INTENTION TO ACCEPT AUGMENTED REALITY (AR) TECHNOLOGY TO ENHANCE STUDENTS LEARNING IN HIGHER EDUCATION INSTITUTIONS

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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SUPERVISOR APPROVAL

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I hereby declare that this research thesis is my original work, and I have written it in its entirety. I have duly acknowledged all the sources of information that were used in the thesis.

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DEDICATION

To my dearest Parents, Encik Ismail bin Mat and Puan Norlila binti Abat Shah, my lovely family, Supervisor and my fellow friends. Thankyou for your support and encouragement.

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ABSTRACT

The fast advancement of technology has recognised the application of Augmented Reality (AR) technology in the learning process. AR enhances learning experiences by providing an interactive experience of a real-life environment with a generated by software contextual combine of information. Initially, AR was extensively studied in the education, entertainment and gaming industries. In contrast, the potential of augmented reality for educational and learning reasons has received little attention. In addition to a lack of sources for evaluating AR technology in education, there is a lack of knowledge regarding the elements that influence students' long-term desire for using AR technology in their learning process and user acceptance of augmented reality (AR) systems may be impacted by operational issues including hardware problems, tracking issues, or system failures. The number of the respondents that have participated in this research is 130 respondents. Hence, this study quantitatively investigates the determinants of intention to accept augmented reality (AR) technology using the extended Unified Theory of Acceptance and Use of Technology (UTAUT) and Theory of Planned Behavior (TPB). An online questionnaire has been distributed to universities students that have using AR Technology. Researcher has used the SPSS tools to test the hypothesis. All the hypothesis result are significant positively affect the intention to accept augmented reality (AR) technology in higher education institutions. This finding could contributed to the academic and practitioner communities in a variety of fields, including Policy makers, AR developers, users and others.

Keyword : AR Technology, Higher Education, Intention to Accept

ABSTRAK

Kemajuan teknologi yang pantas telah mengiktiraf aplikasi teknologi Augmented Reality (AR) dalam proses pembelajaran. AR meningkatkan pengalaman pembelajaran dengan menyediakan pengalaman interaktif persekitaran kehidupan sebenar dengan gabungan maklumat kontekstual yang dihasilkan oleh perisian. Pada mulanya, AR telah dikaji secara meluas dalam industri pendidikan, hiburan dan permainan. Sebaliknya, potensi realiti tambahan atas sebab pendidikan dan pembelajaran kurang mendapat perhatian. Di samping kekurangan sumber untuk menilai teknologi AR dalam pendidikan, terdapat kekurangan pengetahuan mengenai elemen yang mempengaruhi keinginan jangka panjang pelajar untuk menggunakan teknologi AR dalam proses pembelajaran mereka dan penerimaan pengguna terhadap sistem realiti tambahan (AR) mungkin. terjejas oleh isu operasi termasuk masalah perkakasan, isu penjejakan atau kegagalan sistem. Bilangan responden yang telah menyertai penyelidikan ini adalah seramai 130 orang responden. Oleh itu, kajian ini secara kuantitatif menyiasat penentu-penentu niat untuk menerima teknologi realiti tambahan (AR) menggunakan lanjutan Teori Penerimaan dan Penggunaan Teknologi Bersepadu (UTAUT) dan Teori Tingkah Laku Terancang (TPB). Soal selidik dalam talian telah diedarkan kepada pelajar universiti yang telah menggunakan Teknologi AR. Pengkaji telah menggunakan alat SPSS untuk menguji hipotesis. Kesemua keputusan hipotesis adalah signifikan memberi kesan positif kepada niat untuk menerima teknologi realiti tambahan (AR) di institusi pengajian tinggi. Penemuan ini boleh menyumbang kepada komuniti akademik dan pengamal dalam pelbagai bidang, termasuk Pembuat dasar, pembangun AR, pengguna dan lain-lain.

Kata Kunci : Teknologi AR, Institusi pengajian tinggi, Niat untuk menerima

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CHAPTER 1

INTRODUCTION

1.1 Background of Research

This chapter presents a background of the study related to the acceptance of augmented reality in higher education to enhance student's learning supported by relevant references. The researcher highlighted the problem statement that led to the research questions and research objectives. However, Augmented reality (AR) is defined as a technology that combines digital and physical information in real time and with human involvement via various technological tools. AR has so many applications that when it is used in the classroom, students report high levels of satisfaction and favourable views towards its use (Barroso-Osuna et al., 2019).

The Augmented Reality (AR) technology has been experiencing growth in tandem with various types of hardware, especially with the development of various types of gadgets and smart device applications. Through a virtual digital covering, AR technology may produce optical illusions in the actual environment to enhance awareness of space. This feature is usable and has been used in the area of education. AR is the technology that combines elements from the real world and virtual worlds so that they interact in the same world space (Hanid et al., 2020).

The use of augmented reality (AR) in education is now popular. Significant findings from research indicated that students who utilised augmented reality (AR) technology might increase their level of motivation in addition to having high levels of confidence and pleasure with utilising augmented reality (AR) -based mobile devices for learning. These results are in line with analysis that found that utilizing an AR application in education might help students pay attention and become more motivated to acquire knowledge (Hanid et al., 2020). Additionally, Augmented reality (AR) has had a significant and positive impact on higher education. Students' interest in this technology has increased significantly, encouraging their involvement, focus, as well as and understanding of the material being taught. Researchers in education have

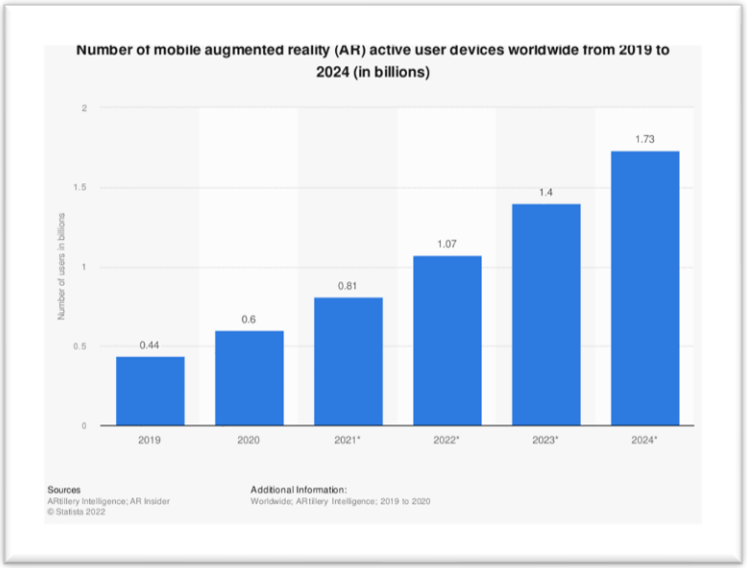
noticed AR's amazing potential as well as significant effects on cognitive and emotional learning outcomes (Al Shafeey et al., n.d.).

AR offers innovative options for enhancing learning and efficient learning settings. For experiments, augmented reality (AR) merges the digital environment with the actual sensory experience, allowing an integration of the real and virtual worlds and resulting in compelling user engagement. In addition to knowledge, Augmented Reality (AR) also offers instructions on how to handle newly obtained data. Additionally, technology is a simple and organic way to teach because it opens up a lot of possibilities for inquiry. For those with physical disabilities, Augmented Reality (AR) is an established field of psycho-physical research. greater student exposure to real-world settings and greater environmental awareness due to contact with digital components are two benefits of implementing augmented reality technology in education (Al Shafeey et al., n.d).

Education is adjusting to these changes by integrating technology into the learning environment as technology continues to progress and become more widely utilized by students. AR is one technology that is gradually making its way into the classroom. The term "augmented reality" (AR) refers to an extended reality (XR) style that includes both virtual and physical aspects. Additionally, augmented reality gives three-dimensional materials and interactivity. There are also two other kinds of AR. There are image-based AR technology and location-based AR technology. It's possible for educators to use image-based AR technology in educational institutions to show augmented elements once a marker label is picked up (Yu et al., 2020).

Education and augmented reality are not excluded. The idea of the development of Ukraine's digital economy and society for the years 2018 to 2020 supports how it is implemented. Its top priorities include developing an effective national strategy for the digitalization of education as a critical component of educational reform, identifying targeted efforts to connect classrooms to broadband Internet, developing and implementing contemporary models for providing computers to students and educational institutions and preparing for, adjusting to, and organizing access to multimedia technologies. and the development of suitable digital educational platforms for use in managing education and the educational process (GUREVYCH et al., 2021).

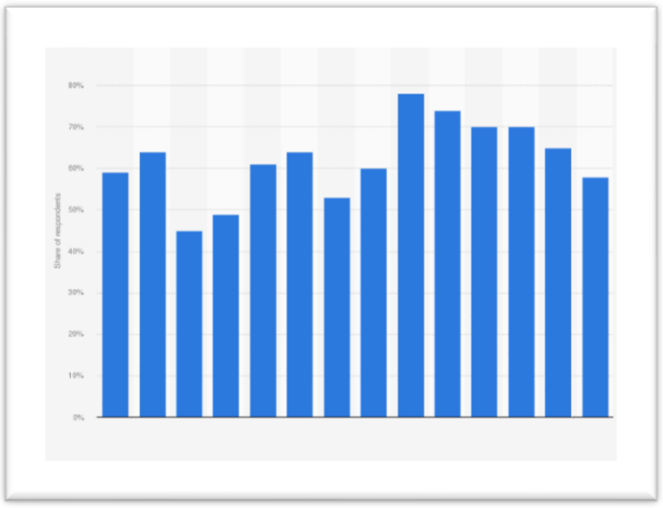
Table 1.1 User of augmented reality (AR) active user devices wordlwide from 2019 to 2024



Sources : Global mobile augmented reality (AR) user devices 2019-2024 (2022)

As per recent data, by 2024 there will be an estimated 1.7 billion mobile augmented reality (AR) user devices worldwide, a rise of 1.5 billion from the 200 million seen in 2015. In 2022, there will be an estimated 1.1 billion mobile AR user devices worldwide (Global Mobile Augmented Reality (AR) user devices | Statista, 2022).

Table 1.2 : Awareness of augmented reality (AR) in Malaysia from 3rd quarter 2019 to 4th quarter 2022



Sources: Awareness of augmented reality Malaysia Q3 2019-Q4 2022 (2023)

In the fourth quarter of 2022, 58% of Malaysian respondents to an Oppotus study on technological trends were familiar with augmented reality (AR). When compared to the same time in 2021, when 74% of respondents claimed they were familiar with AR technology, this was a decrease (Malaysia: Awareness of Augmented Reality 2022 Statista, 2023).

1.2 Problem Statement

Even while the application of augmented reality in education is growing, especially since the appearance of mobile computing devices, the technology's level of acceptance is still in the early stages. Analysing user approval before implementing a new technology is essential to enhancing its performance for future use. To minimise possible usability issues with augmented reality (AR) technology, extensive study and research based on user demands and user expectations are needed. Morevover, User acceptance of augmented reality (AR) systems may be impacted by operational issues including hardware problems, tracking issues, or system failures (Dalim et al., 2017).

Additionally, augmented reality (AR) demonstrates its potential for enhancing education learning and teaching. AR is also especially effective at improving learning that is student-focused when it comes to idea teaching. This allows students to assume responsibility for their learning and promotes independent and personalised learning. Some students even want to integrate augmented reality (AR) in future classroom learning activities. Furthermore, it appears that when employing tablets in the classroom, AR is more successful than traditional education. The issue still exists when the expense of the necessary gadgets is the biggest issue with AR. In general, the necessary devices are must medium smartphones or tablets with cameras (Blankenberg et al., 2021).

In addition to the devices' high cost, there are also limitations with using augmented reality as a teaching tool. Some studies suggest that AR may not be successful, particularly in packed classrooms and when technological difficulties arise. Because AR can only be used as 3D visual aids for learning the topic that can be visualised, there are some subjects where using AR as teaching material is ineffective,

such as mathematical equations (Blankenberg et al., 2021).

1.3 Research Questions

The researchers has developed a several questions based on the problem statement

RQ1: What are the factors that could influence the intention to accept of augmented reality (AR) technology in the higher education institutions?

RQ2: What are the relationship between these factors and the intention to accept of augmented reality (AR) technology in the higher education institutions?

RQ3: What are the most influence factors and the intention to accept augmented reality (AR) technology in the higher education institutions?

1.4 Research Objectives

RO1: To determine the factors that could influence the intention to accept augmented reality (AR) technology in the higher education institutions.

RO2: To examine the relationship between these factors and the intention to accept of augmented reality (AR) technology in the higher education institutions.

RO3: To analyze the most significant factors that could be related to the intention to accept augmented reality (AR) technology in the higher education institutions.

1.5 Scope and Limitations of the Research

1.5.1 Scope

The purpose of this study is to determine the acceptance of augmented reality (AR) technology in higher education institutions. Quantitative research methods are used to collect data for future research or analysis using relevant tools. While collecting information related to this research, the researcher used two different types of data from primary and secondary data sources.

Furthermore, this study includes various demographic profiles such as group age, gender, races, level of education and universities which may cause different perspectives on the use of AR technology. The respondents was collected in the selected universities such as UTeM, USM, UTM, UNIMAS, UUM, UniIMAP, UPSI, UITM and MMU. In addition, this study has been built on the theory of unified acceptance and the use of AR technology (UTAUT) to improve students learning at the higher education level.

1.5.2 Limitations

The main limitations of this research is limited of time for conducting the search that led to data collection constraints. Furthermore, there are some of the secondary data sources that hard to access due to the private and only the member of the organisation can access it. Besides, some of the article also required fees to obtain the full details of the documents. Apart from that, the honesty of the respondent in data collection are very helpful but some of them are not responsible or not honesty to respond the questionnaire. These conditions effects the findings of this research.

1.6 Significance of the Research

1.6.1 Academic

This study will give benefits to the students for understanding of the augmented reality (AR). However, In this study of this research work, the researchers extend the Unified Theory of Acceptance and Use of Technology (UTAUT) model proposed by (Venkatesh et al., 2003) and the Theory of Planned Behaviour (TPB) proposed by (Ajzen 1991). As a result, it will contribute to the body of knowledge in technology management research.

Academic literature, such as this study, has assisted academics in better understanding innovation processes and the factors that influence new technology adoption and distribution. Researchers examined models of creation, transfer of technology, and adoption to assist organisations direct their strategy for introducing and

adopting new technologies. This research have a big opportunity in the improvement of technological innovation.

1.6.2 Practitioner

Augmented Reality (AR) technology has become increasingly significant to Practitioner communities in a variety of fields, including medicine, engineering, architecture, and education. Here are some ways in which AR technology is being used by practitioners:

Medical practitioners are using augmented reality (AR) technology to improve medical simulations, training, and patient care. AR technology helps medical professionals visualize and manipulate 3D models of internal organs, enabling them to better understand and diagnose illnesses.

Next, engineers are using augmented reality (AR) technology to improve the design and maintenance of complex systems, such as aircraft and machinery. AR technology enables engineers to overlay digital models onto physical objects, helping them to identify problems and make improvements more quickly.

Besides, architects also are using augmented reality (AR) technology to create immersive visualizations of buildings and urban environments. AR technology enables architects to walk through and experience building designs before they are constructed, helping them to identify potential problems and make design improvements.

Last but not least the educators. they are using augmented reality (AR) technology to create interactive and immersive learning experiences for students. AR technology enables students to visualize complex concepts, making it easier for them to understand and retain information.

1.7 Summary

Based on the research, it was found that most students were generally positive towards the use of augmented reality (AR) technology to enhance their learning experience in higher education institutions. Students felt that the technology had the potential to create a more engaging and interactive learning environment, which could lead to better knowledge retention and understanding. However, there were some concerns raised regarding the cost and accessibility of augmentd reality (AR) technology, particularly for students from low-income backgrounds. It was also noted that some students may not be as comfortable with technology in general, which could impact their willingness to use augmented reality (AR) in their learning. Overall, the research suggests that AR technology has the potential to enhance the learning experience for students in higher education, but it is important for institutions to consider these concerns and ensure that the technology is accessible and affordable for all students.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this study is to determine factors of intention to accept the augmented reality (AR) technology to enhancing students learning in higher education institutions. In this chapter, the dependent variables will be stated clear. The dependent variables is intention to accept augmented reality (AR) technology to enhancing students learning in higher education, and the independent variables is attitude from TPB (theory of planned behavior), performance expectancy, effort expectancy, social influencing and facilitating conditions from UTAUT. (Nor Zairah Ab.Rahim, 2012) stated that The Unified Theory of Acceptance and Use of Technology (UTAUT) were used for this study because of its advantages. While, for Theory of Planned Behavior (TPB), This theory enables you to understand how individuals behave across different settings, scenarios and situations. Unlocking insight based on attitudes towards behaviours, norms and perceived control enable practitioners and marketers to understand where barriers exist and how to encourage a change in behaviour (Theory of Planned Behaviour, 1991). The theory that researcher used is extended UTAUT (UTAUT + TPB).

2.2 Higher Education

Higher education is the third degree of education after high school. It takes place at colleges and universities and frequently includes both undergraduate and graduate courses. Further education increases your chances of getting a job and boosting your earning potential (What Higher Education Is," 2015). Higher education is a valuable cultural and scientific resource that supports human growth as well as economic, technical, and societal transformation. It encourages the interchange of information, research, and innovation, and it prepares students for ever-changing employment markets. It is a passport to economic stability and a steady future for students in poor situations.

With increased enrollment, student mobility, diversity of provider, research dynamism, and technology, higher education has evolved drastically during the last few decades. There are around 235 million students enrolled in universities worldwide (UNESCO, 2022) India has the most universities in the world. According to data from July 2021, India had an estimated 5,288 universities. The United States had 3,216 universities, followed by Indonesia, which had 2,595 institutions.

