Percent
Diploma	22	5.66	22	5.66
Bachelor Degree	330	84.83	352	90.49
Master	30	7.71	382	98.2
PHD/ Doctorate	7	1.8	389	100

Table 4.4: Respondent's Level of Study

Source: Developed for the research

Figure 4.4: Respondent's Level of Study

This pie chart shows the ranges of level of study among the respondents. There is 84.83% (330 respondents) who are pursuing bachelor of degree which is the highest among 4 categories. Students who are pursuing a diploma 5.66% (22 respondents) responded to the questionnaire. Next followed by students pursuing master's degree with 7.71% (30 respondents). It can be seen that there is the least respondent that is pursuing PHD/Doctorate with 1.80% (7 respondents) throughout the survey.

4.1.1.5 Type of University

Type of University	Frequency	Percentage	Cumulative Frequency	Cumulative Percent
Public/Government	195	50.13	195	50.13
Private	194	49.87	389	100

Table 4.5: Respondent's Type of University

Figure 4.5: Respondent's Type of University
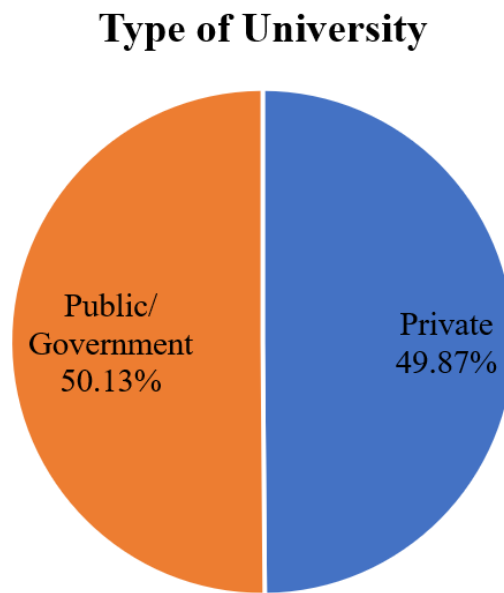
Type of University

Source: Developed for the research

Based on the result that shown in Table 4.5 and Figure 4.5, there are a total of 389 respondents who have taken part in this study. The respondent percentage from both types of university is almost similar, which shows that public or government universities have 50.13% (195 respondents) and private universities have 49.87% (194 respondents).

4.1.2 Central Tendencies Measurement of Constructs

This section will demonstrate how to calculate the mean and standard deviation values of the four independent variables and dependant variable. The SPSS software was used to determine the mean and standard deviation score for the 33 questions presented in Section B and Section C of the questionnaire, which are 1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree.

Central Tendencies Measurement: Student Engagement

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	SD Ranking
Behavioral Dimension I take advantage of the key information given by my lecturer/ tutor during online learning classes. (Ex: video suggestions to enhance understanding of content.)	4.20	1	0.039	0.770	9
Behavioral Dimension I regularly participate in online learning class discussions in most of my classes.	3.89	6	0.044	0.874	5
Behavioral Dimension I ask my tutor/lecturers questions during my online learning class if I do not understand content.	3.79	7	0.051	1.001	2
Emotional Dimension I am excited to take part in the online learning activities conducted in the class.	3.75	9	0.049	0.974	3
Emotional Dimension I feel inspired to improve my online learning skills.	3.94	5	0.043	0.857	6

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	S.D Ranking

Emotional Dimension

| I feel comfortable raking part in online learning discussions. | 3.97 | 4 | 0.46 | 0.908 | 4 |

Cognitive Dimension

| I evaluate the options and ideas shared by my lecturer/tutor and my course mates during my online learning lessons. | 4.03 | 2 | 0.041 | 0.809 | 7 |

Cognitive Dimension

| I tend to apply the knowledge I've learnt during my online learning lessons to real world problems. | 4.02 | 3 | 0.041 | 0.809 | 8 |

Cognitive Dimension

| I go through the learning materials (Ex: lecture slides) before I take part in online learning classes. | 3.77 | 8 | 0.055 | 1.089 | 1 |

| **Student Engagement Average Value** | **3.93** | - | - | **0.64** | - |

Central Tendencies Measurement: User Friendliness

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	S.D Ranking

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	S.D Ranking
I believe online learning platforms are user-friendly.	4.16	3	0.044	0.870	1
It only took me a short time to fully understand how to use the online learning platform.	4.06	5	0.042	0.837	4
It is easy for me to find necessary information when using online learning platforms.	4.25	1	0.040	0.787	5
I learned to use the online learning platform very quickly.	4.22	2	0.040	0.782	6
I think that the learning methods used in online learning platforms are not difficult for me.	4.12	4	0.043	0.847	2
The online learning system set up by my university is compatible with the way I learn.	4.05	6	0.043	0.844	3
User Friendliness Average Value	**4.14**	**-**	**-**	**0.62**	**-**

Central Tendencies Measurement: Course Design

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	S.D Ranking

The online learning materials (Ex: lecture slides, tutorial questions) provided for my course is aligned with the course objectives.	4.15	2	0.040	0.798	5
The online coursework activities (assignment, video presentation, online debate etc.) reflect the course objectives.	4.20	1	0.039	0.763	6
The online course content and learning outcomes is clear and well-structured.	4.10	3	0.041	0.799	4
The online coursework is designed well so I can interact and communicate with my course mates.	4.06	5	0.042	0.832	2
I am satisfied with the way my lecturer/tutor delivers the course content (Ex: lecture slides, pre-recorded videos etc.)	4.02	6	0.042	0.831	3
I am satisfied with the alternative assessment plans provided for my course (Ex: Replacing Final examination with Open-book Final assessment).	4.10	4	0.044	0.874	1
Course Design Average Value	**4.11**	-	-	**0.61**	-