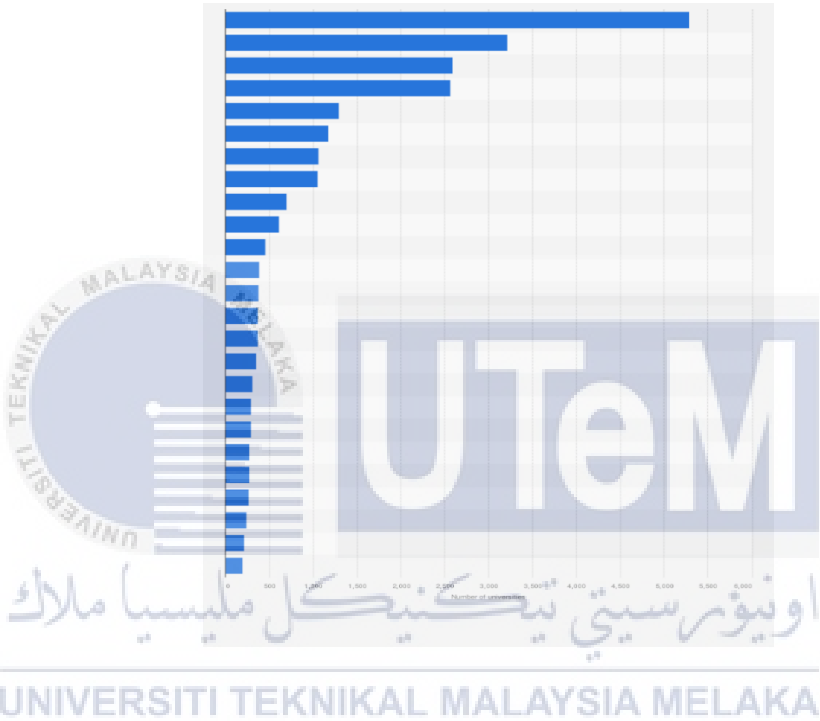


Figure 2.1 : Number of universities worldwide in 2021, by country
Source : Statista Research Department, Nov 17, 2022

The University of Malaysia in Kuala Lumpur started the Malaysian higher education system formally in 1959. Since then, the evolution of Malaysia's higher education system has been closely linked to social progress or domestic demands. International requires such as globalisation, internationalisation, and trade in higher education have impacted the Malaysian higher education system in modern Malaysia. (Morshidi, 2010).

Following the creation of the Ministry of Higher Education Malaysia (MOHE) on March 27, 2004, the growth of higher education has received major attention. 2019 Munusamy and Hashim (Dobos, 2011). In May 2013, The Ministries of Education (MOE) and Higher Education (MOHE) were united to accelerate change and align education strategy goals across both ministries. MOHE was re-established in 2015, two years later, to meet the demand for human resource development. However, (Miandy Munusamy & Hashim, 2019) said it was abolished following the 14th General Election in May 2018 in accordance with the new Malaysian agenda.

Furthermore, higher education in Malaysia is well-organized. The country has a large number of higher education institutions. International students look for to continue their higher education at popular Malaysian universities that provide a diverse selection of professional and academic programmes. In Malaysia, both public and private higher education institutions provide great educational courses and programmes (Malaysia education info, 2023).

In addition, Malaysia has 20 government institutions of higher learning, 50 private universities, and six foreign university branch campuses in 2011, as well as 403 active private colleges, 30 polytechnics, and 73 public community colleges in 2011. These HEIs provide a wide choice of higher credentials at affordable prices.

Currently, (UNESCO National Commission Country Report Higher Education Report MALAYSIA, 2022) mentioned that Malaysia has 20 public universities, 36 polytechnics, and 105 community colleges, according to the report. Apart from declare HEIs, Malaysia has 434 private HEIs (PHEIs), which are grouped into four groups: 54 universities, 39 university colleges, 331 colleges, and 10 international branch campuses (IBC). Nottingham University Malaysia, the University of Southampton Malaysia, and Monash University Malaysia are among famous IBCs. As shown in Figure 2.2, this raises the total number of HEIs under the directauthority of MOHE to 595.

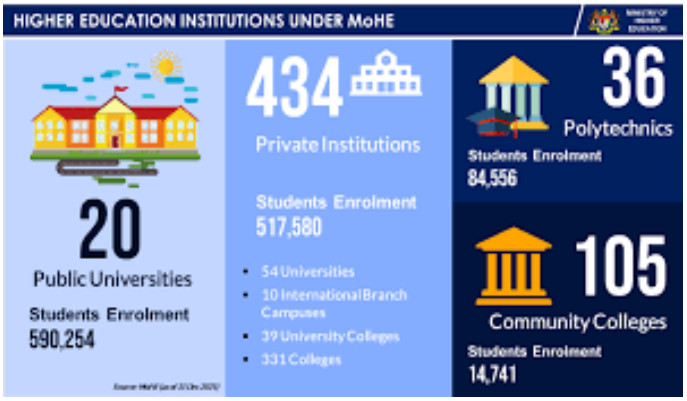


Figure 2.2 : Higher Education Institutions in Malaysia
Source : UNESCO National Commission Country Report Template (Under the UNESCO World Higher Education Conference, 2022)

2.3 Augmented Reality

Augmented reality (AR) generated by computers perceptual information-enhanced interactive experience that augments the actual environment is known as augmented reality. Augmented reality places digital content on real-world environments and objects via software, programmes, and hardware such as AR glasses. This enhances the user experience and turns one's immediate surroundings into an interactive learning environment, which is particularly valuable in manufacturing and Industry 4.0 activities. It allows industrial users to become "one" with the systems and machines with which they connect, as well as to enrich and complement technology and IoT networks with human ingenuity, observation, and creativity.

Nowadays a new medium “Augmented Reality” offer us unique affordances, combining physical and virtual worlds. This is the new way of manipulating how we interact with that world. Without replacing the real world. this technology augments virtual information on top of the real world with continuous and implicit user control of the point of view and interactivity. It provides a composite view for the user with a combination of the real scene viewed by the user and computer generated virtual scenes (Kesim & Ozarslan, 2012).

Furthermore, the use of Augmented Reality has been used in various field. According to (Wang et al., 2020), Tourism, archaeology, art, commerce, industrial manufacture and maintenance, education, disaster management, entertainment and leisure, and medical care have all made use of augmented reality technologies.

The use of augmented reality technology to tourist attractions in the sector of tourism can restore historic sites by employing mobile phone cameras, screen software, and other technical means to merge genuine situations. Using AR applications in the tourism sector, will in the future become inevitable for companies to remain competitive in this business (Gharaibeh et al., 2021). Although AR applications are still at an early stage of commercialization, the amount of technology spending is large.

Anay et al., 2022 has mentioned that archaeology is a process that is based on hermeneutics. there will always be new discoveries and data, which will lead to new interpretations, which may lead to either refining of current conjectures or invention of new ones, and occasionally even removal of the old ones. Additional information may be gathered in addition to viewing scenes. In archaeological investigations, augmented reality (AR) technology is frequently utilised to zoom in on artefacts in actual settings so that archaeologists may more correctly locate their position.

The application of augmented reality (AR) technology in the field of art has enabled people to have more angles of experience and interpretation of reality. Often this fusion of reality and reality has become an art form. An artist can create an AR experience for their viewers with a webAR link, QR code, or the painting itself. That will create a more engaging experience for the viewer (John Hymes, 2021).

Next, in term of medical. (Wang et al., 2020) report that the doctor can use the augmented reality (AR) technology to more accurately locate the patient's surgical site. The AR technology can better observe the fetus in real time. The augmented reality (AR) technology can also remind the patient to take the medicine on time by letting the patient wear the relevant equipment.

However, in this research. The researchers will focus on the augmented reality (AR) technology in education. Research on AR in education has demonstrated that AR has a positive effect on students' learning outcomes (Avila-Garzon et al., 2021). As teaching and learning is a crucial process, many computer-based technologies have been proposed to provide new experiences in these activities. Over the past two decades, many researchers and educators have worked on ways to bring AR and VR into educational setting (Dalim et al., 2017). Furthermore, AR can be used widely in all fields of education and the efficiency of the teaching and learning process will be improved. In order to in doing this, augmented reality (AR) technology in education mostly uses tools such as smartphones and even tablets in the learning process. MART (Mobile Augmented Reality) is the one of the example of the devices.

There are various advantages of using mobile-augmented reality (mAR) as a learning medium. (Abdillahi Barreh & Abas, 2013) claimed that Augmented Reality (AR) helps to improve the learning experience by employing 3D synthetic objects allowing students to observe the item using their eyesight with various mobile interfaces. the 3D objects may be controlled through interaction. This helps the learner to more vividly visualise the learning content by using 3D objects and interactivity to see how particular objects might behave (Bulagang & Baharum, 2017). For example. MARLCardio is the one application that we can see for the students usage for enhance their learning in medical.

Figure 2.3 : Mobile Augmented Reality
Source: what is Augmented Reality, 2018

2.4 Dependent variables

2.4.1 Intention to accept AR technology

In preceding years, AR is designed to impact learner's understanding in the fields of medical, science and education. Though, most of the work is done in teaching with e-learning, blended learning, MOOCs and augmented reality, yet closely related work is summarized in subsequent paragraphs (Mumtaz et al., 2017). Using AR technology in education is to improve the quality of learning and make it more engaging, interactive and fun for students. The application of augmented reality in classrooms, like many previous educational advances, may face institutional limitations and teacher hesitation. However, the nature of typical AR system approaches differs significantly from the teacher-centered, delivery-based focus of traditional education techniques (Bower et al., 2014; Kerawalla et al., 2006).

According to researchers, motivated students put more effort into finishing a task than uninterested students do. When someone is motivated, they have the power to start and control their behaviour in order to complete a task. Numerous studies have been conducted and are available in the literature that support the use of augmented reality to improve student motivation by better visualising the course information (Di Serio et al., 2013; Martin-Gutierrez, 2014).

AR has been shown to improve learning outcomes and information visualisation by producing richer (Sırakaya & Sırakaya, 2022). Additionally, it has been discovered that this has a favourable effect on students' levels of engagement, satisfaction, and drive to learn (Akçayır & Akçayır, 2017). The bulk of higher education students are digital natives who grew up with technology and hence anticipate its integration into every area of daily life. It's worth noting that regular usability concerns and a lack of understanding with new technologies are widespread (Akçayır & Akçayır, 2017). Moreover, it is confirmed that AR has enhanced learning outcomes in STEM topics (Sırakaya & Sırakaya, 2022). AR has also been shown to improve learning outcomes and information visualisation through the creation of richer, more immersive content.

Table 2.1 : Definitions of Intention to use/accept

Themes	Definition	Authors
Intention to use/accept	the extent to which a user experiences positive feelings in using technology	(Teo, 2019)

2.5 Independent variables

2.5.1 Attitude

Attitudes. This refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior of interest. It entails a consideration of the outcomes of performing the behavior. In this study, The attitudes (ATT) of higher education students are defined as the degree to which they have positive or negative reactions to the intention of accepting Augmented Reality for enhancing their learning. Attitudes (ATT) are one of the influencing elements towards suggested technologies that have already been identified in the Theory of Planned Behaviour (TPB). Previous research demonstrated that an individual's good attitude increased their positive decision to purchase on list products in the setting of a mobile shopping application. (Gao et al., 2015). In otherwords, individuals' attitude (ATT) will decide how they are using the suggested technologies.

Table 2.2 : Definitions of Attitude

Theme	Definition	Author
Attitude	A person's attitude can be described as their level of positive or negative perception of the behaviour.	(Ajzen, 1991.)
Attitude	A disposition to respond favorably or unfavorably towards some psychological object.	(Ajzen & Fishbein, 1975)

2.5.2 Performance Expectancy

Performance expectancy is defined how the participants perceive that the use of augmented reality (AR) technology will improve their performance during the learning process. (Ghalandari, 2012) mentioned that the usefulness of perceptions is the degree to which a person thinks that employing a specific system will enhance the quality of his job. The relative advantage is how a system's capabilities enhance the efficiency of specific tasks. The repercussions of behaviour are related to the results outcomes. They are divided into personal expectations and performance expectations based on actual evidence

Table 2.3: Definitions of Performance Expectancy

Themes	Definition	Authors
Performance Expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance	(Venkatesh et al., 2003.)
Performance Expectancy	User expectancy of the technology in assisting them to increase their work performance	(Nordin et al., 2016)

2.5.3 Effort Expectancy

Effort expectancy is defined as determines the level to which a participant believes that AR technology will be easy to use. When predicting user intention using augmented reality (AR) technology, effort expectancy is important. Therefore, the effort expectancy has a positive effect on intention to accept augmented reality (AR).

Table 2.4 : Definitions of Effort Expectancy

Themes	Definition	Authors
Effort Expectancy	Defined as the level of ease associated with the use of a technology	(Venkatesh et al., 2012)
Effort Expectancy	Technology ease of use	(Nordin et al., 2016)

2.5.4 Social Influencing

The emerging characteristics that impact an individual's decision to accept technology have identified SI as one of the possible determinants (Ajzen, n.d.; Taylor & Todd, 1995). The people emphasised that peers and superiors are the groups of people who have a strong effect on people's opinions about implementing specific technologies (Taylor & Todd, 1995). Social Influencing was defined in this study as the amount to which students feel that other key groups of people agree they should continue to use augmented reality (AR) in the learning process. Using the Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm, previous research shows that SI is one of the primary elements influencing an individual's decision to use new technology after seeing their colleagues do better at their jobs (Maillet et al., 2015).

Table 2.5 : Definitions of Social Influencing

Themes	Definition	Author
Social Influencing	The extent to which people believe that using the new system is something they should do.	(Venkatesh et al., 2003.)
Social Influencing	Influential factor in explaining the use of technology.	(Sripalawat et al., 2011.)

2.5.5 Facilitating Conditions

Facilitating condition that was generated from previous constructs, particularly perceived behaviour control in the Decomposed Theory of Planned Behaviour and Theory of Planned Behaviour, based on the concept of UTAUT. Facilitating Conditions (FC) are conditions offered by authorities to increase the application of suggested technology. In this study, Faciliating Conditions (FC) were defined as students' reported level of interest in using augmented reality (AR) in the learning process on a continual basis. A previous research used the Theory of Reasoned Action to the use of mobile commerce services (Lin et al., 2014).

Table 2.6 : Definitions of Facilitating Conditions

Theme	Definition	Author
Facilitating Conditions	The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system.	(Venkatesh et al., 2003)
Facilitating Conditions	Which an individual perceives that organizational and technical infrastructures required to use the intended system are available	(Ghalandari, 2012)

2.6 Underpinning Theory

2.6.1 UTAUT

Researchers performing empirical studies of user intention and behaviour frequently capitalise on UTAUT as a theoretical lens in technology adoption and diffusion research (Williams et al., 2015).The ongoing management task of ensuring user acceptance of technology is a constant. (Maciej Serda et al., 2007), and one that has accepted IS/IT researchers to the point that technology adoption and dissemination study is now regarded as one of the more mature fields of research (Venkatesh et al., 2003).

This significant level of activity has seen the use of a wide range of exploratory techniques examining many different systems and technologies in countless different contexts, to the point where even a quick review of the existing body of literature reveals a variety of stakeholder perspectives, technologies and contexts, units of analysis, theories, and research methods (M. Williams et al., 2011).

This condition has led to some confusion among researchers, who are sometimes required to pick and select features from a wide range of often against models and ideas. In response to this confusion, and in order to harmonise the literature on new technology acceptance, Venkatesh et al.(2003) developed The Unified Theory of Acceptance and Use of Technology (UTAUT), a unified model that brings together alternative views on user and innovation acceptance (Williams et al., 2015).

The UTAUT suggests that four core constructs (Performance expectancy, Effort expectancy, Social influence and Facilitating conditions) (Venkatesh et al., 2003). Researchers and practitioners, it is argued, will be able to determine an individual's intention to use a specific system by examining the presence of each of these constructs in a'real world' environment, allowing for the identification of the key influences on acceptance in any given context.

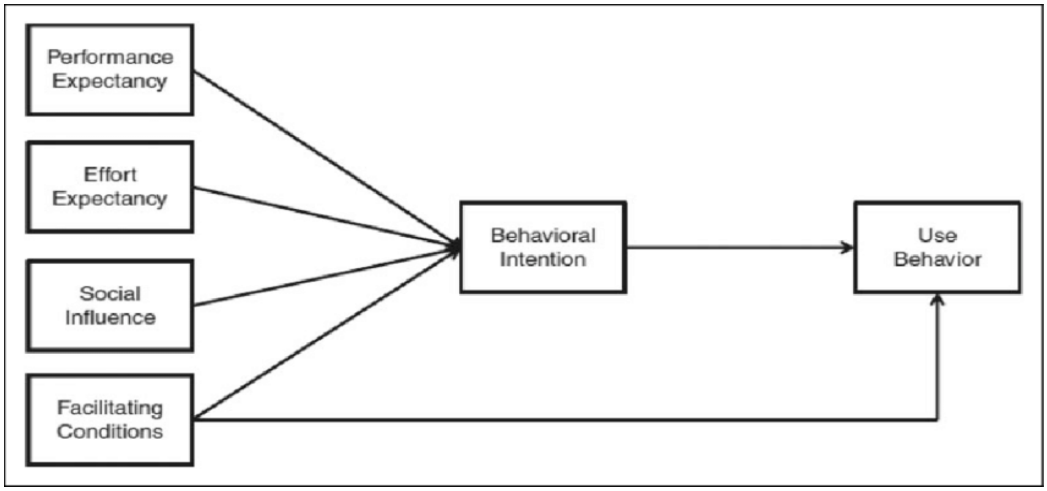


Figure 2.4 : Framework of UTAUT
Source : The Unified Theory of Acceptance and Use of Technology

2.6.2 THEORY OF PLANNED BEHAVIOR

Research dealing with various aspects of the theory of planned behavior (Ajzen, 1985, 1987) is reviewed, and some unresolved issues are discussed. In general terms, empirical data shows that the hypothesis is well supported. Attitudes towards the behaviour, subjective norms, and perceived behavioural control may all be used to predict different types of behaviour with high accuracy; and these intents, along with perceptions of behavioural control, account for a significant amount of variance in actual behaviour.