Central Tendencies Measurement: Availability of Resources

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	S.D Ranking
I have access to at least one basic learning device (laptop, smartphone, PC etc.)	4.39	1	0.036	0.715	6
I have access to internet at my place of study (Mobile data, Wifi etc.)	4.38	2	0.037	0.731	4
Relevant learning resources (e-Textbook, database, software) are accessible to me.	4.19	5	0.041	0.813	3
I am aware of the online learning resources provided by my university (Ex: Laptop rental).	3.99	6	0.050	0.995	1
My university provides subscription for online learning software accounts (Microsoft Teams, Zoom etc.)	4.25	3	0.043	0.840	2
I am satisfied with the level of resources that I currently have to conduct my online learning.	4.23	4	0.037	0.721	5
Availability of Resources Average Value	**4.24**	-	-	**0.56**	-

Central Tendencies Measurement: Digital Literacy

Questionnaires	Mean	Mean Ranking	S.E Mean	Standard Deviation	S.D Ranking
I feel comfortable using digital devices in my online learning.	4.24	2	0.038	0.749	5
I am willing to learn more about digital technology to help in my online learning.	4.30	1	0.036	0.707	6
I feel like I am on the same pace as my course mates in using digital technology.	4.11	5	0.043	0.845	3
I think my learning can be enhanced by using digital tools and resources.	4.17	3	0.040	0.785	4
I need help while using online software (Microsoft Teams, Zoom etc.).	3.57	6	0.064	1.257	1
Technical help from my university is available and helpful.	4.11	4	0.043	0.846	2
Digital Literacy Average Value	**4.09**	-	-	**0.59**	-

4.2 Scale Measurement

4.2.1 Internal Reliability Test for Pilot Test

No.	Coefficient of Cronbach's alpha	Reliability level
1	More than 0.90	Excellent
2	0.80-0.89	Good
3	0.70-0.79	Acceptable
4	0.6-0.69	Questionable
5	0.5-0.59	Poor
6	Less than 0.59	Unacceptable

No	Variables	Coefficient Alpha	No. of Items
1	**Dependent Variable** Student Engagement	0.876	9
2	**Independent Variable** User Friendliness	0.841	6

3	**Independent Variable** Course Design	0.835	6
4	**Independent Variable** Availability of Resources	0.775	6
5	**Independent Variable** Digital Literacy	0.744	6

4.3 Inferential Analysis

4.3.1 Pearson's Correlation Analysis

Pearson's correlation analysis is used to determine the strength and direction between the dependant and independent variables, as well as the orientation and extent to which the variable is related to others. In this study, Pearson's Correlation Analysis is used to investigate four independent variables: User-friendliness, Course design, Resource availability and Digital literacy.

-	-	User Friendliness	Student Engagement
User Friendliness	**Pearson Correlations**	1	0.596**
	Sig. (2 - tailed)	-	.000

- -		-	-
Student Engagement -	**Pearson Correlations**	**0.596****	**1**
- -	**Sig. (2 - tailed)**	**.000**	-

Table 4.6: Correlations between User Friendliness and Student Engagement

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

Source: Data generated by SPSS version 21.0

- -	-	**Course Design**	**Student Engagement**
Course Design -	**Pearson Correlations**	**1**	**0.657****
- -	**Sig. (2 - tailed)**	-	**.000**
- -	-	-	-
Student Engagement -	**Pearson Correlations**	**0.657****	**1**

- -	Sig. (2 - tailed)	.000	-

Table 4.7: Correlations between Course Design and Student Engagement

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

Source: Data generated by SPSS version 21.0

- - -	-	Availability of resources	Student Engagement
Availability of resources -	**Pearson Correlations**	1	0.463**
- -	Sig. (2 - tailed)	-	.000
- -	-	-	-
Student Engagement -	**Pearson Correlations**	0.463**	1
- -	Sig. (2- tailed)	.000	-

Table 4.8: Correlations between Availability of Resources and Student Engagement

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

Source: Data generated by SPSS version 21.0

		Digital Literacy	Student Engagement
Digital Literacy -	Pearson Correlations	1	0.720**
- -	Sig. (2- tailed)	-	.000
- -	-	-	-
Student Engagement -	Pearson Correlations	0.720**	1
- -	Sig. (2 - tailed)	.000	-

Table 4.9: Correlations between Digital Literacy and Student Engagement

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

Source: Data generated by SPSS version 21.0

4.3.2 Multiple regression analysis

Hypothesis 1

H0: There is no significant relationship between user friendliness of online learning platforms and student engagement among Malaysian university students.

H1: There is a significant relationship between user friendliness of online learning platforms and student engagement among Malaysian university students.

From the result in the Table, there is a positive correlation between user friendliness and student engagement. The variable of user friendliness has a 0.596 moderate correlation with the variable of student engagement. Therefore, when user friendliness increases, the student engagement will also increase.

Hypothesis 2

H0: There is no significant relationship between course design and student engagement among Malaysian university students.

H1: There is a significant relationship between course design and student engagement among Malaysian university students.

From the result in the Table, there is a positive correlation between course design and student engagement. The variable of course design has a 0.657 high correlation with the variable of student engagement. Therefore, when course design increases, the student engagement will increase which is proven by this statement.

Hypothesis 3

H0: There is no significant relationship between availability of online learning resources and student engagement among Malaysian university students.

H1: There is a significant relationship between availability of online learning resources and student engagement among Malaysian university students.

As shown in the Table, there is a positive correlation between availability of online learning resources and student engagement. The variable of availability of online learning resources has a 0.463 moderate correlation with the variable of student engagement. Thus, when availability of online learning resources increase, the student engagement will increase.

Hypothesis 4

H0: There is no significant relationship between digital literacy and student engagement among Malaysian university students.

H1: There is a significant relationship between digital literacy and student engagement among Malaysian university students.

The table shows that there is a positive correlation between digital literacy and student engagement. The variable of digital literacy has a 0.720 high correlation with the variable of student engagement. Thus, when digital literacy increases, the student engagement will also increase.

Hypothesis 5

H0: The four independent variables(user friendliness, course design, availability of resources and digital literacy) are not significantly explaining the variance in student engagement.

H5: The four independent variables(user friendliness, course design, availability of resources and digital literacy) are significantly explaining the variance in student engagement.

Model	R	R-square	Adjusted R-square	Std. Error of the Estimate
1 -	0.760	0.578	0.573	3.76604

a.   Predictors: (Constant), User friendliness, Course Design, Resource Availability, Digital Literacy
b.   Dependant Variable: Student Engagement

Table 4.10: R square's Model Summary

Source: Data generated by SPSS version 21.0

The R-value exhibits the correlation coefficient between the dependent variable and the four independent variables. According to the R'square Model Summary table, the correlation coefficient(R) of four independent variables (user friendliness, course design, availability of resources and digital literacy) with the dependent variable (student engagement) is 0.760. Therefore, we can conclude that there is a **positive** and **high** correlation between the four independent variables and the dependent variable.

The R square value in the R-square Model Summary table is 0.578. This shows that the 57.8% of independent variables can explain the dependent variable's variations. The R-square value means that the independent variables (user friendliness, course design, availability of online learning resources and digital literacy) can explain 57.8% of the variation in the dependent variable(student engagement) in this research. However, this still leaves (100%-57.8%= 42.2%) unexplained in this research. In other words, 42.2% of the additional factors that are crucial for determining student engagement were overlooked in this study.

ANOVA

Model	Sum of squares	Df	Mean square	F.	Sig.
Regression	7,452.648	4	1,863.162	13.365	0.000
Residual	5,446.303	384	14.183		
Total	12,898.951	388			

a.   Predictors: (Constant), User friendliness, Course Design, Resource Availability, Digital Literacy
b.   Dependant Variable: Student Engagement

Table 4.11 ANOVA

Source: Data generated by SPSS version 21.0

Based on ANOVA table show above, the p-value is 0.000. The p-value is lower than the alpha value 0.01. However apart from that, the F-statistic demonstrates a significant value at 13.365. As a result, the model accurately describes the relationship between the dependant and predictor variables. Hence, the independent

variables (User-friendliness, Course design, Resource availability and Digital literacy) explain a significant portion of the variation in student engagement. The null hypothesis(H0) can be rejected and the alternative hypothesis(H1) is accepted.

Coefficients

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std Error	Beta		
(Constant)	4.876	1.583		3.081	0.002
User Friendliness (UF)	0.149	0.081	0.096	1.839	0.067
Course Design (CD)	0.517	0.088	0.325	5.874	0.000
Resource Availability(RA)	-0.293	0.084	-0.169	-3.487	0.001
DigitalLiteracy (DL)	0.879	0.086	0.536	10.173	0.000

a.   Dependant variable: Student Engagement

Table 4.12 Coefficients

Source: Data generated by SPSS version 21.0

According to the Coefficient Table above, digital literacy most significant independent variable in this study. This is because digital literacy has a t-value of 10.173 and a p-value of 0.000(which is lesser than the alpha value 0.01). These values demonstrate the importance of digital literacy in predicting student engagement. Furthermore, digital literacy is the predictor variable that helped contribute the most to the variation in student engagement. This is because its beta value is the highest(0.536) when compared to the other predictor variables(User-friendliness, Course design and Resource availability).

Furthermore, course design is the second most significant independent variable, with a t-value of 5.874 and a p-values of 0.000(which is lesser than the alpha value

0.01). These values demonstrate the importance of course design in predicting student engagement. Not only that, course design contributes the second most to the variation in student engagement because its beta value is 0.325 which is higher than the remaining two predictor variables(User-friendliness and Resource availability).

The least significant independent variable is resource availability, which ahs a negative t-value of (-3.487) and a p-value of 0.001(which is lesser than the alpha value 0.01). Due to its p-value, this indicates that resource availability is a significant predictor of student engagement. Furthermore because the beta value for this predictor variable is the lowest (-0.169), it makes the third most significant contribution to the variability of student engagement.

In this study, user-friendliness plays no role in defining student engagement. This is since the p-value for user friendliness is 0.067(which is greater than the alpha value 0.01). Furthermore, user-friendliness contributes the second lowest variability in student engagement because its beta value is the second lowest (0.096) when compared to the other predictors.

The four independent variables are the factors that determine student engagement. This can be represented by the equation shown below:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$

Based on Table, the regression equation for the student engagement is:

PE = 4.876 +0.149(UF) + 0.517(CD) -0.293(RA) + 0.879(DL)

Where:

Y = Student Engagement (SE)

a = Regression Constant

X_1= User Friendliness(UF)

X_2= Course Design (CD)

X_3= Resource Availability (RA)

X_4= Digital Literacy (DL)

According to the regression equation,

Increasing of one unit of User friendliness will increase 0.149 unit of Student Engagement;

Increasing of one unit of Course design will increase 0.517 unit of Student Engagement;

Increasing of one unit of Resource Availability will decrease 0.293 unit of Student Engagement;

Increasing of one unit of Digital Literacy will increase 0.879 unit of Student Engagement;

Based on the equation, the variable of predictor with the highest contribution to student engagement's deviation is digital literacy. This is because it has highest beta value of 0.879. However, the predictor variable that contributes lowest and negatively to student engagement's deviation is resource availability with a beta value of -0.293.