While attitudes, subjective norms, and perceived behavioural control have been demonstrated to be connected to suitable sets of salient behavioural, normative, and control beliefs about the behaviour, the actual nature of these relationships remains unknown. In dealing with these relationships, expectancy value formulations are only partially successful.

Finally, Another unsolved problem is the addition of previous behaviour in the prediction equation. The scant evidence on this subject indicates that the theory predicts behaviour pretty well in compared to the behavioural reliability ceiling. (Ajzen, 1985, 1987).

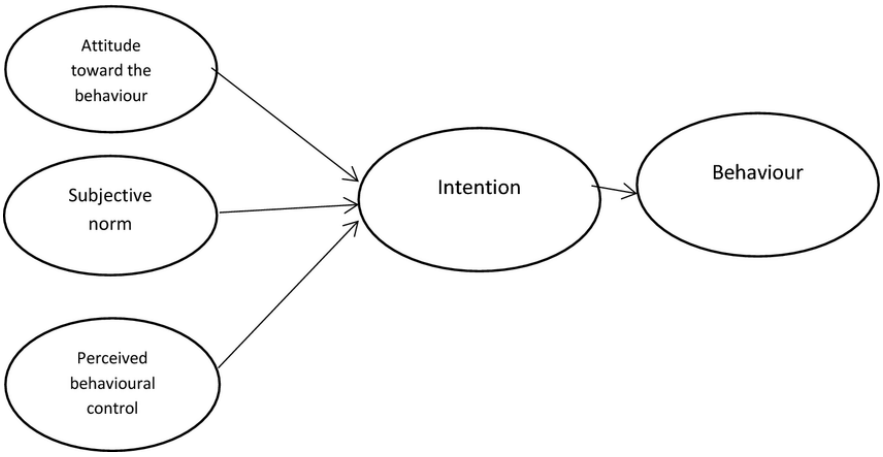


Figure 2.5 : Framework of Theory Planned Behaviour (TPB)
Source from: Theory of Planned Behaviour

2.7 Theoretical Framework

Extended UTAUT

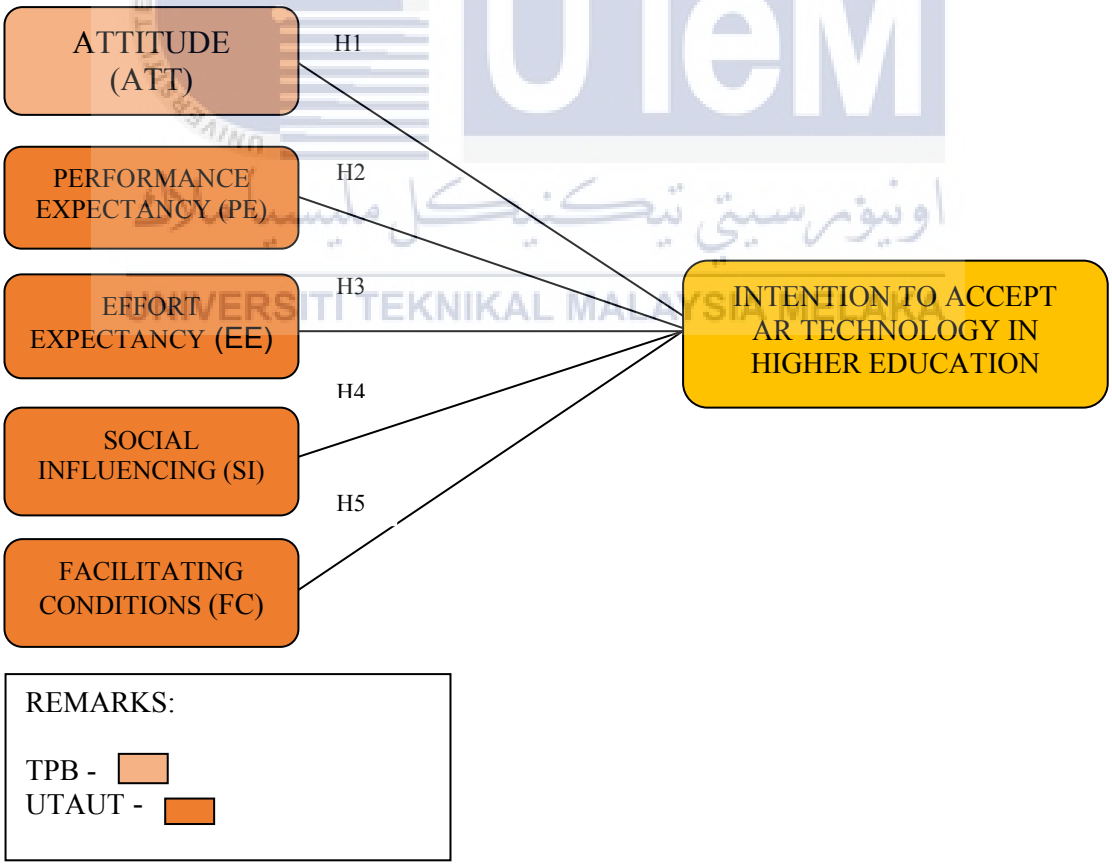


Figure 2.6 : Theoretical Framework of the study

2.8 Hypotheses Development

2.8.1 Attitude and the Intention to accept the AR technology

The attitude (ATT) in this study is defined as the proportion of higher education students who have favourable or unfavourable reactions to using and intending to utilise AR technology for enhancing students learning in higher education institutins. Augmented Reality (AR) is one of the technology application that students used in their learning process. One of the contributing elements is attitude (ATT). Technology Adoption Model (TAM), Theory of Reasoned Action, and Decomposed Planned Theory of Behaviour have all previously recognised attitudes towards suggested technology. In several study situations, previous studies discovered a favourable relationship between the attitude (ATT) and Actual usage (AU) factors. For instance, responses from 330 users of social networking sites (SNS) demonstrate that the Attitude (ATT) is effective in predicting how social networking sites are used (Ha et al., 2015). Besides, Researchers in the past also discovered that a person's positive mood had an impact on their decision to buy items from a list when using a mobile shopping application (Gao et al., 2015b).

To put it another way, people's attitude (ATT) will influence how they utilise the suggested technology. As a result, the following hypothesis was intended:

H 1: The attitude (ATT) of Malaysian university students significantly affect their Intention to accept augmented reality (AR) technology.

2.8.2 Performance Expectancy and the Intention to accept the AR technology

Performance expectancy is defined as the degree to which participants believe using AR technology will enhance their performance while studying (Sunardi et al., 2022). Performance Expectancy is defined as the degree to which a higher institution student feels that applying augmented reality application will help to increase their performance in the learning process for the purposes of this study. Previous research found that Performance Expectancy always had an advantageous impact on detecting the intention of provided technology in various contexts of study (Nabihah Mohd Nizar et al., 2019).

H2: Performance Expectancy of Malaysian university students has a significant affect towards their intention to accept augmented reality (AR).

2.8.3 Effort Expectancy and the Intention to accept the AR technology

The definition of effort expectancy is the degree to which a participant thinks AR technology will be user-friendly (Sunardi et al., 2022). In this study, Effort Expectancy is defined as the number of higher education students who feel they would be free of effort while utilising augmented reality (AR). Previous study findings support the existence of a relationship between Effort Expectancy and intention. Their research found that perceived ease of use is the most important indicator of customer satisfaction with mobile application services. All of these data demonstrate that when a person believes the proposed technology is simple to use and can provide benefits, the number of people who utilise it increases. Nonetheless, it found positive significant relationship between the stated technology's with the effort Expectancy and the intention to use (Nabihah Mohd Nizar et al., 2019).

The current study will conduct more research on the subject using the following hypothesis:

H3: Effort Expectancy of Malaysian university students has a significant affect on their intention to accept augmented reality (AR)

2.8.4 Social Influencing and the Intention to accept the AR technology

The degree to which a participant thinks that significant others' opinions have an impact on augmented reality technology is known as social influence (Sunardi et al., 2022). Social Influencing has been acknowledged as one of the potential markers by the emerging aspects that affect a person's decision to utilise technology (Ajzen, n.d.; Taylor & Todd, 1995). People emphasised that the social groupings that have the biggest impact on an individual's decision to use a certain technology are peers and superiors (Taylor & Todd, 1995). For the purposes of this study, student perception index (SI) was defined as the degree to which students feel that other significant groups of individuals think they should keep utilising augmented reality (AR) in the learning process. According to research based on the Unified Theory of Acceptance and

Use of Technology (UTAUT) model, Social Influencing is one of the primary elements influencing a person's decision to use proposed technology when they observe their coworkers performing better at their jobs (Maillet et al., 2015).

This study's conclusion was further supported by Hamari and Koivisto (Hamari & Koivisto, 2015), who found that peer's influence had a significant impact on the use of mobile applications for encouraging physical activity. Therefore, the current investigation continues the following hypothesis:

H 4: Social Influencing of Malaysian university students has a significantly affect on their intention to accept augmented reality (AR)

2.8.5 Facilitating Conditions and the Intention to accept the AR technology

A participant's level of confidence in the infrastructure's ability to support augmented reality technology is known as the facilitating condition (Sunardi et al., 2022). Facilitating conditions, such as perceived behaviour control in the Decomposed Theory of Planned Behaviour and Theory of Planned Behaviour, were evolved from earlier constructs that were founded on the notion of UTAUT. Facilities supplied by the government to increase the usage of suggested technology are referred to as FC. In this study, Facilitating Conditions "FC" was defined as the students' perceived amount of support for using augmented reality (AR) continuously when helped by a mobile device. In a previous research, the Theory of Reasoned Action was expanded to explore how mobile commerce services are used (Lin et al., 2014).

The same conclusion was also reported in a research by Shang and Wu (Shang & Wu, 2017), which found that customers' decisions to use mobile purchasing services were influenced by their perceptions of the valve. Therefore, the following hypothesis was investigated in this study:

H 5: Facilitating Conditions of Malaysian higher institution students has a significant affect on their intention to accept augmented reality (AR).

2.9 Summary of Hypothesis

Table 2.7 : Summary of Hypothesis

Hypothesis	Statement	Reference
H1	The Attitude (ATT) of Malaysian university students significantly affect their Intention to accept augmented reality (AR).	(Ha et al., 2015) (Gao et al., 2015)
H2	Performance Expectancy (PE) of Malaysian university students has a significant affect towards the intention to accept augmented reality (AR).	(Sunardi et al., 2022) (Nabihah Mohd Nizar et al., 2019)
H3	Effort Expectancy (EE) of Malaysian university students has a significant affect on intention to accept augmented reality (AR).	(Sunardi et al., 2022) (Nabihah Mohd Nizar et al., 2019)
H4	Social Influencing (SI) of Malaysian university students has a significantly affect on their intention to accept augmented reality (AR).	(Ajzen, n.d.) (Ajzen, n.d.; Taylor & Todd, 1995) (Maillet et al., 2015) (Hamari & Koivisto, 2015)
H5	Facilitating Conditions (FC) of Malaysian higher institution students has a significant affect on intention to accept augmented reality (AR).	(Lin et al., 2014) (Shang & Wu, 2017)

2.10 Summary

Essentially, this chapter defines the aim to learn about the use of AR Technology before discussing the independent variables of the research, which are attitude, performance expectancy, effort expectancy, social influencing and facilitating conditions. The research also explains the concept of The Unified Theory of Acceptance and Use of Technology (UTAUT) and Theory of planned behaviour (TPB). In the last section, a conceptual framework and hypothesis development are added.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter will describes the method that researchers applied in this study. Research methodology simply refers to the practical "how" of a research study. More specifically, it's about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims, objectives and research questions. Specifically, how the researcher went about deciding (Derek Jansen & Warren, 2020.). Additionally, the study design is described in this chapter, and the research approach is aimed at solving the research problem.

3.2 Research Design

Research is a careful and systematic way of solving problems and gaining new knowledge. The meaning of research design is deceptively easy to understand. it is a strategy that offers the underlying framework for integrating all aspects of a quantitative study to ensure that the findings are reliable, unbiased, and as broadly applicable as possible (Dannels, 2018). The research design determines how the participants are chosen, what variables are used and how they are adjusted, how data are gathered and analysed, and how unnecessary variability is managed so that the overarching research topic may be addressed. No matter how sophisticated the statistical analysis, if the wrong study design was utilised, the researcher's results can be useless. According to Asenahabi (2019), that research can also be defined as being a systematic process of discovery and advancement of human knowledge. It should solve a problem or make an innovative contribution to the existing body of knowledge.

3.3 Research Design method

Three primary types of research designs include descriptive, exploratory, and explanatory (causal) designs. Descriptive research focuses on observing and describing the characteristics of a phenomenon, typically using surveys, case studies, or content analysis. Exploratory research aims to generate insights and formulate hypotheses for further investigation, often employing literature reviews, interviews, and focus groups. Explanatory research, on the other hand, investigates cause-and-effect relationships between variables, employing experimental or quasi-experimental designs to establish causal connections.

Creswell, 2014 indicates that while organising a study, three areas should be considered: philosophical worldviews, research design, and research methodologies (Figure 3.1). The research design is regarded as a component for the study in order to determine if the design should be quantitative, qualitative, or mixed approaches (Habib, 2021).

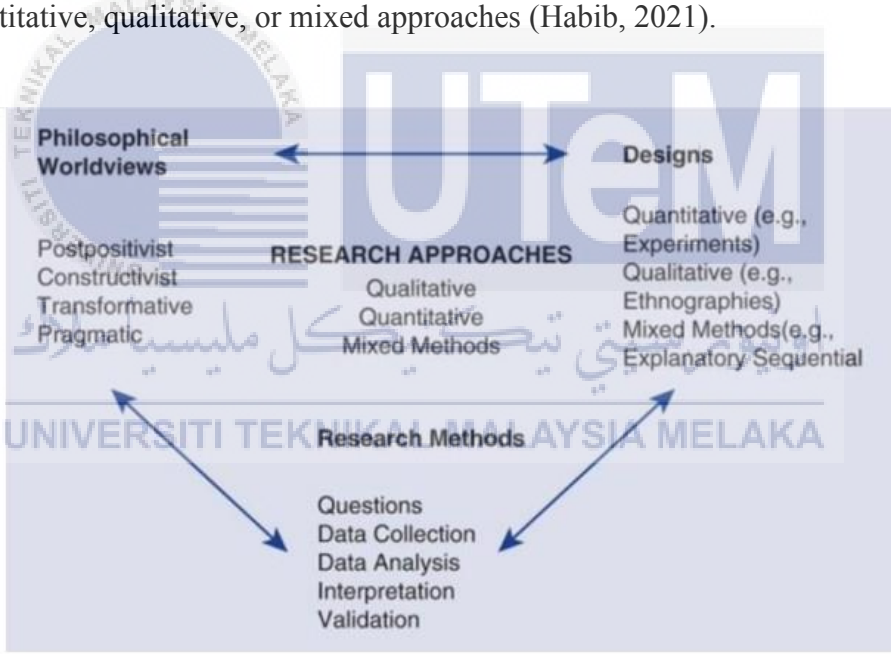


Figure 3.1 : Research Approaches
Source: Research Design: Qualitative, Quantitative, and Mixed Methods, 2018

In this research of study, the researcher has used the descriptive research and explanatory method for respondents to answer the questions.

3.3.1 Descriptive Research Design

According to Best and Kahn (2007), The phrase descriptive research has been incorrectly used to three different types of study. Maybe the similarities have hidden their differences. Each of them uses the process of systematic research to obtain and analyse empirical facts in order to build knowledge. Each requires the knowledge of a thorough and systematic investigator to be done competently. A little explanation may help to put each one into context (Neeru Salaria, 2012).

The term descriptive research is often used among research methodologists. Descriptive research is described as a research approach used to correctly characterise existent occurrences. The term "existing phenomena" distinguishes descriptive research from experiment research, which examines not only existing phenomena but also phenomena following a time of treatment. The results of descriptive investigation are already accessible. What a researcher must do is collect accessible data using research tools such as tests, questionnaires, interviews, and even observation. The main goal of descriptive research is to describe systematically the existing phenomena under the study (Atmowardoyo, 2018).

Descriptive studies summarise data such as the mean, median, mode, departure from the mean, variance, percentage, and correlation between variables. This type of measurement is common in survey research, although it often extends beyond descriptive data to generate judgements.

3.4 Methodological Choices

There are various types of methodological research, broadly categorized into quantitative, qualitative, and mixed-methods approaches. Quantitative methodological research focuses on refining and advancing statistical techniques and experimental designs for numerical data analysis, often aiming for precision and generalizability. Qualitative methodological research seeks to deepen the understanding of subjective experiences and social phenomena, refining techniques such as interviews, observations, and content analysis. Mixed-methods research combines both quantitative and qualitative approaches, utilizing their

respective strengths to provide a more comprehensive and nuanced understanding of a research problem.

In this research, researcher has used quantitative method research. Quantitative is defined as the systematic investigation of a phenomena using the collecting of numerical data and the use of mathematical, statistical, or computational methods (Olasile babatunde adedoyin, 2020). Quantitative research refers to a variety of methodologies associated with the systematic analysis of social phenomena through the use of statistical or numerical data. As a result, quantitative research requires measurement and requires that the phenomena under investigation can be measured. Quantitative research aims to collect data through measurement, examine this data for patterns and correlations, and validate the measurements performed. All of this is covered by quantitative research.

For all methods of measurement, the same standards are used to verify, compute, and interpret the results. The variables and hypothesis that make up quantitative research objectives cannot be separated since each of these categories have variants that can take many different values. Hypothesis are unknown claims or maintains about the connection between variables (Olasile babatunde adedoyin, 2020). According to (Håkansson, 2013), The most often used research methods in quantitative research include surveys, ex post facto, case studies, and experimental research.

3.5 Research Strategy

The purpose of this chapter is to outline the types of research strategies which are used to investigate and analyse. A research strategy is a general plan for carrying out a research investigation. A research strategy guides the study's conception, execution, and assessment.

Acccording to the theoretical framework, to gather data from respondents, the survey is separated into two sections: demographics and variables influencing students' intention to accept AR technology in enhancing students learning in higher education institutions.

Likert, 1932 stated the likert scale has been used to create the questionnaire. The five-point Likert scale would start off negatively with 1 signifying a lot of disagreement and end positively with 5 signifying a lot of agreement.

Strongly disagree	Disagree	Normal	Agree	Strongly Agree
1	2	3	4	5

Figure 3.2 Five Point Likert Scale
Source : (Likert, 1932)

3.5.1 Questionnaire Design

In this part, the questionnaire were construct in the google form and has been distributed in online. There will be section A, section B, section C and Section D. Section A will consist of with the demographic information such as age, gender, race, level of educations and universities. Section B will consist with the general questions about augmented reality (AR) technology. The example questions in section B is "Have you ever heard about augmented reality (AR) technology?", "What are the AR related devices that you have used in your process learning?" and many more. Section C and section D will related with the subjective norms. For example, in the likert scale contains 5 scales namely 1 refers to strongly disagree, 2 refers to disagree, 3 refers to normal, 4 refers to agree and 5 refers to strongly agree. Section C are contained with the Independent variables key constructs such as (Attitude, Performance Expectancy, Effort Expectancy, Social Influencing and Facilitating Conditions) while in section D, it contains the Dependent variable questions, which is Intention To accept.

3.6 Scientific Canons

3.6.1 Pilot Test

Pilot testing is a type of software testing that decides the component of the system or the entire system under real-time operational settings. The Pilot Test is used to evaluate a research project's feasibility, length, cost, risk, and performance. A strong research study with appropriate experimental design and correct delivery is necessary to achieve high-quality results (In, 2017).

In order to avoid wasting time and resources, the created questionnaire was evaluated before the study to see if it was feasible. The pilot test included the target universities students. The research are collect 30 to 50 participants for pilot test. The amount of time it took them to complete the questionnaire, its validity, reliability, applicability, and sensitivity, as well as any difficulties they encountered, were noted. The SPSS statistical programme was then used to test the reliability of the results. Based on the results and comments from the pre-testing, the questionnaire was modified.

It's crucial to understand the survey's potential flaws and limitations before actually sending out the questionnaire. Grammar and spelling mistakes have been fixed. Cronbach's Alpha results were also recorded for the pilot test and reliability test. One of the most important reasons for doing a pilot research is to collect the basic data needed to calculate a sample size for the primary outcome. For continuous outcomes, preparatory data such as the control group's mean and standard deviations are required (In, 2017).

3.6.2 Reliability Analysis of Pilot Test

Reliability is the consistency with which a technique measures something. The measurement is regarded dependable if the same result can be consistently obtained by using the same procedures under the same conditions (Fiona Middleton, 2019). Cronbach's alpha, often referred to simply as "Cronbach's alpha" or "α" (alpha), is a statistical measure used to assess the internal consistency or reliability of a set of related items in a questionnaire or survey. It was developed by Lee Cronbach in 1951. For this research, researcher has used the table of Kreje and Morgan. Unfortunately, for actual data, researcher just got 130 respondents. (Mundfrom et al., 2005) mentioned tha the minimum sample size required to meet the “good” level of agreement criterion begins to stabilize, in just about every case, at a point below 100.

Table 3.1 : Reliability Statistics of Pilot Test

Cronbach’s Alpha	N of items
0.920	30

Table 3.2 Interpretation Guidelines for Cronbach's Alpha

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionnable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Source : George and Malley (2003)

3.6.3 Sampling Technique

Sampling is an important component of every research study. The appropriate sampling technique may make or break the validity of the research, hence it is critical to select the appropriate approach for each question (Dan Fleetwood, 2019). The basic purpose of sampling is to establish a representative sample in which the smaller group (sample) appropriately represents the larger group (population). If the sample is carefully chosen, it will be generalizable to the population. There is 2 types of sampling procedures, which is probability sampling and non-probability sampling.

Table 3.3 Sampling Techniques in Quantitative and Qualitative Research

Probability Sampling	Non-probability Sampling
Simple random sampling (SRS)	Convenience Sampling
Systematic sampling	Purposive Sampling
Stratified sampling	Quota Sampling
Cluster sampling	Dimensional Sampling
Stage or multi-stage sampling	Snowball Sampling

Source : (Pace, 2021)

Probability sampling approaches often take longer and cost more than non-probability sampling procedures. Randomization is not used in non-probability sampling. This approach is highly dependent on the researcher's ability to pick sample items. The sample findings may be incomplete, making it impossible for all population segments to participate in the sample on an equal footing. While, Non-probability sampling is more dependent on the researcher's capacity to select and select from a greater variety of probable samples. The sample findings may be skewed, making it hard for all population elements to participate evenly in the sample (Saunders et al., 2019). As a result, the sample approach utilised in this study is non-probability sampling.

3.6.4 Validity

The approach measures what it claims to measure. When research has high validity, the findings connect to true physical or social qualities, traits, and variances (Fiona Middleton, 2019). There are several sorts of validity since the measurement precision of abstract notions is difficult to detect. Confusion and disagreement among experts on the definition of constructs and how they should be assessed can also occur (Simms, 2008). In this research, the internal validity is used to measure the presence of the scale items in the questionnaire of this research.

3.7 Sampling Design

3.7.1 Target Population

The target population of this study is the student from universities that implemented the AR technology in the course such as architecture, medical, engineering, animation and art. The target population will be in the Public and private universities. Here are some universities in Malaysia that are known to use Augmented Reality (AR) technology.

Firstly, Universiti Teknologi Malaysia (UTM). The Department of Geoinformation at UTM is known to use AR in their research and teaching. Acccording to (Admission to UTM, 2023), they have a total of 17,500 undergraduates students. Next University is Universiti Malaysia Sarawak (UNIMAS). The Faculty of Computer Science and Information Technology at UNIMAS has been using AR for various research projects (Faculty of Computer Science

and Information Technology, 2023). They have 15,000 undergraduate students. Besides, Our own university which is University Teknikal Malaysia Melaka (UTeM) have around 12,000 undergraduates students (Universiti Teknikal Malaysia Melaka, 2023). The Virtual Reality Lab at UTeM has been using AR for research and development of interactive virtual environments.

Next, Multimedia University (MMU) they have a total of 22,000 of students. The Institute of Postgraduate Studies at MMU has used AR in various research projects and academic programs (Multimedia University (MMU), 2023). Besides, Universiti Sains Malaysia (USM), the population is 28,000 (USM UNDERGRADUATE MALAYSIA, 2023). The School of Educational Studies at USM has used AR in their research to enhance learning. In addition, Universiti Teknologi Mara (UITM). This university has around 151,403 undergraduate students. The Faculty of Architecture. Art and Design and Engineering in this university has used the AR technology in their education (Uitm: pregraduate, 2023). Next, University Malaysia Perlis (UniMAP). UniMAP had approximately 8000 undergraduate students (Universiti Malaysia Perlis, 2024). Some UniMAP students might be working on individual projects, research initiatives, or personal learning endeavors that involve AR. These projects could be independent or supervised by faculty members interested in exploring AR's educational potential.

University Utara Malaysia (UUM). UUM Undergraduate Students is around 4,067 new students (Undergraduate Local. Universiti Utara Malaysia., 2022). UUM welcomed 4,067 new students for the 2022/2023 academic session, starting in October 2023. UUM used interactive learning apps. Students develop AR apps for educational purposes, like visualizing 3D models of molecules in chemistry or creating interactive history lessons. Last but not least. Univeristy Pendidikan Sultan Idris (UPSI). UPSI has 8,000 to 10,000 undergraduate students in 2023 (UPSI | Institut Pengajian Siswazah, 2023). Universiti Pendidikan Sultan Idris (UPSI) does incorporate Augmented Reality (AR) technology in their education across various faculties and departments, aiming to enhance learning experiences and foster deeper engagement. So, the target total of the population in this research is 94,500 respondents.

3.7.2 Sampling Size

The sample size of respondents for the study is calculated using the Krejcie and Morgan sample size table (Krejcie & Morgan ,1970). The sample size table by Krejcie and Morgan (1970) states that for a population of 94,500, a sample size of 384 usable data is needed for data processing. Consequently, 130 respondents make up the research's sampling size.

Table 3.4 : Krejcie and Morgan (1970) sample size table

TABLE 1

Table for Determining Sample Size from a Given Population

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.

Source : (Krejcie & Morgan , 1970)

In this research, the total respondents that researcher has collected are 130 respondents. Based on the table above, this match with the sample of 97 with the N is 130. The percentage of my response rate is 97/384 = 0.253. In this research, the researcher just got sample around 97. In addition, they also found a smaller sample size (< than 500) need 20% - 25% response rate to provide fairly confident estimates (Wu et al., 2022).

This research just got 130 respondents due to time constraints and also difficulty in finding students in the selected universities that are using augmented reality (AR) technology. So, the researcher has expand the respondents by adding another 4 universities to reach the target population but unfortunately, the researcher has not able to make it. So, the final total of the respondents that was collected is 130.

3.8 Data Collection Procedure

3.8.1 Primary Data Collection

Primary data is information gathered from firsthand experience and obtained directly from the source. According to (Joop J. Hox & Hennie R. Boeije, 2005), Primary data are data that are collected for the specific research problem at hand using procedures that fit the research problem best. The primary data for this study has been gathered via an online questionnaire in order to examine the most important factors that might have an impact on intention to accept AR technlogy in enhancing students' learning in higher education institutions . The Internet is a crucial instrument for data collection since it ensures the survey's adaptability and convenience for the respondents. A survey form has been developed and has been distributed online in the form of a Google Form. Researcher has chosen to use social media platforms for the purpose of conducting a survey or administering a questionnaire such as Facebook, Instagram and telegram.

3.8.2 Secondary Data Collection

Secondary data is the data that originally collected for a different purpose and reused for another research question (Joop J. Hox & Hennie R. Boeije, 2005). Secondary data also refers to any dataset gathered by someone other than the person who is using it. Secondary data sources can be incredibly beneficial. They enable academics and data analysts to create big, high-quality databases that aid in the resolution of business challenges. In this research secondary data is used.

3.8.3 Measurement Of Constructs

Table 3.5 : Measurement of Construct : Dependent Variable

Dependent Variable	Measurement	Source of Measurement	Adopted
Intention to Accept AR technology	I'd like to use this AR technology independently (outside classroom)	(Eka Prasetya, 2017)	I tend to accept using AR technology independently (outside the classroom).
	I'd like to use this kind of system for other course subjects		I tend to accept using AR technology for other relevant subjects.
	I'd like to use this AR technology in the future		I tend to accept using AR technology because it will improve my skills in education.
	I will strongly recommend that others use it	(Peng et al., 2016)	
	Using AR application enhances my training interest	(Papakostas et al., 2021)	I tend to accept using AR technology in the future.
			I will strongly recommend others to accept using AR technology in their studies.

Table 3.6 : Measurement of Construct : Independent Variable

Independent Variable	Measurement	Source of Measurement	Adopted
Attitude	I enjoy the lessons instructed with AR applications.	(Küçük et al., 2014)	I enjoy the lessons guided by AR applications.
	I come to the class more eagerly when AR applications are used		I come to the class more eagerly when AR applications are used.
	I can concentrate better on the lesson when AR applications are used.		I can concentrate better on the lesson when AR applications are used.

Independent Variable	Measurement	Source of Measurement	Adopted
	AR applications make my learning difficult because they confuse my mind.		AR applications make my learning process interesting.
	It is difficult to use AR applications.		I believe that AR can be a valuable tool to improve the learning process.

Table 3.7 : Measurement of Construct : Independent Variable

Independent Variable	Measurement	Source of Measurement	Adopted
Performance Expectancy	I believe AR can help with Vicon learning.	(Sunardi et al., 2022)	I believe AR can help to facilitate the learning process.
	Using augmented reality would improve my drive to study new things.		Using AR would enhance my motivation to study new things.
	Using AR would increase my efficiency in learning new things.		Using AR would increase my efficiency in learning new things.
	My academic performance would increase if I used the AR.		My academic performance would increase if I used the AR.
	AR has the potential to boost my productivity.	(William Guest et al., 2018)	AR has the potential to boost my productivity.

Table 3.8 : Measurement of Construct : Independent Variable

Independent Variable	Measurement	Source of Measurement	Adopted
Effort Expectancy	Learning how to use AR tool is easy.	(Sunardi et al., 2022)	Learning how to use AR tool is easy.
	The interaction with this AR tool is clear and understandable.		The interaction with this AR tool is clear and understandable.
	I would find the AR tools is easy to use.		I would find the AR tools easy to use.
	It would be simple for me to develop proficiency with these AR tools.		It would be simple for me to develop proficiency with these AR tools.
	My interaction with AR is clear and understandable.	(William Guest et al., 2018)	AR tools have more user-friendly features.

Table 3.9 : Measurement of Construct : Independent Variable

Independent Variable	Measurement	Source of Measurement	Adopted
Social Influencing	Important individuals in my life feel that I should use these kinds of augmented reality products.	(Sunardi et al., 2022)	Important people in my life feel that I should use AR applications.
	Important individuals in my life feel that I should use augmented reality technologies.		I am influenced by the positive experiences and testimonials of others when adopting AR technology.
	In general, the college administration has encouraged the usage of AR technologies.		In general, the college administration encouraged the usage of AR technologies.
	In overall, my presentation promotes the usage of augmented reality tools.		I am likely to use AR technology as a result of

Independent Variable	Measurement	Source of Measurement	Adopted
	People who are important to me think that I should use AR	(William Guest et al., 2018)	observing my peers benefiting from it.
			The acceptance and positive feedback from my social media network impact my openness to use AR technology.

Table 3.10 : Measurement of Construct : Independent Variable

Independent Variable	Measurement	Source of Measurement	Adopted
Facilitating Conditions	I have the necessary resources to use AR tools.	(Sunardi et al., 2022)	I have the necessary resources to use AR tools.
	I have the necessary knowledge to use AR tools.		I have the necessary knowledge to use AR tools.
	AR tools work well with the other learning platforms I use.		AR tools work well with the other learning platforms I used.
	If I have trouble utilising these kind of AR technologies, I may seek assistance from others.		
	I have the resources required to utilise AR.	(William Guest et al., 2018)	If I have trouble utilising AR technologies, I may seek assistance from others.
			I have strong technical support from the lecturers for using AR technology.

3.9 Data Analysis tools

3.9.1 Descriptive Analysis

Descriptive analysis is a summary statistic that is used to explain and conclude the data obtained from respondents. The data in this study was obtained using a questionnaire approach and analysed using a common metric such as mean frequency, total data, and percentage. Furthermore, the data gathered from respondents are validated using the SPSS software.

Attitude, Performance Expectancy, Effort Expectancy, Social Influencing, and Facilitating Conditions are the descriptive statistics for the variables in this study. The items are measured using a five-point Likert scale. In statistics, the mean demonstrates the average value of a set of data points. Respondents who agree with the criteria have a higher mean score than those who disagree or have a negative attitude towards the variables. The standard deviation, on the other hand, is a statistic generated from the square root of the variance that is used to quantify the dispersion of a data set in regard to the mean.

The higher the standard deviation, the higher the dispersion in the data. In this study, descriptive analysis is used to answer the first research question, which is to determine the intention to accept AR Technology to enhance student learning in higher education institutions from the perspective of extended UTAUT + TPB (Theory of Planned Behaviour).

3.9.2 Pearson Correlation

Hahs-Vaughn, 2023 stated that the Pearson correlation coefficient calculates the linear association between two variables and requires numerical codes for each variable's category. To analyse the link between two changes, the correlation coefficient can efficiently determine if they have a comparable changing trend. The Pearson correlation coefficient is a common approach to assess similarity (Liu et al., 2022).

The Pearson correlation coefficient, also known as the product period correlation coefficient, is represented in a sample by r and expressed in the population from which the sample was drawn. The coefficient is evaluated on a scale with no units, ranging from 1 to +1. If the sign of the correlation coefficient was positive, there would have been a positive correlation (Sedgwick, 2012).

Table 3.11: The Relationship of Correlation Coefficient

Relationship

Correlation Coefficient	Strength Relationship
1	Perfect
0.7<r<1 or -0.7<r<1	Strong
0.3<r<0.7 or -0.3<r<0.7	Moderate
0<r<0.3 or 0<r<-0.3	Weak
0	Zero

Source : Fauziah Sh. (Correlation Coefficient and Strength) 2022

3.9.3 Regression Analysis

Sykes, 1993 mentioned that regression analysis is a statistical technique used to investigate correlations between variables. To investigate such concerns, the researcher gathers information on the underlying causes of interest and employs regression to estimate the quantitative influence of the explanatory variables on the variable under investigation.