4.4 Conclusion

To summarise Chapter 4, the statistics derived from the questionnaire was summarised, and the SPSS outputs were subsequently analysed. The assessment is split into two parts: descriptive analysis and inferential analysis.

Pearson Correlation and Multiple Regression analysis were used in this study to demonstrate the relationship and implications seen between the independent and dependant variables. Nevertheless, new discoveries were discovered through data analysis. The Pearson correlation analysis showed that all the independent variables correlated well with the dependant variable(2 with moderate correlation and 2 with high correlation). The analysis's goal is to demonstrate the correlation between the variables when tested separately with the dependant variable. The results of this analysis satisfactorily proved the hypothesis. Multiple regression analysis, on the other hand, was used to examine how the four independent variables interact to cause variability in student engagement. Two new discoveries were made during this analysis. The first is that user-friendliness has no bearing on student engagement. Other research journals have yet to comment on this discovery. The

second discovery is that the variable (availability of resources) has a negative t-value in multiple regression analysis which demonstrates that this independent variable has a negative impact on the variance of student engagement. The analysis results and interpretations done in Chapter 4 will be used in the following chapter to produce discussion, conclusions, implications and recommendations for Chapter 5.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.1 Discussion of Major Findings

Hypotheses	Supported/Not supported	Significance
H1: There is a significant relationship between user friendliness of online learning platforms and student engagement.	β= 0.596 Supported	p= 0.067>0.01 Not Significant
H2: There is a significant relationship between online learning course design and student engagement.	β= 0.657 Supported	p= 0.000< 0.01 Significant
H3: There is a significant relationship between availability of online learning resources and student engagement.	β= 0.463 Supported	p= 0.001< 0.01 Significant
H4: There is a significant relationship between digital literacy and student engagement.	β= 0.720 Supported	p= 0.000< 0.01 Significant

Table 5.1 Summary of the results from Hypothesis Testing

5.1.1 Relationship between user friendliness of online learning platforms and student engagement

H1: There is a significant relationship between user friendliness of online learning platforms and student engagement.

Based on the results derived from Chapter 4, we can assume that user friendliness and student engagement have a significant, positive, and moderate relationship. The variables have recorded correlation coefficient value of 0.596 and p-value of 0.000 that is significant at the alpha value 0.01.

In regard of that, we can understand that there is positive link between user friendliness and student engagement. It is supported by Arbaugh (2000) as he found in his research that student engagement increases when students are satisfied with the online learning experience. The satisfaction of online learning experience is linked to its user friendliness.

Furthermore, the findings in our study is also supported by Henderson et al., (2015) and Ilin (2020) as they have concluded in their study that the failure of student adaptation towards online learning is directly linked to the lack of user friendliness of online learning systems. To promote student engagement online learning systems should be designed to adapt user friendliness of students rather than expecting students to adapt to the system (Llin, 2022). Authors Al-Kumaim et al., (2021) also agree with the hypothesis as they found a linkage between students' inability to adapt to online learning platforms and their respective engagement levels.

According to the results we obtained from multiple regression analysis, we discovered that user friendliness is not having a significant relationship between student engagement. As we further our research to justify the insignificant relationship of user- friendliness and student engagement, we found that demographic factors of the respondents played an important role in influencing the

variables. For instance, age group, level of study and gender have influenced the relationship between user- friendliness and student engagement. According to past researchers, age group is one of the demographic factors that affect user friendliness because as the most of the respondents for this study are from generation Z(18 - 23). Basically, they are more familiar with technology and it was easy for them to adapt to this new way of learning, says Yu, Eunjyu (2020). Although the wake of online learning has become more prominent nowadays, some of the online platforms are already well known among students. That familiarity could be one of the reasons for students to practice online learning without affecting their engagement during classes,Yu, Eunjyu (2020).

Furthermore, the level of study of the students from demographic profile was also affecting the user friendliness because as the students are more educated(higher level of study) they can easily adapt and adapt to the online learning systems. Students at a higher level of study are not affected by the user friendliness of the online learning systems. Due to that, as the students master their skills in accessing online platforms they are able to stay engaged during their classes. Conversely, since very less research has been conducted in this area of study in the past five years, literature that supports this new discovery could not be found. Hence, we believe this new discovery in our research would be a very useful contribution for the future researchers to conduct their research in this area of study.

5.1.2 Relationship between of online learning course design and student engagement

H2: There is a significant relationship between online learning course design and student engagement.

According to the results derived from Chapter 4, we can assume that course design and student engagement have significant positive and high relationship. The variables carry a correlation coefficient value of 0.657 and p-value of 0.000 which is significant at the alpha value 0.01.

The findings from this research showcase that course design and student engagement are positively linked. This finding is also supported by Deka (2021) as he concluded in his research that course design has a positive relationship with student engagement. Khlaif, Salha & Kouraichi (2021) also agree with the findings from this research; they found a positive relationship between the quality of digital content and engagement level of students.

Furthermore, in Jafar (2016)'s research, they find a positive relationship between course design and student engagement. Jafar (2016) explained that having a well-structured course design would encourage students and give them an obligation to enhance their learning. Marsha Carr (2014) also agrees with the hypothesis of this study. Marsha Carr (2014) explains how engagement of a student is dependent on how well the course structure is designed.

5.1.3 Relationship between availability of online learning resources and student engagement

H3: There is a significant relationship between availability of online learning resources and student engagement.

Based on our results derived from Chapter 4, we can conclude that there is a significant positive and moderate relationship between availability of resources and student engagement levels. The variables carry a correlation coefficient value of 0.463 and p-value of 0.000 which is significant at the alpha value 0.01.