Multiple regression is used in this study to address the third research question, which is to investigate the most significant elements that may influence students' intention to accept AR technology. Multiple regression is used since there are 5 independent variables (attitude, performance expectancy, effort expectancy, Social Influencing and Facilitating Conditions) and one dependent variable (Intention to accept AR technology). The multiple regression equation is illustrated below :

$$Y= \alpha + \beta1X1+\beta2X2 + \beta3X3 + \beta4X4 + \beta5X5$$

Table 3.12 Representative of each Symbols in multiple regression equation

Symbols	Refers To
Y	Dependent Variable (intention to accept AR Technology)
α	Constant
β1	Coefficient 1
β2	Coefficient 2
β3	Coefficient 3

Symbols	Refers To
X1	Independent Variable 1 : Attitude
X2	Independent Variable 2 : Performance Expectancy
X3	Independent Variable 3 : Effort Expectancy
X4	Independent Variable 4 : Social Influencing
X5	Independent Variable 5 : Facilitating Conditions

3.10 Time Horizon

This layer determines the research time frame - cross-sectional or short term study, comprising data collection at a given moment in time. Longitudinal is a data collection repeated over a long period of time in order to compare data. According to Le Chat, (2016), Cross-sectional research is a type of analysis. A study can be conducted in which data is collected only once, sometimes over a period of days, weeks, or months, to answer a research topic. These investigations are known as one-shot or cross-sectional studies. Meanwhile, longitudinal studies are used when data on the dependent variable is collected at two or more periods in time to answer a research issue. In this study, researchers used a cross-sectional study because it collect the date just for once.

3.11 Time Scale

As an illustration, the research process will go from planning the study through carrying it out and finishing with data collection and analysis.

Table 3.13 : Gantt Chart

Gantt Chart for Final Year Project 1

Task	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing PSM Progress															
Proposed Supervisor															
Distribution of Supervisor															
Find topic for research															
briefing about logbook															
discuss about the idea of drafting the title															
explanation the research proposal template to understanding more															
Theory framework briefing and confirmation															
learn on how to get article information about our topic research (using scopus															
how to use mendeley cite in microsoft word															
learn on how to organize word with easily with correct format															
title observation with correct keyword on scopus															
explanation about title research for confirmation															

Task	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
presentation for chapter 1															
do the correction immediately wirh SV guidance															
briefing about R-studios for bibliography and how to use it															
article finding in website															
research proposal discussion (chapter 1)															
scihub usage															
Explaination about chapter 2															
Present the progress of chapter 1 & 2															
Do a correction for chapter 1 & 2															
Explain about research method															
Briefing about the FYP 1 presentation															

3.12 Summary

In this chapter, This chapter goes into great depth on the study design, main data sources, sample selection, and questionnaire design. Finally, a timeline was offered for a more thorough understanding of the historical period. The pilot study incorporates the data analysis and testing of the research methodology.

CHAPTER 4

DATA ANALYSIS AND FINDING

4.1 Introduction

Chapter 4 presents the statistical analyses conducted to test the hypotheses outlined in Chapter 2. Data collected from 130 respondents through questionnaires served as the basis for these analyses. Chapter 3's research methodology provided the framework for data analysis, commencing with reliability testing for each factor using SPSS software. Descriptive statistics were then employed to elucidate the findings in relation to participant demographics. Subsequently, normality tests confirmed adherence to the assumptions of the statistical procedures. Additionally, Pearson Correlation and Multiple Regression analysis were conducted to investigate the relationships between independent and dependent variables on these relationships. Finally, the hypotheses were formally evaluated, and the research outcomes were thoroughly discussed.

4.2 Reliability Analysis for Actual Data

Reliability test are used to determine the consistency of the data collected. Cronbach's Alpha analysis are involved in this part to analysed the strength of reliability and consistency. Cronbach's Alpha analysis are utilized to measure the reliability of independent variables and dependent variables for this research.

Table 4.1 : Reliability Statistic for Actual Data

Cronbach's Alpha	N of Items
0.966	30

Table 4.2 : Reliability Statistic of each variables

Variables	Number of Items	Cronbach's Alpha
Attitude (ATT)	5	0.901
Performance Expectancy (PE)	5	0.889
Effort Expetancy (EE)	5	0.913
Social Influencing (SI)	5	0.873
Facilitating Conditions (FC)	5	0.874
Intention To Use (ITA)	5	0.875

Actual survey had been finally fully conducted where the overall Cronbach's Alpha have been produced. Based on table 4.1, all the 30 items in survey questionnaires have relatively high internal consistency due to the high Cronbach's Alpha value of 0.966. Besides, Table 4.2 showed that analysis of each variables for each items in the study. Most of the variables such as Attitude (ATT), Performance Expectancy (PE), Effort Expectancy (EE), Social Influencing (SI), Facilitating Conditions (FC) and Intention to Accept (ITA) had excellent value of Cronbach's Alpha, which results stated that higher than 0.7 (Taber K, 2018).

4.3 Descriptive Statistic Analysis

Descriptive Statistic Analysis was independent to describe the characteristics of total sample that have been selected from population. Moreover, it provides a clearly view of summaries with assist of graphic analysis about respondents and measure to ensure better understanding. The statistical software IBM SPSS version 27 was used to generate the descriptive statistics of each construct.

4.3.1 Respondent's Demographic Profile

Demographic profile is the basic information of respondents that participate in answering survey questionnaires. Demographic profile of the sample such as the analysis of

each respondent's personal details in terms of age group, gender, races, highest education and universities was discussed in this chapter.

4.3.1.1 Age

Table 4.3 : Age Group

		Frequency	Percent (%)
Valid	18 years – 20 years	30	23.1
	21 years – 23 years	93	71.5
	24 years – 26 years	7	5.4
	Total	130	100.0

Based on Table 4.3, it showed that there are different ages of respondents that participated in this questionnaire, divided into 3 categories including (18 years-20 years), (21 years – 23 years) and (24 years – 26 years). For first category (18 years-20 years), there is 30 respondents (23.1%). For second category (21 years- 23 years), there are 71.5% that equivalent to 93 respondents. And last category is (24 years-26 years). The total number of respondents who have been collected in this category is 7 people which is equivalent to 5.4%.

4.3.1.2 Gender

Table 4.4 : Gender Group

		Frequency	Percent (%)
Valid	Male	44	33.8
	Female	86	66.2
	Total	130	100.0

Table above shows the total of the gender (Male and Female). The Male Shows the lowest among gender. There are about 44 respondents and Female shows the highest which is around 86 respondents. The percentages of male stated 33.8% and the percentages of female reveal 66.2%.

4.3.1.3 Races

Table 4.5 : Races

		Frequency	Percent (%)
Valid	Malays	96	73.8
	Chinese	11	8.5
	Indian	11	8.5
	Iban	4	3.1
	Kadazan	1	0.8
	Brunei	1	0.8
	Murut	1	0.8
	Dusun	1	0.8
	Melanau	1	0.8
	Sungai	1	0.8
	Nigerian	1	0.8
	Bumiputera Sarawak	1	0.8
	Total	130	100.0

Table 4.5 stated the races that have responds to the google form. There are Malays, Chinese, Indian, Iban, Kadazan, Brunei, Murut, Dusun, Melanau, Sungai, Nigerian and Bumiputera Sarawak. Malays has the highest respondents which is 96 respondents that equivalent to 73.8%. Meanwhile, both Chinese and Indian have the same number of 11 respondents that representing 8.5%. The rest of the races represent the 12 respondents that equivalent to 3.1% and 0.8% that equal to 9.5%.

4.3.1.4 Highest Education

Table 4.6 : Highest Education

		Frequency	Percent (%)
Valid	SPM	3	2.3
	STPM	22	16.9
	Ijazah Sarjana Muda	100	76.9
	Ijazah Sarjana	5	3.8
	PhD	0	0
	Total	130	100.0

Table 4.6 stated the level of highest education. Ijazah Sarjana Muda has the highest amount of respondents which is 100 respondents that contributed to 76.9%. STPM has the second highest of respondents which is lead to 16.9% (22 respondents). Master (Sarjana Muda) only has 5 respondents and leads to 3.8%. Next, SPM recorded only 3 respondents which is the lowest with a percentage of 2.3 and last but not least, PhD did not get any respondents.

4.3.1.5 Universities

Table 4.7 : Universities

		Frequency	Percent (%)
Valid	UTeM	39	28.9
	UTM	19	14.1
	USM	21	15.6
	UNIMAS	13	9.6
	MMU	9	6.7
	UITM	10	7.4
	UNIMAP	11	7.7
	UUM	2	1.4
	UPSI	2	1.4
	Total	130	100.0

Table 4.7 shows the total of respondents according to a certain university. UTeM has the majority of respondents which is 39 respondents that lead to 28.9%. The second highest is from USM which is 21 respondents (15.6%). Next, UTM has has 19 respondents and represents 15.6%. Besides, UNIMAS recorded only 13 respondents that equivalent to 9.6%. UniMAP has 11 respondents and UITM has 10 respondents each represent 7.7% and 7.4%. The only private university which is MMU recorded as many as 9 respondents which is lead to 6.7%. Last but not least, UUM and UPSI has equal respondents (2 respondents) that each university is equivalent to 1.4%.

4.3.2 General Questions About Augmented Reality (AR) Technology

In this sectons, it is involving the discussion related to knowledge and experience of respondents in using Augmented Reality (AR) Technology. Besides, analysis of respondent's opinion and about this kind of technology used in higher education institutions had been describe.

Table 4.8 : General Questions 1

Application on Augmented Reality (AR) Technology		Frequency	Percentage (%)
Have you ever heard about augmented reality (AR) technology?	• Yes • No	90 40	69.2 30.8

The table 4.8 shows that the general question number 1 of the intention to accept Augmented Reality (AR) Technology for enhancing students learning in higher education institutions. The total of respondents participated was 130. 90 respondents of them answer Yes while the rest (40) respondents answer No. The percentage of respondents that said Yes is (69.2%) and the percentage of respondents that said No is (30.8%).

Here are some common why did the students said yes acquire knowledge about AR technology. Firstly, Educational Institutions. Teachers may introduce AR concepts as part of the curriculum. Courses in technology, computer science, or related fields may cover AR applications and principles. Next, School Initiatives. Some schools and educational institutions have digital literacy programs that expose students to various technologies, including AR. Lastly, Educational Apps. Mobile applications designed for educational purposes may include AR components to enhance learning experiences. Students may encounter AR while using educational apps and games (Hussain et al., 2021).

In summary, the awareness of augmented reality among students is influenced by a combination of educational practices, access to technology, teaching methods, personal interests, and cultural factors. As technology continues to evolve, it becomes increasingly important for educational systems to adapt and integrate emerging technologies into their curricula to ensure students are well-prepared for the digital world.

Table 4.9 : General Question 2

Application on Augmented Reality (AR) Technology		Frequency	Percentage (%)
If Yes, what are the websites or applications related to AR that you used in your learning process?	• MARLCardio	14	14.7
	• JigSpace	21	22.1
	• Complete Anatomy 2021	12	12.6
	• ARvid	30	31.6
	•	8	8.4
	• Tidak Pasti	2	2.1
	• Webex	1	1.1
	• Haven't use yet	1	1.1
	• -	1	1.1
	• Never used yet	1	1.1
	• Don't knows	1	1.1
	• None	1	1.1
	• Event	1	1.1
	• Snapchat Filter	1	1.1

The table 4.9 shows that the general question number 2 of the intention to accept Augmented Reality (AR) Technology for enhancing students learning in higher education institutions. The total of respondents participated was 95. MARLCardio, JigSpace, Complete Anatomy 2021, Arvid and webex is the application under education that have been used in the learning process. The total under this category was 78 respondents that equivalent to 82.1%.

The total of the respondents that answer "none" is 10 respondents (10.6%) and the rest of the percentage which is 1.1% is dominating to Haven't used yet, Never used yet, Don't knows, Event and lastly Snapchat Filter. Snapchat filter is the filter application that include the AR technology in the system.

In summary, ARvid was the most commonly used AR application among the respondents, followed by JigSpace. Some respondents reported using MARLCardio (Nabihah Mohamad Nizar et al., 2019) and Complete Anatomy 2021 . A portion of respondents indicated not using any AR applications, expressing uncertainty, or mentioning other miscellaneous responses related to AR usage.

Table 4.10 : General Question 3

Application on Augmented Reality (AR) Technology		Frequency	Percentage (%)
What are the AR related devices that you have used in your process learning?	• MART • TART	94 36	72.3 27.7

Table 4.10 shows details the results of a survey on student acceptance of Augmented Reality (AR) technology for learning enhancement. Among 130 respondents, 94 (72.3%) expressed towards on using Mobile Augmented Reality Technology (MART), while 36 (27.7%) expressed the used on Tablet Augmented Reality Technology (TART).

Most of them use mobile phones rather than tablets due to the fact that mobile phones are easy to carry anywhere with their small size (Bröhl et al., 2018). So, that will be the strong reason why Mobile Augmented Reality Technology (MART) are the highest than Tablet Augmented Reality Technology (TART).

Table 4.11 : General Question 4

Application on Augmented Reality (AR) Technology		Frequency	Percentage (%)
Do you think that augmented reality (AR) technology could become a valuable tool for enhancing students process learning?	• Yes • No	127 3	97.7 2.3

Table 4.11 shows that Out of 130 students polled, a whopping 97.7% equal to 127 respondents were down with trying AR to boost their learning, while, only 30.8% equal to 3 respondents saying no for this questions.

In this question, most of them are agree with the question because AR tools could guide students through learning process in enhanced way, as AR can upgrade traditional books with a digital layer (Kraut & Jeknić, 2019). Furthermore, AR learning method might raise common understanding of the learning material.

Table 4.12 : General Question 5

Application on Augmented Reality (AR) Technology		Frequency	Percentage (%)
The acceptance of augmented reality (AR) technology in higher education institutions will make learning more interesting.	• Yes • No	126 4	96.9 3.1

Table 4.12 shows that a survey of 130 students in higher education found strong support for using AR in learning, with 96.9% (126 students) indicating their acceptance. Unfortunately, 3.1% (4 students) are deny that Augmented Reality (AR) Technology will make learning more interesting.

The amount of respondents that are answer yes is because they believed that augmented reality (AR) technology with using a variety of dynamic resources (applications) will improving motivation, stimulating interests and helping to increase the level of their activity and make classes / lessons interesting for both teachers and students (GUREVYCH et al., 2021b).

4.3.3 Descriptive Analysis Variables (Independent Variable)

4.3.3.1 Attitude

Table 4.13 : Attitude

Code	Item	N	Mean	Std. Deviation
ATT1	I enjoy the lessons guided by AR applications	130	4.02	.923
ATT2	I come to the class more eagerly when AR applications are used.	130	4.05	.897
ATT3	I can concentrate better on the lesson when AR applications are used.	130	4.08	.872
ATT4	AR applications make my learning process interesting.	130	4.21	.851
ATT5	I believe that AR can be a valuable tool to improve the learning process.	130	4.22	.790
Overall Mean			4.1154	

From table 4.13, results revealed overall mean for Attitude is 4.1154. The mean of ATT5 recorded the highest among all items which is 4.22 with the standard deviation is 0.790, followed by ATT4 with mean is 4.21 and the standard deviation recorded 0.851. then, followed by ATT3 with a mean value of 4.08 and 0.872 is the total of ATT3 standard deviation. Standard deviation is 0.897 for ATT2 and the mean value is 4.05. Lastly, ATT1 is the lowest mean among all of the 5 ATT which is 4.02 with the 0.923 of standard deviation.

4.3.3.2 Performance Expectance

Table 4.14 : Performance Expectancy (PE)

Code	Item	N	Mean	Std. Deviation
PE1	I believe AR can help to facilitate the learning process.	130	4.18	.805
PE2	Using AR would enhance my motivation to study new things.	130	4.19	.836
PE3	Using AR would increase my efficiency in learning new things.	130	4.15	.782
PE4	My academic performance would increase if I used the AR.	130	3.94	.963
PE5	AR has the potential to boost my productivity.	130	4.09	.811
Overall Mean			4.1123	

In this table, 5 items were constructed. The overall mean in the table 4.14 is 4.1123. As shown, The highest mean that was recorded is from PE2 with mean is 4.19 with the standard deviation is 0.836. Next, followed by PE1 which the value of mean is 4.18 with the standard deviation is 0.805 and PE3 was recorded by the value of mean is 4.15 and the standard deviation is 0.782. PE5 value of mean is 4.09 with the standard deviation of it is 0.811. Last but not least is PE4. PE4 was recorded as the lowest value of mean with the value of 3.94 and the standard deviation is 0.963.

4.3.3.3 Effort Expectancy

Table 4.15 : Effort Expectancy (EE)

Code	Item	N	Mean	Std. Deviation
EE1	Learning how to use AR tool is easy.	130	3.82	.902
EE2	The interaction with this AR tool is clear and understandable.	130	3.98	.826
EE3	I would find the AR tools easy to use.	130	3.92	.872
EE4	It would be simple for me to develop proficiency with these AR tools.	130	3.89	.883
EE5	AR tools have more user-friendly features.	130	4.05	.829
Overall Mean			3.9338	

There are five items in this table. Table 4.15 shows the total mean is 3.9338. As demonstrated, the highest mean was observed from EE5, with a mean of 4.05 and a standard deviation of 0.829. Next, EE2 was recorded with a mean value of 3.98 and a standard deviation of 0.826, and EE3 with a mean value of 3.92 and a standard deviation of 0.872. The EE4 mean value is 3.89, with a standard deviation of 0.883. Last but not least, EE1. EE1 had the lowest mean value of 3.82 and a standard deviation of 0.902.