The findings from this research showcase that availability of resources and student engagement are positively linked. The findings from this study is supported by Khlaif et al., (2021). In Khlaif et al., (2021)'s study concluded that lack of availability of technological devices has led to negative student engagement in the online learning environment. This is because students feel disengaged while doing their online learning and are unable to engage in cognitive learning processes (Bedenlier et al., 2020).

However, we have also found that resource availability carries a negative regression value of -0.293 which signifies a negative relationship with student engagement in the regression equation. To date, there is no study found that supports this outcome. Hence, the result obtained for this research is a new contribution to this field of topic. Based on our interpretation of the data received, we theorised that lack of resource availability is no longer a strong determinant in student engagement level due to the staleness of the issue with time. Even though lack of resource availability was a critical issue for Malaysian students in the preliminary stages of online learning adoption, now that online learning has become widely adopted across universities in Malaysia, resources have become readily available to the students. Thus it is no longer a strong determining factor towards student engagement. There is lack of studies that have theorised this hypothesis, hence findings from this research can be used as a new discovery.

5.1.4 Relationship between digital literacy and student engagement

H4: There is a significant relationship between digital literacy and student engagement.

Based on our results derived from Chapter 4, we can conclude that there is a significant positive and high relationship between digital literacy and student engagement levels. The variables carry a correlation coefficient value of 0.720 and p-value of 0.000 which is significant at the alpha value 0.01.

The findings from this research showcase that digital literacy and student engagement are positively linked. Author Byungura et al., (2018) as cited in Werang & Leba (2022) agree that there is a positive relationship between digital literacy and student engagement. Sadaf et al., (2017) explains in his study how digital literacy establishes a strong link towards the classroom environment. Similarly Howard et al. (2016) has also proved in his research how usage of digital technology promotes student engagement. Kim et al., (2018) concludes that by excelling digital literacy

students will be able to react effectively and show their emotions towards learning during the online learning process.

5.2 Implications of the Study

5.2.1 Managerial Implications

5.2.1.1 Student Engagement (Dependent Variable)

According to the research, student engagement is significantly affected by user friendliness, course design, availability of resources and digital literacy. Basically, student engagement is one of the vital elements that every student should practice to stay focused in their classes.

It is vital to make sure that the student engagement should be perfectly directed to the development of knowledge, accumulation of experiences and behaviour building among undergraduates, H.C. Teoha, Maria Chong Abdullahb, Samsilah Roslanc, Shaffe Daudd (2013). On the other hand, enhancing the classroom friendliness to studying and developing engaging didactic materials will motivate students to participate in the learning process, boosting cognitive outcomes and reducing dropout rates, says Fredricks (2004) cited in Izzul Fatawi (2020). Moreover, student participation boosts contentment, learning motivation, sense of commitment and effectiveness in online learning.

5.2.1.2 User Friendliness (Independent Variable)

According to our research, the results show a positive relationship between user friendliness and student engagement. The more the students familiarise with the online platforms, the more the students will stay engaged during classes.

This study has been supported by past researchers. When the students are happy with their online learning experience and can take charge of their own learning, student engagement will automatically increase, Arbaugh (2000). In addition, students will acquire a favourable attitude toward using new technology tools in their learning when they perceive that the tools are simple to use, and as a result, they will be inclined to keep using them, says Huang (2021).

However, since the multiple regression test has proven the variable insignificant, this also implies that user friendliness is not a strong variable to predict student engagament. Based on our interpretation, the age demographic and level of study of the respondents for this study has also played a role in the user friendliness of online leanrning systems. Eventhough, the user friendliness of online learning system do promote a higher engagement level among university students, their existing academic level and adaptability to new technology also contributes to their ability to easily adopt the new online learning system.

5.2.1.3. Course Design (Independent Variable)

In regard of this research, the results show a positive relationship between course design and student engagement. The better the course design provided by the lecturers, the better the students will be engaged during classes.

Course design is one of the basic things that every student should follow in their study period. Due to that, it is important to make sure that the course design is of good quality to give a good educational knowledge to the students. Innovative educational methods, quick methods, quick assessment on student work, a fair response to academic achievement, and an appropriate course design can all foster student enthusiasm and dedication to their studies (H.C. Teoha, et al., 2013). Furthermore, using the very well integrated course design in online learning experience, students tend to be more engaged in the classes. This is because students are given a wider range of tools to create this learning and work closely with other students on promoting each other's learning, L. Dee Fink (2007).

5.2.1.4 Availability of Resources (Independent Variable)

According to this research, the results show a positive relationship between availability of resources and student engagement. The more the students have access with the resources used to attend their classes, the more the students will be engaged during classes.

It is important to make sure that the students have the access to all the basic resources to attend their classes. It is because the resources are the main tools that connect the students in online learning and without them, they cannot pursue their online learning. The lack of availability of technological devices is affecting the student to be more engaged in the online classes, Khalifa et al., (2021). On the other hand, the student who has full access to the resources to attend online class will stay focused in their classes without any interruptions, says Bedenlier et al., (2020).

However since the multiple regression equation shows a negative relationship between availability of resources and student engagement, this is not a strong variable to predict student engagement levels. Based on our interpretation, the issue regarding lack of resources has become obsolete after 2 years since the implementation of online learning systems. The variable has a positive correlation with student engagement(Person correlation test) and also a negative relationship with student engagement(Multiple regression test). Hence we theorise that even though this issue(lack of online learning resources) was critical in the beginning stages of the pandemic, with time the issue has become irrelevant in determining student engagement levels in Malaysian universities.

5.2.1.5 Digital Literacy (Independent Variable)

According to our research, the results show a positive relationship between digital literacy and student engagement. The more the students have the digital literacy to attend their classes, the more the students will be engaged during classes.