4.3.3.4 Social Influencing

Table 4.16 : Social Influencing (SI)

Code	Item	N	Mean	Std. Deviation
SI1	Important people in my life feel that I should use AR applications	130	3.71	.902
SI2	I am influenced by the positive experiences and testimonials of others when adopting AR technology.	130	3.91	.867
SI3	In general, the college administration encouraged the usage of AR technologies.	130	3.88	.937
SI4	I am likely to use AR technology as a result of observing my peers benefiting from it.	130	3.98	.797
SI5	The acceptance and positive feedback from my social media network impact my openness to use AR technology.	130	4.07	.749
Overall Mean			3.9108	

Table 4.16 shows that the overall mean for attitude is 3.9108. SI5 had the greatest mean of 4.07 with the standard deviation of 0.749, followed by SI4 with a mean of 3.98 and a standard deviation of 0.797. Then comes SI2, which has a mean value of 3.91 and a total standard deviation of 0.867. The standard deviation for SI3 is 0.937, while the mean value is 3.88. Finally, SI1 has the lowest mean among the five ATT, 3.71, with a standard deviation of 0.902.

4.3.3.5 Facilitating Condition

Table 4.17 : Facilitating Condition (FC)

Code	Item	N	Mean	Std. Deviation
FC1	I have the necessary resources to use AR tools	130	3.75	1.020
FC2	I have the necessary knowledge to use AR tools.	130	3.78	.980
FC3	AR tools work well with the other learning platforms I used.	130	3.90	.870
FC4	If I have trouble utilising AR technologies, I may seek assistance from others	130	4.07	.818
FC5	I have strong technical support from the lecturers for using AR technology.	130	3.90	.905
Overall Mean			3.8815	

Facilitating Conditions value for mean and standard deviation was shown in the table of 4.17. The overall mean for this item is 3.8815. The highest FC is FC4 with the mean 4.07 and the value of standard deviation is 0.818. FC4 got the lowest standard deviation. The second highest is from FC3 and FC5. Both of the FC got 3.90 for the value of mean but the standard deviation is different and each showing a standard deviation of 0.870 and 0.905. Next is FC2 with the value of mean is 3.78 with the standard deviation is 0.980. FC1 recorded as the lowest mean which is 3.75 and for the standard deviation, FC1 recorded the highest with the value is 1.020.

Among the Independent Variables examined in the study, Attitude emerged with the highest overall mean, showcasing a value of 4.1154. This indicates a relatively strong and positive average perception across the various items encompassed within the Attitude variable. Conversely, the lowest overall mean score was attributed to Facilitating Conditions, highlighting a mean value of 3.8815. This comparatively lower mean score suggests that respondents, on average, expressed a somewhat less favorable perception when considering the items related to Facilitating Conditions.

4.3.4 Dependent Variable

4.3.4.1 Intention To Accept Augmented Reality (AR) Technology

Table 4.18 : Intention To Accept Augmented Reality (AR) Technology

Code	Item	N	Mean	Std. Deviation
ITA1	I tend to accept using AR technology independently (outside the classroom).	130	4.01	.831
ITA2	I tend to accept using AR technology for other relevant subjects.	130	4.05	.781
ITA3	I tend to accept using AR technology because it will improve my skills in education.	130	4.02	.826
ITA4	I tend to accept using AR technology in the future.	130	4.15	.808
ITA5	I will strongly recommend others to accept using AR technology in their studies.	130	4.07	.828
Overall Mean			4.0585	

The data table showed that the Dependent Variable (ITA) value for mean and standard deviation. The overall mean for this item is 4.0585. The highest ITA is ITA4, with a mean of 4.15 and a standard deviation of 0.808. The second highest comes from ITA5. It received a mean value of 4.07. The next variable is ITA2, which has a mean of 4.05 and a standard deviation of 0.781. Standard deviation of ITA2 has the lowest value. Furthermore, ITA3 mean was recorded 4.02 with the 0.826 of standard deviation. ITA1 had the lowest mean (4.01) and the highers standard deviation (8.31).

4.4 Normality Test

Normality tests are crucial for deciding the measures of central tendency and assessing the best statistical methods for data analysis. In many studies related to the health evaluation, one of the primary steps is to test the normal distribution of the data to ensure an efficient analysis (Hatem et al., 2022). More precisely, it is a measure of the lack of symmetry and the relative size of the two tails. Ideally, a skewness equal to 0 is noted in a symmetrical dataset or a normal distribution. The normal distribution has two components, namely, skewness and kurtosis. Skewness is related to the status of the data's mode median and mean relative to each other. There is symmetric distribution when the mean is in the middle of the distribution; thus, there is no skewness (DEMİR, 2022).

Table 4.19: Analysis of Skewness and Kurtosis

		ATT	PE	EE	SI	FC	ITA
N	Valid	130	130	130	130	130	130
	Missing	0	0	0	0	0	0
Skewness		-.802	-.981	-.543	-.243	-.438	-.318
Std. Error of Skewness		.212	.212	.212	.212	.212	.212
Kurtosis		1.292	2.112	.742	-.410	.035	-.756
Std. Error of Kurtosis		.422	.422	.422	.422	.422	.422

Table 4.19 above stated the result of Skewness and Kurtosis analysis. For this study, it shows all variables have a negative skewness values which indicators that too many high scores in the distribution. Besides, Kurtosis value of variable such as Social Influencing (SI) and Intention To Accept (ITA) is negative which mean it has flat and light tailed distribution.

The skewness values suggest a left-skewed distribution for each dataset. The kurtosis values, while generally close to the normal distribution, may show some departure from normality, particularly in the second dataset with a kurtosis of 2.112. The acceptable range of normality is less than 3 for skewness and less than 10 in value for kurtosis. Any value that falls within this range is considered normal for further analysis (Effendi Ewan Mohd Matore &

Zamri Khairani, 2020). In conclusion, skewness and kurtosis results is fall within ±1 and ±2 respectively. Hence, the dataset are counted as normally distributed.

4.5 Pearson Correlation Analysis

The pearson correlation analysis is used in this study to measure of the relationship between independent variables (Attitude, Performance Expectancy, Effort Expectancy, Social Influencing, Facilitating Conditions) and dependent variables (Intention to Accept). It is generally considered that r ≤ 0.39 represents weak correlations, r between 0.40 to 0.69 moderate correlations, r between 0.70 to 1 strong or high correlations, and r ≥ 0.9 very high correlations (Fu et al., 2020).

Table 4.20: Pearson Correlation Analysis

		ATT	PE	EE	FC	SI	ITA
ATT	Pearson Correlation	1	.844**	.723**	.682**	.589**	.685**
	Sig (2 - tailed)		<.001	<.001	<.001	<.001	<.001
	N	130	130	130	130	130	130
PE	Pearson Correlation	.844**	1	.775**	.682**	.529**	.711**
	Sig (2 - tailed)	<.001		<.001	<.001	<.001	<.001
	N	130	130	130	130	130	130
EE	Pearson Correlation	.723**	.775**	1	.688**	.619**	.629**
	Sig (2 - tailed)	<.001	<.001		<.001	<.001	<.001
	N	130	130	130	130	130	130
SI	Pearson Correlation	.682**	.682**	.688**	1	.737**	.631**
	Sig (2 - tailed)	<.001	<.001	<.001		<.001	<.001

		ATT	PE	EE	FC	SI	ITA
	N	130	130	130	130	130	130
FC	Pearson Correlation	.589**	.529**	.619**	.737**	1	.604
	Sig (2 - tailed)	<.001	<.001	<.001	<.001		<.001
	N	130	130	130	130	130	130
ITA	Pearson Correlation	.685**	.711**	.629**	.631**	.604**	1
	Sig (2 - tailed)	<.001	<.001	<.001	<.001	<.001	<.001
	N	130	130	130	130	130	130
**Correlation is significant at the 0.01 level (2-tailed).							

Table 4.20 presents the findings of a Pearson Correlation Coefficient Analysis, which reveal that Attitude (ATT), Performance Expectancy (PE), Effort Expectancy (EE), Social Influencing (SI), and Facilitating Conditions (FC) all have positive and statistically significant correlations with the Intention to Accept.

A Pearson correlation analysis revealed a strong positive relationship between performance expectancy (PE) and intention to accept (ITA) ($r = 0.711$, $p < 0.001$). This suggests that a one-unit increase in perceived performance expectancy is associated with a 0.711 unit increase in intention to accept, with a statistically significant level.

Besides, the results showed that there was a second high positive significant relationship between Attitude (ATT) and intention to accept (ITA) due to the correlation value of 0.685 with a significant value of 0.001, followed by the relationship between social influencing and effort expectancy with the intention to accept which also indicates high positive significant relationship due to both correlation value of 0.631 and 0.629 respectively.

Lastly, the correlation value between Facilitating Conditions (FC) and intention to accept (ITA) represents the lowest correlation value which 0.604 with a significant level 0.001. In

general, if the absolute value of Pearson correlation coefficient is close to 0.8, collinearity is likely to exist (Shrestha, 2020).

4.6 Variance Inflation Factor (VIF)

Variance inflation factor is used to measure how much the variance of the estimated regression coefficient is inflated if the independent variables are correlated (Shrestha, 2020). In the context of a multivariate regression model, multicollinearity comes up when there is a correlation between many independent variables. This might have a negative impact on the regression findings. As a result, the variance inflation factor can quantify how much a regression coefficient's variance is inflated owing to multicollinearity.

Table 4.21: Variance Inflation Factors

Model		Collinearity Statistics	
		Tolerance	VIF
1.	ATT	.254	3.931
	PE	.219	4.562
	EE	.329	3.039
	SI	.327	3.054
	FC	.416	2.406
a. Dependent Variable : ITA			

The tolerance value should be higher than one and recommended the best value at lower than 5 (Hair et al, 2019). A VIF score of 10 or above indicated strong collinearity and advised removing the constructs or combining predictors into a single construct to alleviate collinearity issues. To put it simply, VIF is the negative of the tolerance value, and small VIF values indicate poor correlation between items. Nevertheless, The value of the VIF score values less than 10 are still acceptable, as shown in table 4.21. The VIF score for all of the constructs in this study (attitude, performance expectancy, effort expectancy, social influencing, and facilitating conditions) are mostly less than 10, indicating that there are no multicollinearity issues in this dataset.

4.7 Main Data Analysis

As described in the previous chapter, Multiple Regression Analysis was used in this study to analyse the strength of a relationship between an outcome and a dependent variable, as well as the relevance of each relationship predictor. This study investigate the direct relationship presented, and a simple regression was run to test the Attitude, Performance Expectancy, Effort Expectancy, Social Influencing and Facilitating Conditions (Independent Variables), and Intention to Accept (Dependent Variable).

Table 4.22: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change
Direct Relationship	.765a	.586	.569	2.18537	.586
a. Predictors: (Constant), ATT, FC, EE, SI, PE					

The table 4.22 that follows above displays is the model summary of this study based on the results provided in the model of direct association, where the value of R is 0.765 and the coefficient of determination, R square, is 0.586. The R square column, which represents the R square value, indicates how much variance there is in the dependent variable, which is the consumer's intention to accept augmented reality (AR) technology in higher education institutions, as determined by the independent variables such as attitude, performance expectancy, effort expectancy, social influencing, and facilitating condition.

The R-squared value $0.5 < r < 0.7$ this value is generally considered a Moderate effect size (Mira & Odeh, 2019). The coefficient of determinant, R square is 0.586 which indicates a moderate explanatory magnitude. This value means that 58.6% of variance affected consumer intention to accept augmented reality technology can be determined by the independent variables. The remaining 41.4% of consumers intention to accept augmented reality (AR)

technology in higher education institution will be explained by other factors that are not included in this research.

Table 4.23: Coefficient Multiple Regression

		Unstandardized Coefficients		Standardized Coefficients	t-value	p-value
		B	Std. Error	Beta		
Direct Relationship	Constant	3.985	1.253		3.181	.002
	ATT	.129	.104	.143	1.245	.216
	PE	.384	.117	.404	3.274	.001
	EE	.012	.090	.013	.132	.895
	SI	.062	.097	.065	.641	.523
	FC	.222	.079	.250	2.788	.006
a. Dependent Variable: ITA						

The following table 4.23 shows the calculated coefficient in the model direct connection, where the constant is 3.985. The standardized beta value for the attitude is 0.129, the beta value for perfomance expectancy is 0.384, the beta value for the effort expectancy is 0.012, and the beta value for the social influencing is 0.062 and lastly, the value for the beta of the facilitating condition is 0.222.

According to the model's direct relationship, it can be assumed that facilitating conditions (FC) and performance expectancy (PE) has a positive influence on a consumer's desire to embrace augmented reality (AR) technology, as their significant value is 0.006 and 0.001, with a P-value less than 0.5. Furthermore, there is no significant relationship between social influencing, effort expectancy and attitude with consumers' intention to accept augmented reality (AR) technology. The significant values (p-value) are 0.523, 0.895, and 0.216, respectively, with a P-value greater than 0.05.

According to the data has been analysed from coefficient table equation of multiple regression in the final model for this study was formed as below:

Intention To Accept Augmented Reality = 3.985 + 0.384PE + 0.222FC

In accordance with the equation above, the regression intercept is 3.985, which represents the expected level in the intention to accept augmented reality AR technology when performance expectancy is 0. Furthermore, the regression slope, or unstandardized coefficient, with a value of 0.384, indicates how much the researcher predicts intention of accepting augmented reality AR technology to change for a one-unit rise in performance expectancy. This coefficient is the mean increase in intention to embrace augmented reality AR technology (dependent variable) for each extra 1 required in Facilitating Condition (FC) and Performance Expectancy (PE) (independent variable).

A greater bit of values is usually connected with higher t-values and lower P-values. The Beta value is used to determine the effect of independent variables, which indicates that the larger the coefficient value, the greater the value of each independent variable to the dependent variable.

4.8 Hypotheses Testing

There are five hypotheses in this study. All five hypotheses were fully solved, and the outcomes of hypothesis acceptance or rejection were determined. Hypothesis 1 through 5 are concerned with the test of mullticollinearity between independent and dependent variables, as assessed by Pearson Correlation Analysis and Multiple Regression Analysis.

Hypothesis 1

H1: There is a significant positive relationship between the Attitude and the Consumers intention to accept Augmented Reality (AR) technology in higher education institutions.

Augmented Reality (AR) is one of the technology application that students used in their learning process. In several study situations, previous studies discovered a favourable relationship between the attitude (ATT) and Actual usage (AU) factors. First is limited Understanding. Users may not fully understand the capabilities and potential benefits of AR technology, leading to skepticism or reluctance to accept it. Without a clear understanding of what AR can offer, users may not see the value in adopting it (Hao et al., 2015). Next, Perceived Complexity. AR applications can sometimes be perceived as complex or difficult to use, which may deter users from accepting them. If users feel that AR requires too much effort to learn or use, they may be less inclined to adopt it (Kraut & Jeknić, 2018).

Hypothesis 1 was tested using Pearson Correlation and Multiple Regression analysis. Table 4.20 in Pearson Correlation analysis revealed a moderate positive relationship between attitude and intention to accept, with a correlation value of 0.685, $p<0.05$. Table 4.23 in Multiple Regression analysis stated. **Hence, the hypothesis 1 was not supported.**

Hypothesis 2

H2: There is a significant positive relationship between the Performance Expectancy and the Consumers intention to accept Augmented Reality (AR) technology in higher education institutions.

Performance Expectancy always had an advantageous impact on detecting the intention of provided technology in various contexts of study. Considering this context, If individuals perceive that using AR technology in education will positively impact their performance and learning outcomes, they are more likely to adopt and use it. This psychological factor plays a significant role in shaping attitudes and intentions toward incorporating AR into educational practices. Various attributes of technology, such as efficiency, speed, and accuracy, can develop individuals' performance expectancy, influencing their technology usage intentionS. It is the most significant factor influencing consumers in the online context and in education (Wen et al., 2023).

Hypothesis 2 was examined using Pearson Correlation and Multiple Regression analysis. The results has shown in Table 4.20 of the Pearson connection analysis showed a moderate positive connection (0.711) between performance expectancy and intention to accept ($p<0.05$). In addition, the findings of Table 4.23 in Multiple Regression analysis revealed that there is significant relationship between performance expectancy and intention to accept. The significant value in the coefficient table of Multiple Regression analysis was 0.001, which is lower than 0.005. **So, hypothesis 2 was supported.**

Hypothesis 3

H3: There is a significant positive relationship between the Effort Expectancy and the Consumers intention to accept Augmented Reality (AR) technology in higher education institutions.

Effort expectancy represents the user 's perceived ease of use of the services provided by AR technology, which is considered to be one of the better ways to deliver information to the user while keeping the user's cognitive load low, and it therefore requires less effort than traditional (Xia et al., 2023). several studies have revealed a positive effect of effort expectancy

on behavioral intention , while other studies have not found a significant effect (Xia et al., 2023).

Based on Pearson Correlation Analysis in Table 4.20. There is a positive relationship between effort expectancy and intention to embrace augmented reality (AR) technology, with a correlation value of 0.629 ($p<0.05$). The Multiple Regression Analysis resulted in a significant value of 0.895, indicating that there is no significant positive link between these two variables, as shown in table 4.23. **Therefore, hypothesis 3 was not supported.**

Hypothesis 4

H4: There is a significant positive relationship between the Social Influencing and the Consumers intention to accept Augmented Reality (AR) technology in higher education institutions.