The UK Higher Education system found that the students that incorporate digital literacy development into their studying are more productive in their coursework and more marketable after graduation. Moreover, higher education's intentional embrace of digital learning methods promotes the growth of digitally literate students who can function at ease and creatively in technologically advanced settings in all spheres of their lives, says Claire McGuiness and Crystal Fulton (2019).

5.3 Limitations of Study

Even though a study is well conducted, it still has its limitations. This is because there are several viewpoints and research areas that need to be considered while evaluating the study. Consequently, this study has a few limitations. While the research was being conducted, the limits were discovered.

One of the limitations is sample size. The research is focused on university students only from Malaysia. Since the target respondents are chosen based on cluster sampling method, therefore the questionnaire was only distributed to top 3 universities from public and private respectively based on Times Higher Education World University Rankings. Therefore, the outcome might not represent all university students in Malaysia and insignificant to produce a reliable study since the target respondents' range had been constrained. If a larger sample size is taken into consideration, a more accurate study could have been conducted.

The second limitation of this study is involvement of the respondents. During distribution of surveys, it was challenging to engage with and reach the university students since the location of these universities are far apart and spread all across Malaysia, we had to distribute the survey through online platforms such as WhatsApp and Instagram. Some of the respondents we approached neglected to complete the survey questionnaire because they are preoccupied with their work, so constant reminders were required to obtain their responses. During the period of survey distribution, certain university students were in the midst of studying for their final exams, hence they did not allocate time to carefully read and fill out the

questionnaire. Their honest judgement while doing this survey might have been compromised due to their lack of focus and urgency. Hence, it might affect the accuracy of the responses received.

The time to carry out this research has also been one of the limitations of this study. In a short period of time, we examined the data, tracked down the respondents, conducted the required tests and analyses, and made necessary changes to the study so that it would be more accurate. So, it is possible that the time constraint might impact the quality of the study. Furthermore, since we had a limited amount of time, we had to narrow down the target respondents from our initial objective of 500 respondents to 389 respondents.

Apart from that, shortage of resources is also one of the barriers in this study. Although there are many journals and articles related to our study that may be easily obtained online, many of the top-quality journals and articles are not accessible since they require online journal purchases. Hence, the study was conducted without the full usage of existing journals.

5.4 Recommendations for Future Research

Based on our study, we have some recommendations to give as advice to the future researchers who show interest in the relevant topic in order to make some improvements on it.

First of all, future researchers may carry out the relevant study in different country to obtain the perspective of foreign students. This is because universities from different countries have various resource availabilities that would influence their environmental practices. Other than that, to get a more reliable data, future researchers could also target more universities in Malaysia beyond the ones focused in this study.

Apart from that, future researchers may introduce rewards and incentives to increase survey participation and to boost the probability of survey response and completion. It will be rewarding to give a small incentive to the respondents after

completing the survey. For example, gift vouchers is one of the pragmatic rewards available since researchers can request it from well-known establishments without any cost involved.

Moreover, we recommended future researchers to develop time management skills. This is because this research contains a high workload in a short period of time. This can help to solve limitations of involvement among respondents. For example, future researchers should use a planner to list down the time required for each chapter and distribute the work evenly throughout their project duration. This tracking method can make the process seamless without confusion and omission.

Last but not least, future researchers should fully utilise the resources given by their respective university. Researchers should be able to access the necessary scholarly journals and articles through university's library to find more relevant journals to support their future research. Universities usually have subscriptions for academic journals, hence students may access those journals at free of charge.

5.5 Conclusion

To conclude, in this chapter past research was used to support the findings obtained under each hypothesis. Two new findings were obtained that will be considered as a new discovery and a contribution to this field of topic. Implications of study has been discussed to understand the meaning behind the findings obtained in the study. And the limitations of this study have been addressed through the recommendations given to future researchers.

This study has successfully revealed the effect of online learning on student engagement among Malaysian university students. The problem statement of this study was to address the issues gone by Malaysian university students in their transition from physical to online learning. Each online learning variable(user-friendliness, course design, availability of resource and digital literacy) in our study has a positive correlation with student engagement. However, certain factors are more significant than others in affecting the engagement level of Malaysian university students.

By taking this research into account, the current issue of low engagement levels of Malaysian university students can be addressed. The policy makers(Ministry of Education) and academic institutions in Malaysia can address this issue by strengthening the online learning systems to contribute to higher student engagement levels.

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UNIVERSITY TUNKU ABDUL RAHMAN (UTAR)

FACULTY OF BUSINESS AND FINANCE

BACHELOR OF BUSINESS ADMINISTRATION (HONS)

ACADEMIC YEAR 2022

YEAR 3 SEMESTER 3

Dear respondents,

I am Nishantinee Sathe, a final year student from University Tunku Abdul Rahman(UTAR). My team members and I are currently pursuing a degree in Bachelors of Business Administration. We are conducting our final year study to understand the relationship between online learning and student engagement.

The rise of the pandemic forced many institutions around the world to adopt and adapt to online learning systems. According to our research, this transition has especially affected university students in Malaysia as most local universities have been accustomed to traditional physical lectures and tutorials. We are interested to explore the engagement level of university students while participating in online classes. Our study focuses on selected Malaysian universities hence please proceed with the questionnaire if you are a current student from the universities listed below. If you are not a current student from the universities listed below, this questionnaire is not catered to you. Thank you for your time, you may exit this questionnaire.

Selected universities:

UM(Universiti Malaya)

USM(Universiti Sains Malaysia)

UTM(Universiti Teknologi Malaysia)

UTAR(Universiti Tunku Abdul Rahman)

UTP(Universiti Teknologi PETRONAS)

UNITEN(Univerisiti Tenaga Nasional)

This questionnaire consists of 3 main sections:

Section A: Demographic data

Section B: Aspects of student engagement

Section C: Factors of online learning

Your participation in this survey is completely voluntary. I will not be at disadvantage if you choose not to complete the questionnaire. Your private information will strictly be kept confidential. Data collected from this survey will only be used for academic purposes. If you have decided to participate in this questionnaire, please answer all the questions as honestly as possible. This questionnaire will only take 10 minutes to complete.

If you have any queries or concerns regarding the questionnaire, feel free to contact us at our email address:

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SECTIONA

RESPONDENT DEMOGRAPHIC

1. Gender

Female	Male

2. Age group

18-20	21-23	24-27	28-older

3. Level of study

Diploma	Degree	Master	PHD/Doctorate

4. Type of university

Public	Private

5. Which university are you from? (type in your answer)

6. What course are you taking? (type in your answer)

7. What is your current academic semester and year? (type in your answer)

SECTION B

DV: STUDENT ENGAGAMENT

Strongly disagree-1, Disagree- 2, Neutral- 3, Agree-4, Strongly agree-5

Behavioural dimension

1. I take advantage of the key information given by my lecturer/tutor during online learning classes. (Ex: video suggestions to enhance understanding of content)

1	2	3	4	5

2. I regularly participate in online learning class discussions in most of my classes.

1	2	3	4	5

3. I ask my tutor/lecturers questions during my online learning class if I do not understand the content.

1	2	3	4	5

Emotional dimension

1. I am excited to take part in the online learning activities conducted in the class.

1	2	3	4	5

2. I feel inspired to improve my online learning skills.

1	2	3	4	5

3. I feel comfortable taking part in online learning discussions.

1	2	3	4	5

Cognitive dimension

1. I evaluate the opinions and ideas shared by my lecturer/tutor and my coursemates during my online learning lessons.

1	2	3	4	5

2. I tend to apply the knowledge I've learnt during my online learning lessons to real world problems.

1	2	3	4	5

3. I go through the learning materials (Ex: lecture slides) before I take part in online learning classes.

1	2	3	4	5

Section C

IV 1: EASE OF USE

1. I believe online learning platforms are user-friendly.

1	2	3	4	5

2. It only took me a short time to fully understand how to use the online learning platform.

1	2	3	4	5

3. It is easy for me to find necessary information when using online learning platforms.

1	2	3	4	5

4. I learned to use the online learning platform very quickly.

1	2	3	4	5

5. I think that the learning methods used in online learning platforms are not difficult for me.

1	2	3	4	5

6. The online learning system set up by my university is compatible with the way I learn.

1	2	3	4	5

IV 2: COURSE DESIGN

1. The learning materials (Ex: lecture slides, tutorial questions) provided for my course is aligned with the course objectives.

1	2	3	4	5

2. The online coursework activities (assignment, presentation, debate etc.) reflect the course objectives.

1	2	3	4	5

3. The online course content and learning outcomes is clear and well-structured.

1	2	3	4	5

4. The online coursework is designed well so I can interact and communicate with my coursemates.

1	2	3	4	5

5. I am satisfied with the way my lecturer/tutor deliver the course content (Ex: lecture slides, pre-recorded videos etc.)

1	2	3	4	5

6. I am satisfied with the alternative assessment plans provided for my course (Ex: Replacing Final exam with Open-book Final assessment).

1	2	3	4	5

IV 3: AVAILABILITY OF RESOURCES

1. I have access to at least one basic learning device (laptop, smartphone, PC etc.)

| 1 | 2 | 3 | 4 | 5 |

2. I have access to internet at my place of study (Mobile data, Wifi etc.)

| 1 | 2 | 3 | 4 | 5 |

3. Relevant learning resources (e-Textbook, database, software) are accessible to me.

| 1 | 2 | 3 | 4 | 5 |

4. I am aware of the online learning resources provided by my university (Ex: laptop rental).

| 1 | 2 | 3 | 4 | 5 |

5. My university provides subscription for online learning software accounts (Microsoft Teams, Zoom etc.)

| 1 | 2 | 3 | 4 | 5 |

6. I am satisfied with the level of resources that I currently have to conduct my online learning.

| 1 | 2 | 3 | 4 | 5 |

IV 4: DIGITAL LITERACY

1. I feel comfortable using digital devices in my online learning.

| 1 | 2 | 3 | 4 | 5 |

2. I am willing to learn more about digital technology to help in my online learning.

1	2	3	4	5

3. I feel like I am on the same pace as my course mates in using digital technology.

1	2	3	4	5

4. I think my learning can be enhanced by using digital tools and resources.

1	2	3	4	5

5. I need help while using online software(Microsoft Teams, Zoom etc.).

1	2	3	4	5

6. Technical help from my university is available and helpful.

1	2	3	4	5

PILOT TEST

RELIABILITY TEST

STUDENT ENGAGEMENT (DV)

Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.869	.869	4

Item Statistics

	Mean	Std. Deviation	N
Innovation1	3.23	1.182	70
Innovation2	3.03	1.179	70
Innovation3	3.34	1.020	70
Innovation4	3.43	1.111	70

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.257	3.029	3.429	.400	1.132	.030	4
Inter-Item Covariances	.788	.663	.993	.331	1.499	.013	4
Inter-Item Correlations	.624	.555	.713	.158	1.285	.003	4

User friendliness (IV 1)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items

.808	.815	4

Item Statistics

	Mean	Std. Deviation	N
Product1	3.77	1.230	70
Product2	4.11	1.001	70
Product3	3.97	.932	70
Product4	3.97	.978	70