Social influencing refers to the effects of social elements on the acceptability, use, and efficacy of augmented reality (AR) in educational context. It requires understanding how individuals are influenced by their social surroundings, which include classmates, educators, and larger social circles, in their interactions with and benefits from AR-enhanced learning settings. Social influencing is a key variable in the early phases of technology adoption. Individuals tend to consider the use of technology as a subjective norm after a while and gathering usage experiences (Park & Kim, 2021).

Pearson Correlation analysis was conducted in Table 4.20 for determine the relationship between social influencing and intention to accept. The result show the value of the correlation coefficient was 0.631which indicates high positive relationship. Regression analysis showed a value of 0.523 which exceeding than 0.05. This proved that there is a no significant between social influencing and the intention to accept augmented reality (AR) technology in higher education institutions. **To conclude, this hypothesis was not supported.**

Hypothesis 5

H5: There is a significant positive relationship between the Facilitating Conditions and the Consumers intention to accept Augmented Reality (AR) technology in higher education institutions.

Saprikis et al., 2021 stated that these situations can help to create a more conducive atmosphere for efficient usage of AR tools and apps in the learning process. AR is a unique technology that requires supportive environments. For example, it is essential to determine if consumers have appropriate mobile devices capable of running AR apps, as well as whether they understand how to utilise them. When these requirements are satisfied, they will be able to utilise AR technology more readily.

To get an understanding in hypothesis 5, Pearson Correlation and Multiple Regression analyses were performed, and the results are presented in Tables 4.20 and 4.23. The correlation coefficient for this variable is 0.604. Furthermore, there is a significant relationship between facilitating conditions and the intention to accept augmented reality (AR) technology, as illustrated by table 4.23 in Multiple Regression Analysis, where the value is 0.006 (less than 0.05).**Thus, hypothesis 5 was supported.**

Table 4.24: Summary of Hypothesis

Research Objectives	Hypothesis	Results	Decisions
RO1: To determine the factors that influence the intention to accept augmented reality (AR) technology in the higher education institutions. RO2: To examine the relationship between these	Hypothesis 1 : There is a significant positive relationship between attitude and the intention to accept augmented reality (AR) technology in higher education institutions	p-value: 0.216 β value: 0.143	Not supported

Research Objectives	Hypothesis	Results	Decisions
factors and the intention to accept of augmented reality (AR) technology in the higher education institutions. RO3: To asses the most influence factors that could be relate to the intention to accept augmented reality (AR) technology in the higher education institutions.	Hypothesis 2 : There is a significant positive relationship between performance expectancy and the intention to accept augmented reality (AR) technology in higher education institutions	p-value: 0.001 β value: 0.404	Supported
	Hypothesis 3 : There is a significant positive relationship between effort expectancy and the intention to accept augmented reality (AR) technology in higher education institutions	p-value: 0.895 β value: 0.013	Not supported
	Hypothesis 4 : There is a significant positive relationship between social influencing and the intention to accept augmented reality (AR) technology in higher education institutions	p-value: 0.523 β value: 0.065	Not supported
	Hypothesis 5 : There is a significant positive relationship between facilitating conditions and the intention to accept augmented	p-value: 0.006	Supported

Research Objectives	Hypothesis	Results	Decisions
	reality (AR) technology in higher education institutions	β value: 0.250	

4.9 Summary

To summary, this study implemented survey questionnaires and collected data from 130 respondents. This chapter focused on the result findings and data analysis to clarify the study's objectives. A wide range of analyses were performed, including reliability analysis, descriptive analysis, normality test, multicollinearity, Pearson Correlation analysis, and Multiple Regression analysis. The researcher conducted all of the analyses using SPSS software in order to assess the data and determine the link between the independent and dependent variables. There was just one hypothesis that was supported, while the other four had been eliminated since the p-value above 0.05. The next chapter is the concluding chapter of this study, which includes the conclusion and recommendations for further research.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the researcher discusses the conclusions and discoveries from Chapter 4 which is Data Analysis. The results of the previous chapter's data analysis helped in addressing the researcher aims and hypotheses provided in Chapters 1 and 2, respectively. Furthermore, the study's weaknesses were thoroughly examined, and future recommendations were provided in this chapter. Finally, the researchers presented their overall conclusion to this study.

5.2 Overview of the Study

This study applies Venkatesh model framework which is (UTAUT) and develop to be an extended utaut (utaut + tpb) to explicate the influencing factors in enhancing students learning in higher education institutions. In the Unified Theory of Acceptance and Use of Technology (UTAUT) model, the internal attributes (Performance Expectancy (PE), Effort Expectancy (EE), Social Influencing (SI) and Facilitating Conditions (FC). Enhancing students learning in higher education institutions serve as the organism that mediates the relationship between the UTAUT and the response, which are the relationship between internal attribute and intention to accept augmented reality (AR). In addition to this model, one other supporting theories were utilized to explain the variables which is Theoretical Planned Behavior (TPB) one of the TPB attributes that has add is Attitude (ATT).

5.3 Discussion Of Findings

The remainder of this chapter covers the research findings. before discussing the findings of the research objectives, this study describes the demographic profile of the respondents, and the research objectives and hypotheses will be discussed based on the results of the analysis. The following discussion in this section has been structured based on the research question addressed in this research.

5.3.1 Research Objectives 1

RO1: To determine the factors that influences the intention to accept augmented reality (AR) technology in the higher education institutions.

Table 5.1: Descriptive Result (Decrease to Increase)

Label	Construct	Overall Mean Score	Rank
FC	Facilitating Conditions	3.8815	1
SI	Social Influencing	3.9108	2
EE	Effort Expectancy	3.9338	3
PE	Performance Expectancy	4.1123	4
ATT	Attitude	4.1154	5

The table above shows the descriptive statistics which indicates the mean score for each construct 3.8 and above, which illustrates that UTAUT variables (Performace Expectancy, Effort Expectancy, Social Influencing and Facilitating conditions) by (Venkatesh et al., 2003). Meanwhile, for the Attitude was developed by (Ajzen, 1991) that could influences the intention to accept augmented reality (AR) technology in higher education institutions.

The highest mean score was Attitude (ATT) which is 4.1154. This mean this factor has the most important factor influencing student's intention to accept augmented reality (AR) technology. Attitude (ATT) is effective in predicting how social networking sites are used (Ha et al., 2015). Besides, Researchers in the past also discovered that a person's positive mood had an impact on their decision to buy items from a list when using a mobile shopping application. To put it another way, people's attitude (ATT) will influence how they utilise the suggested technology. This suggest that students attitude are more influence to accept the augmented reality (AR) tecnology for enhance their learning in highere education isntsitutions.

The lowest mean score in the descriptive result is Facilitating Conditions (FC) which is 3.8815. Particularly, because AR is a cutting-edge technology (Teo, 2019), facilitating conditions are required, such as whether students have devices to use the AR apps, whether students have knowledge about the availability of AR apps, and whether an assistant is available to help them with using the AR apps. When these environmental conditions are satisfied, students and visitors more readily use AR at the universities (Alqahtani et al., 2018).

5.3.2 Research Objectives 2

RO 2: To examine the relationship between these factors and the intention to accept of augmented reality (AR) technology in the higher education institutions.

Research objectives 2 will eloborate in detail about the relationship between the factors and the intention to accept augmented reality (AR) technology. According to the result analysis in the chapter 4, all factors have a strong significant relationship.

Hypothesis 1:

There is a significant positive relationship between Attitude (ATT) and intention to accept Augmented Reality (AR) technology in higher education institutions.

Attitude defined by (Ajzen, 1991) is "a person's level of positive or negative perception of behaviour." The concept of attitude emphasises how a person's attitude might impact their willingness to accept augmented reality (AR) technology. In this study, attitude is defined as a person's beneficial or negative rating of behaviour. The outcome from Pearson Correlation analysis had stated that there is a significant positive between attitude and the intention to accept due to the correlation value of 0.685 with $p<0.05$. There also has no significant relationship between attitude and intention to accept because of $p<0.05$. Therefore, hypothesis 1 was not supported.

In this context, Augmented Reality (AR) is one of the technology application that students used in their learning process. Researchers in the past also discovered that a person's positive mood had an impact on their decision in using AR technology (Gao et al., 2015b). To put it another way, people's attitude (ATT) will influence how they utilise the suggested technology like Augemented Reality (AR) technology.

Hypothesis 2:

There is a significant positive relationship between Performance Expectancy (PE) and intention to accept Augmented Reality (AR) technology in higher education institutions.

Pearson Correlation analysis revealed a significant positive relationship between performance expectancy and intention to accept with the correlation value is 0.711. There is a significant link between performance expectancy and intention to accept due to the significant value 0.001 ($p<0.05$). As a result, Hypothesis 2 was supported.

Considering this context, If individuals perceive that using AR technology in education will positively impact their performance and learning outcomes, they are more likely to adopt and use it. This psychological factor plays a significant role in shaping attitudes and intentions toward incorporating AR into educational practices. Various attributes of technology, such as efficiency, speed, and accuracy, can develop individuals' performance expectancy, influencing their technology usage intentionS. It is the most significant factor influencing consumers in the online context and in education (Wen et al., 2023)

Hypothesis 3:

There is a significant positive relationship between Effort Expectancy (EE) and intention to accept Augmented Reality (AR) technology in higher education institutions.

A significant relationship is found between effort expectancy and intention to use augmented reality (AR) technology, with a correlation value of 0.629 ($p<0.05$). The Multiple Regression Analysis generated a significant value of 0.895, suggesting that there is no significant positive relationship between these two variables, as shown in Table 4.23. As a result, hypothesis 3 was unsupported.

However, Effort expectancy represents the user 's perceived ease of use of the services provided by AR technology, which is considered to be one of the better ways to deliver information to the user while keeping the user's cognitive load low, and it therefore requires less effort than traditional (Xia et al., 2023). several studies have revealed a positive effect of effort expectancy on behavioral intention , while other studies have not found a significant effect (Xia et al., 2023)

Hypothesis 4:

There is a significant positive relationship Social Influencing (SI) and intention to accept Augmented Reality (AR) technology in higher education institutions.

Pearson shows a correlation study to determine the connection between social influence and intention to accept. The results reveal that the correlation coefficient was 0.631, indicating a strong positive link. Regression analysis revealed a value of 0.523, which is more than 0.005. This proved that there is no significant relationship between social influence and the intention to accept augmented reality (AR) technology in higher education institutions. To summarise, the hypothesis was not supported.

Social influencing refers to the impact of social factors on the adoption, use, and effectiveness of AR in educational settings. It involves understanding how individuals are influenced by their social environment, including peers, educators, and broader social networks, when it comes to engaging with and benefiting from AR enhanced learning experiences. social influence is an important factor influencing technology acceptance in an earlier stage of introduction. As increasingly exposed and accumulated use experiences over time, most people might think that they should use the technology as a subjective norm (Park & Kim, 2021).

Hypothesis 5:

There is a significant positive relationship between Facilitating Conditions (FC) and intention to accept Augmented Reality (AR) technology in higher education institutions.

To understand the relationship between facilitating conditions and the intention to accept augmented reality (AR) technology, as proposed in hypothesis 5, we conducted Pearson Correlation, Multicollinearity, and Multiple Regression analyses. The results are presented in Tables 4.20 and 4.23. Although the correlation coefficient indicated a moderate positive association (0.604). However, the Multiple Regression analysis in Table 4.23 showed no statistically significant relationship between facilitating conditions and AR technology acceptance ($p = 0.006$, exceeding the significance level of 0.05). Consequently, hypothesis 5 was supported.

Facilitating Conditions in the context of augmented reality (AR) technology and its impact on enhancing students' learning, refer to the factors or circumstances that make it easier for the successful implementation and acceptance of AR in educational settings. These conditions can contribute to a more favorable environment for the effective use of AR tools and applications in the learning process. AR is a brand-new technology, facilitating conditions are necessary. For example, it is vital to examine if individuals have suitable mobile devices, which enable the use of AR apps, and also if they know how to use them. When these conditions are met, it is expected that they will use AR technologies more easily (Saprikis et al., 2021).

5.3.3 Research Objectives 3

RO3: To analyze the most significants factors that could be related to the intention to accept augmented reality (AR) technology in the higher education institutions.

In this research objectives, there will be focused on the factors that most significants with the intention to accept augmented reality (AR) technology. The main factor that contribute to the intention to accept augmented reality (AR) technology has been identified in this research based on beta value with t-value and significant value in Multiple Regression Analysis.

This findings shows that higher education institutions students has a high believed in performance expectancy (PE). This attribute has the most impact to the intention to accept augmented reality (AR) technology. The researcher has agreed to make the performance expectancy (PE) as a first element to be considered by students in higher education institutions to implement augmented reality (AR) technology in their learning process.

Performance expectancy is a strong antecedent towards intention to use technology (Arain, Z. Hussain and W. H. Rizv et al., 2019). In addition, (T.H Jung., 2018) found that performance expectancy is positively affecting the intention to use MART. MART has been commonly recognized as an effective method that allows consumers to be more creative and leverage their experience.

Performance Expectancy (PE) has the stronger effect than the others variables. The variable with the highest beta value is likely to have a stronger effect on the dependent variable, indicating that changes in this variable have a more substantial impact on the outcome. Wen et al., 2023 has stated that this behavioural section has an important effect on attitudes and intentions to accept AR into educational activities. Various technological features, such as efficiency, speed, and precision, can shape people's performance expectancy, impacting their intentions to use technology. It is the most significant factor affecting students during education.

5.4 Implication

This term refers to the importance or relevance of a research or academic investigation. When researchers or scholars undertake a study, they aim to address a specific problem, question, or issue. The significance of the study is an explanation of why the research is valuable, what it contributes to the existing body of knowledge, and how it may have practical implications or applications.

5.4.1 Implications of Academic

This study adapted and tested the extended UTAUT (UTAUT + TPB) intention to accept in the context of augmented reality technology application at higher education institutions. The UTAUT and TPB was proposed by (Venkatesh et al., 2003.) and (Ajzen,. 1991). The study adapts and tests an extended version of UTAUT by integrating TPB into the model. This means that in addition to the factors considered in UTAUT, the researchers are also taking into account the attitudes from TPB.

In addition, this extension aims to provide a more comprehensive understanding of the factors influencing individuals' intentions to accept augmented reality technology. Researchers can develop and refine theories that explain how AR influences teaching and learning processes (Almenara et al., 2019). Academics have the opportunity to explore and contribute to the expanding field of AR technology in education through research. This involves investigating the effectiveness of AR applications, studying user behaviors and acceptance, and developing UTAUT theoretical frameworks to better understand the educational impact of AR. A major

contribution of this research is the identification of the gaps and challenges, and these revolve around four main themes. Firstly, awareness of the technology. Second is usability, third is time commitment required to learn and lastly, the willingness to replace corporeal experiences with virtual ones.

In particular, the challenge that consistently appeared were the technical difficulties that affected usability in various categories by students, educators, managers of tourism sites, and their employees. If potential consumers are not using the technology, any positive results will be negligible. Time commitment needed to ensure sufficient proficiency in utilising AR was another consistent challenge identified from the studies in this review. This challenge was especially apparent in tourism, education studies, and many more where training time had to be devoted to ensuring educators were proficient in using AR (Yung & Khoo-Lattimore, 2019).

Furthermore, (Steffen et al., 2019) has mentioned that this research helps other researchers identify paths of additional inquiry. It creates delineations in the purposes of applying the AR, which can greatly aid in revealing areas where a minimal amount of research has been performed, as well as create groupings of research where results can be more systematically compared. It also can help identify why apparent contradictions exist in areas of application and reveal areas that researchers have not adequately explored.

5.4.2 Implications of Practitioner

Accordingly, the implications of the research results are significant for practitioners, particularly augmented reality (AR) application developers, policy makers, providers, users and researchers who are keen on investigating users' technology acceptance models and behavior in mobile Augmented Reality (AR) contexts. The findings offer valuable insights for practitioners involved in the development and refinement of mobile AR applications, guiding them in optimizing features that align with users' expectations and preferences.

Moreover, policy makers can benefit from this research by gaining a nuanced understanding of the factors influencing user acceptance of AR technology, facilitating the creation of informed policies and guidelines. Additionally, end-users stand to gain from a more user-centric design approach, enhancing their overall experience with AR applications. AR

developers, in particular, can leverage these insights to refine their development strategies, creating applications that not only align with users' technological expectations but also contribute positively to the broader AR ecosystem (Chen et al., 2019).

Practitioners in education, such as teachers, instructional designers, and administrators, need to consider strategies for the successful adoption and integration of AR technology into the teaching and learning process. This involves planning how to incorporate AR tools into existing curricular and instructional methods.

In summary, practitioners across various domains can leverage insights into users' intentions to accept AR technology for strategic decision-making, targeted marketing efforts, and the development of user-centric products and services. This understanding also supports researchers in refining models and guiding future studies in the field.

5.5 Limitations of Study

The main limitations of this research revolve around constraints related to time, data collection, and accessibility. The time limitations affected the thoroughness of the search process, potentially leading to gaps in data collection. Moreover, challenges were encountered in accessing certain secondary data sources due to their restricted nature, being accessible only to members of the organization. This limited availability hindered the researcher's ability to gather comprehensive information from these sources. Additionally, some articles crucial to the research required payment for full access, introducing financial constraints.

Furthermore, the reliance on respondents for data collection introduced another set of challenges. While the honesty of respondents is essential for the accuracy of the findings, not all participants may have been responsible or honest in responding to the questionnaires. This introduces a potential bias in the collected data, affecting the reliability and validity of the research outcomes.

Overall, these combined limitations, including time constraints, restricted access to data sources, financial barriers, and potential respondent biases, collectively impact the robustness and generalizability of the research findings. It is essential to acknowledge these limitations

when interpreting the results and consider them as factors that might influence the research outcomes.