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.957	3.771	4.114	.343	1.091	.020	4
Inter-Item Covariances	.556	.409	.795	.386	1.942	.016	4
Inter-Item Correlations	.524	.392	.646	.253	1.646	.010	4

COURSE DESIGN (IV 2)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.808	.815	4

Item Statistics

	Mean	Std. Deviation	N
Product1	3.77	1.230	70
Product2	4.11	1.001	70
Product3	3.97	.932	70
Product4	3.97	.978	70

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.957	3.771	4.114	.343	1.091	.020	4
Inter-Item Covariances	.556	.409	.795	.386	1.942	.016	4
Inter-Item Correlations	.524	.392	.646	.253	1.646	.010	4

AVAILABILITY OF RESOURCES (IV 3)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.854	.854	4

Item Statistics

	Mean	Std. Deviation	N
Promotion1	1.99	1.291	70
Promotion2	2.36	1.274	70
Promotion3	2.24	1.268	70
Promotion4	3.24	1.256	70

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.457	1.986	3.243	1.257	1.633	.299	4
Inter-Item Covariances	.963	.438	1.419	.981	3.238	.103	4
Inter-Item Correlations	.594	.270	.879	.608	3.250	.038	4

DIGITAL LITERACY (IV 4)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.748	.750	4

Item Statistics

	Mean	Std. Deviation	N
Place1	3.47	1.139	70
Place2	3.24	1.148	70
Place3	3.83	1.076	70
Place4	3.43	1.057	70

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.493	3.243	3.829	.586	1.181	.060	4
Inter-Item Covariances	.520	.333	.582	.249	1.746	.008	4
Inter-Item Correlations	.429	.255	.511	.256	2.005	.007	4

DESCRIPTIVE ANALYSIS

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
	Female	41	58.6	58.6	58.6
	Male	29	41.4	41.4	100.0
Valid	Total	70	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
	20 years	11	15.7	15.7	15.7
	21 to 30	38	54.3	54.3	70.0
	31 to 40	12	17.1	17.1	87.1
	41 to 50	9	12.9	12.9	100.0
Valid	Total	70	100.0	100.0	

Employment status

		Frequency	Percent	Valid Percent	Cumulative Percent
	Employe	33	47.1	47.1	47.1
	Student	32	45.7	45.7	92.9
	Unemploy	5	7.1	7.1	100.0
Valid	Total	70	100.0	100.0	

Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
		26	37.1	37.1	37.1
		19	27.1	27.1	64.3
	Bachelor	1	1.4	1.4	65.7
	Diploma	1	1.4	1.4	67.1
	Foundati	2	2.9	2.9	70.0
	Masters	20	28.6	28.6	98.6
	PhD	1	1.4	1.4	100.0
	SPM				
	UEC				
Valid	Total	70	100.0	100.0	

PEARSON CORRELATION ANALYSIS

Correlation DV + IV 1

Descriptive Statistics

	Mean	Std. Deviation	N
Innovation	13.0286	3.81063	70
Product	15.8286	3.31868	70

Correlations

		Innovation	Product
Innovation	Pearson Correlation	1	.353[**]
	Sig. (2-tailed)		.003
	N	70	70
Product	Pearson Correlation	.353[**]	1
	Sig. (2-tailed)	.003	
	N	70	70

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

Correlation DV + IV 2

Descriptive Statistics

	Mean	Std. Deviation	N
Innovation	13.0286	3.81063	70
Price	10.8571	2.57235	70

Correlations

		Innovation	Price
Innovation	Pearson Correlation	1	.321[**]
	Sig. (2-tailed)		.007
	N	70	70
Price	Pearson Correlation	.321[**]	1
	Sig. (2-tailed)	.007	
	N		

		70	70

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

Correlation DV + IV 3

Descriptive Statistics

	Mean	Std. Deviation	N
Innovation	13.0286	3.81063	70
Promotion	9.8286	4.24596	70

Correlations

		Innovation	Promotion
Innovation	Pearson Correlation	1	.071
	Sig. (2-tailed)		.559
	N	70	70
Promotion	Pearson Correlation	.071	1
	Sig. (2-tailed)	.559	
	N	70	70

Correlation DV + IV 4

Descriptive Statistics

	Mean	Std. Deviation	N
Innovation	13.0286	3.81063	70
Place	13.9714	3.33611	70

Correlations

		Innovation	Place
Innovation	Pearson Correlation	1	.266[*]
	Sig. (2-tailed)		.026
	N	70	70
Place	Pearson Correlation	.266[*]	1
	Sig. (2-tailed)	.026	
	N	70	70

*. Correlation is significant at the 0.05 level (2-tailed).

MULTIPLE REGRESSION ANALYSIS

Variables Entered/Removedª

Model	Variables Entered	Variables Removed	Method
1	DigitalLiteracy, ResourceAvailability, Userfriendliness, CourseDesignᵇ	.	Enter

a. Dependent Variable: StudentEngagement

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.760ª	.578	.573	3.76604	.578	131.365	4	384	.000

a. Predictors: (Constant), DigitalLiteracy, ResourceAvailability, Userfriendliness, CourseDesign

ANOVAª

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7452.648	4	1863.162	131.365	.000ᵇ
	Residual	5446.303	384	14.183		
	Total	12898.951	388			

a. Dependent Variable: StudentEngagement

b. Predictors: (Constant), DigitalLiteracy, ResourceAvailability, Userfriendliness, CourseDesign

Coefficientsª

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.876	1.583		3.081	.002
	Userfriendliness	.149	.081	.096	1.839	.067
	CourseDesign	.517	.088	.325	5.874	.000
	ResourceAvailability	-.293	.084	-.169	-3.487	.001
	DigitalLiteracy	.879	.086	.536	10.173	.000

a. Dependent Variable: StudentEngagement