5.6 Recommendation for the Future Research

For this research, The outlined points serve as crucial guidelines for directing future research efforts in the scope of Augmented Reality (AR) applications. The first is Time Management and Data Collection Efficiency. Future researchers should carefully plan and allocate sufficient time for conducting comprehensive searches and data collection. Adequate time management strategies, such as setting clear milestones and utilizing efficient research tools, can help mitigate the constraints posed by limited time.

Next, Enhanced Access to Secondary Data Sources. To address the challenge of restricted access to certain secondary data sources limited to organizational members, future studies should explore collaborative partnerships or negotiations with organizations to gain broader access. This may involve establishing transparent communication channels and agreements to facilitate data sharing.

In addition, Addressing Cost-Related Barriers. Recognizing the financial constraints associated with accessing articles requiring fees, future researchers could explore alternative open-access resources or seek institutional support to overcome financial barriers. Additionally, collaborations with libraries or institutions with subscription access may provide a workaround (Billinghurst & Dünser, 2016).

Last but not least, Ensuring Honest and Responsible Responses. To enhance the reliability of data collected through questionnaires, future researcher should implement measures to encourage honesty and responsibility among respondents. This may involve refining survey design, ensuring anonymity, and implementing validation checks to identify and filter out potentially unreliable responses.

Thus, there is a pressing need for further studies delving into the development and usability of AR applications, particularly focusing on learners' perspectives, opinions, and

preferences within AR-based learning environments. Addressing these issues requires a concerted effort from researchers to formulate empirically proven holistic models and design principles for AR environments, aiming to enhance the pedagogical aspects and overall user experience (M. Akçayır & Akçayır, 2017).

Table 5.1 : Gantt Chart

Table Gantt Chart for Final Year Project 2

Task	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing PSM Progress 2															
Briefing about the questionnaire to distribute															
Sent to the Dr for a check															
Briefing about Chapter 4 and Dr show the example thesis															
Blast the Google Form for the actual data															
Explanation in detail on how to write in Chapter 4															
Show the SPSS (how to run)															
Stop Collecting the actual data															
Starting write Chapter 4															
Doing the correction immediately with SV guidance															
Asking about the progress Chapter 4 and discuss for the Chapter 5															
Explaination about chapter 5 in detail															

Task	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Update to the Dr about our progress															
Correct the Chapter 1-4 and Starting Chapter 5															
Briefing about the Presentation and Do the slide PPT															
FYP 2 presentation															

5.7 Summary

This study contributes new insights to address the research gap observed in Augmented Reality (AR) Technology in higher education institutions and contributes new insights to the Augmented Reality (AR) Technology acceptance research body of knowledge. This study followed a theory to practise approach to develop a conceptual study model and hypotheses based on the constructs of extended UTAUT (UTAUT+ TPB) theory. This study aims to achieve research objectives and address the research questions by empirically testing the 5 hypotheses.

The findings reveal variable that makes the strongest unique contributions in explaining the intention to accept Augmented Reality (AR) Technology in higher education institutions. By carried out Multiple Regression analysis, this present study found out that only one variable which is (Performance Expectancy) had a significant influence on intention to accept Augmented Reality (AR) Technology that found to be a significant influence on intention to accept Augmented Reality (AR) Technology in higher education institutions.

In addition, Performance expectancy should be the first element to be considered by higher education institutions to implement AR Technology as this become the highest choice of factor to accept Augmented Reality (AR) Technology experience. Therefore, all the research objectives and research questions have been answered and achieved. Last but not least, the researchers has identified some limitations in data collection as well as in conducting this research. However, the researchers also came out with some useful suggestions that have been

suggested for the future research in order to obtain more information and contribution for this study. In hence, it will make the learning in higher education institutions more entertaining and promote Augmented Reality (AR) Technology for the better future.

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APPENDIX

SURVEY QUESTIONNAIRE

INTENTION TO ACCEPT AUGMENTED REALITY (AR) TECHNOLOGY TO ENHANCE STUDENTS LEARNING IN HIGHER EDUCATION INSTITUTIONS

NIAT UNTUK MENERIMA TEKNOLOGI REALITI DIPERKUKUH (AR) UNTUK MENINGKATKAN PEMBELAJARAN PELAJAR DI INSTITUSI PENGAJIAN TINGGI

Dear Sir/Madam,

My name is BALQHIS BINTI ISMAIL from Universiti Teknikal Malaysia Melaka (UTeM). Matric number B062010469, a final year student of Bachelor of Technology Management (Technology Innovation) with Honors. I am conducting a survey on the intention to accept augmented reality (AR) technology to enhance students learning in higher education institutions. This research investigates the influence of technology and non-technology factors on the intention to accept augmented reality (AR) technology among students in higher education institutions. The inputs are necessary to proceed with the analysis. The following questionnaire will take you around 10- 15 minutes to complete. Your polite and sincere support in responding to this inquiry is greatly appreciated. Please be advised that any information gathered from this study will be kept strictly secret and confidential and will only be used for academic reasons. Thank you so much for your time and cooperation. Please do not hesitate to contact me if you have any more questions.

Yours Sincerely,

BALQHIS BINTI ISMAIL

Bachelor of Technology Management (Technology Innovation) with Honors.

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Tuan/puan

Nama saya BALQHIS BINTI ISMAIL dari Universiti Teknikal Malaysia Melaka (UTeM). Saya sedang menjalankan tinjauan mengenai hasrat untuk menerima teknologi realiti diperkukuh (AR) bagi meningkatkan pembelajaran pelajar di institusi pengajian tinggi. Penyelidikan ini menyiasat pengaruh faktor teknologi dan bukan teknologi terhadap niat menerima teknologi realiti diperkukuh (AR) dalam kalangan pelajar di institusi pengajian tinggi. Input adalah perlu untuk meneruskan analisis.Soal selidik berikut akan membawa anda sekitar 10 - 15 minit untuk dilengkapkan. Sokongan anda yang sopan dan ikhlas untuk menjawab pertanyaan ini amat dihargai. Harap maklum bahawa sebarang maklumat yang dikumpul daripada kajian ini akan dirahsiakan dan hanya akan digunakan untuk tujuan akademik. Terima kasih banyak atas masa dan kerjasama anda. Sila jangan teragak-agak untuk menghubungi saya jika anda mempunyai sebarang pertanyaan lagi.

Yang ikhlas,
BALQHIS BINTI ISMAIL

Sarjana Muda Pengurusan Teknologi (Inovasi Teknologi) dengan Kepujian
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SECTION A: DEMOGRAPHIC BACKGROUND
BAHAGIAN A: LATAR BELAKANG DEMOGRAFI

Please mark √ in the appropriate answer.
Sila tandakan √ pada jawapan yang sesuai.

1. Age group.
   Kumpulan umur.

   ☐ 18 year-20 year
   18 tahun-20 tahun
   ☐ 21 year-23 year
   21 tahun-23 tahun
   ☐ 24 year-26 year
   24 tahun-26 tahun

2. Gender
   Jantina

   ☐ Male
   Lelaki

   ☐ Female
   Perempuan

3. Races
   Bangsa

   ☐ Malay
   Melayu

   ☐ Chines
   Cina

   ☐ Indian
   India

   ☐ Others (Please specify) _____
   Lain-lain

4. Do you think that augmented reality (AR) technology could become a valuable tool for enhancing students process learning?

Adakah anda berpendapat bahawa teknologi realiti tambahan (AR) boleh menjadi alat yang berharga untuk meningkatkan proses pembelajaran pelajar?

☐ Yes
Ya
☐ No
Tidak

5. The acceptance of augmented reality (AR) technology in higher education institutions will make learning more interesting.

Penerimaan teknologi augmented reality (AR) di institusi pengajian tinggi akan menjadikan pembelajaran lebih menarik

☐ Yes
Ya
☐ No
Tidak

SECTION B: GENERAL QUESTIONS FOR THE AUGMENTED REALITY (AR) APPLICATIONS

BAHAGIAN B: SOALAN UMUM MENGENAI APLIKASI TEKNOLOGI REALITI DIPERKUKUH

Augmented reality (AR) is the application of information in the form of text, visuals, audio, and other virtual upgrades inserted into real-world items in real-time. That "real world" component will set Augmented Reality apart from Virtual Reality. Augmented Reality, as compared to simulation, combines and improves the user's engagement with the real environment. In university education, augmented reality is transforming the way students study. Furthermore, studies have demonstrated that augmented reality (AR) boosts motivation and attention in the learning process for students.

Realiti diperkukuh (AR) ialah aplikasi maklumat dalam bentuk teks, visual, audio dan peningkatan maya lain yang dimasukkan ke dalam item dunia sebenar dalam masa nyata. Komponen "dunia nyata" itu akan membezakan realiti diperkukuh daripada Realiti maya. Realiti diperkukuh, berbanding simulasi, menggabungkan dan menambah baik penglibatan pengguna dengan persekitaran sebenar. Dalam pendidikan universiti, realiti tambahan mengubah cara pelajar belajar. Tambahan pula, kajian telah menunjukkan bahawa realiti tambahan (AR) meningkatkan motivasi dan perhatian dalam proses pembelajaran pelajar.

Figures 1 : Augmented Reality in Engineering Education

Rajah 1 : Realiti diperkukuh dalam Pendidikan Kejuruteraan

Please tick √ into the box listed below that might represent your answer.
S*ila tandakan √ pada kotak yang disenaraikan di bawah yang mungkin mewakili jawapan anda.*

6. Have you ever heard about augmented reality (AR) technology?
Pernahkah anda mendengar tentang teknologi realiti diperkukuh (AR)?

☐ Yes
Ya

☐ No
Tidak

7. If **Yes**, what are the websites or applications related to AR that you used in your learning process?
Jika Ya, apakah laman web atau aplikasi yang berkaitan dengan AR yang anda gunakan dalam proses pembelajaran anda?

☐ MARLCardio
MARLCardio

☐ JigSpace
JigSpace

☐ Complete Anatomy 2021
Complete Anatomy 2021

☐ ARvid
ARvid

☐ Others (Please Specify) _____
Lain-lain

8. What are the AR related devices that you have used in your process learning?
Apakah peranti berkaitan AR yang telah anda gunakan dalam pembelajaran proses anda?

☐ Mobile augmented reality technology (MART)
Teknologi realiti diperkukuh mudah alih

☐ Tablets augmented reality technology (TART)
Teknologi realiti diperkukuh tablet

4. Do you think that augmented reality (AR) technology could become a valuable tool for enhancing students process learning?

Adakah anda berpendapat bahawa teknologi realiti tambahan (AR) boleh menjadi alat yang berharga untuk meningkatkan proses pembelajaran pelajar?

☐ Yes
Ya
☐ No
Tidak

5. The acceptance of augmented reality (AR) technology in higher education institutions will make learning more interesting.

Penerimaan teknologi augmented reality (AR) di institusi pengajian tinggi akan menjadikan pembelajaran lebih menarik

☐ Yes
Ya
☐ No
Tidak

SECTION C: FACTORS OF INTENTION TO ACCEPT THE AUGMENTED REALITY (AR) TECHNOLOGY

BAHAGIAN C: FAKTOR-FAKTOR BAGI NIAT UNTUK MENERIMA TEKNOLOGI REALITI DIPERKUKUH (AR).

Using a 5-point Likert scale, respondents are asked to indicate how strongly they disagree, disagree, neutral, agree, or strongly agree with each statement. Please √ at ONE box for each question to indicate how much you agree or disagree with the following statement.

Menggunakan skala Likert 5 mata, responden diminta untuk menunjukkan sejauh mana mereka tidak bersetuju, tidak bersetuju, neutral, bersetuju, atau sangat bersetuju dengan setiap pernyataan. Sila tandakan √ pada SATU kotak untuk setiap soalan untuk menunjukkan sejauh mana anda bersetuju atau tidak bersetuju dengan pernyataan berikut.

Score *Skor*	**1**	**2**	**3**	**4**	**5**
Scale *Skala*	Strongly Disagree *Sangat Tidak Setuju*	Disagree *Tidak Setuju*	Neutral *Neutral*	Agree *Setuju*	Strongly Agree *Sangat Setuju*

ATTITUDE
SIKAP

A disposition to respond favorably or unfavorably towards some psychological object.
Kecenderungan untuk bertindak balas baik atau tidak baik terhadap sesuatu objek psikologi.

Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
ATT1	I enjoy the lessons guided by AR applications. *Saya menikmati pelajaran yang berpandukan aplikasi AR.*					
ATT2	I come to the class more eagerly when AR applications are used. *Saya datang ke kelas dengan lebih bersemangat apabila aplikasi AR digunakan.*					
ATT3	I can concentrate better on the lesson when AR applications are used. *Saya boleh menumpukan perhatian dengan lebih baik pada pelajaran apabila aplikasi AR digunakan.*					
ATT4	AR applications make my learning process interesting. *Aplikasi AR membuatkan proses pembelajaran saya menarik.*					
ATT5	I believe that AR can be a valuable tool to improve the learning process. *Saya percaya bahawa AR boleh menjadi alat yang berharga untuk meningkatkan proses pembelajaran.*					

PERFORMANCE EXPECTANCY
JANGKAAN PRESTASI

The degree to which an individual believes that using augmented reality (AR) will help him or her to attain gains in performance.
Tahap di mana individu percaya bahawa menggunakan realiti tambahan (AR) akan membantunya untuk mencapai keuntungan dalam prestasi.

Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
PE1	I believe AR can help to facilitate the learning process. *Saya percaya AR boleh membantu memudahkan proses pembelajaran.*					
PE2	Using AR would enhance my motivation to study new things. *Menggunakan AR akan meningkatkan motivasi saya untuk mengkaji perkara baharu.*					
PE3	Using AR would increase my efficiency in learning new things. *Menggunakan AR akan meningkatkan kecekapan saya dalam mempelajari perkara baharu.*					
PE4	My academic performance would increase if I used the AR. *Prestasi akademik saya akan meningkat jika saya menggunakan AR.*					
PE 5	AR has the potential to boost my productivity. *AR mempunyai potensi untuk meningkatkan produktiviti saya.*					

EFFORT EXPECTANCY
JANGKAAN USAHA

Defined as the level of ease associated with the use of a technology.
Ditakrifkan sebagai tahap kemudahan yang berkaitan dengan penggunaan teknolo

Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
EE1	Learning how to use AR tool is easy. *Mempelajari cara menggunakan alat AR adalah mudah.*					
EE2	The interaction with this AR tool is clear and understandable. *Interaksi dengan alat AR ini jelas dan boleh difahami.*					
EE3	I would find the AR tools easy to use. *Saya mendapati alat AR mudah digunakan.*					
EE4	It would be simple for me to develop proficiency with these AR tools. *Mudah bagi saya untuk membangunkan kemahiran menggunakan alat AR ini.*					
EE5	AR tools have more user-friendly features. *Peralatan AR mempunyai ciri-ciri lebih mesra pengguna.*					

SOCIAL INFLUENCE
PENGARUH SOSIAL

Where an individual's behaviors, opinion, or beliefs change as a result of their network ties, often becoming more similar to those with whom they are connected.
Apabila tingkah laku, pendapat atau kepercayaan seseorang berubah akibat ikatan rangkaian mereka, selalunya menjadi lebih serupa dengan orang yang berhubung dengan mereka.
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Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
SI1	Important people in my life feel that I should use AR applications. *Orang yang penting dalam kehidupan saya merasakan bahawa saya harus menggunakan aplikasi AR.*					
SI2	I am influenced by the positive experiences and testimonials of others when adopting AR technology. *Saya dipengaruhi oleh pengalaman positif dan testimoni orang lain apabila menggunakan teknologi AR.*					
SI3	In general, the college administration encouraged the usage of AR technologies. *Secara umumnya, pentadbiran kolej menggalakkan penggunaan teknologi AR.*					
SI4	I am likely to use AR technology as a result of observing my peers benefiting from it. *Saya mungkin akan menggunakan teknologi AR kesan daripada memerhatikan rakan sebaya yang mendapat manfaat daripadanya.*					

Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
SI5	The acceptance and positive feedback from my social media network impact my openness to use AR technology. *Penerimaan dan maklum balas positif daripada rangkaian media sosial saya memberi kesan kepada keterbukaan saya untuk menggunakan teknologi AR.*					

FACILITATING CONDITIONS
SYARAT MEMUDAHKAN

Which an individual perceives that organizational and technical infrastructures required to use the intended system are available.
Yang mana individu menganggap bahawa infrastruktur organisasi dan teknikal yang diperlukan untuk menggunakan sistem yang dimaksudkan tersedia.

Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
FC1	I have the necessary resources to use AR tools. *Saya mempunyai sumber yang diperlukan untuk menggunakan alat AR.*					
FC2	I have the necessary knowledge to use AR tools. *Saya mempunyai pengetahuan yang diperlukan untuk menggunakan alat AR.*					
FC3	AR tools work well with the other learning platforms I used. *Alat AR berfungsi dengan baik dengan platform pembelajaran lain yang saya gunakan.*					
FC4	If I have trouble utilising AR technologies, I may seek assistance from others. *Jika saya menghadapi masalah menggunakan teknologi AR, saya boleh mendapatkan bantuan daripada orang lain.*					
FC5	I have strong technical support from the lecturers for using AR technology. *Saya mendapat sokongan teknikal yang kuat daripada para pensyarah untuk menggunakan teknologi AR.*					

SECTION D: STUDENTS INTENTION TO ACCEPT AUGMENTED REALITY (AR) TECHNOLOGY

BAHAGIAN D: NIAT PELAJAR UNTUK MENERIMA TEKNOLOGI REALITI DIPERKUKUH (AR)

The willingness of a person or group to accept and use Augmented Reality (AR) technology.
Kesediaan seseorang atau kumpulan untuk menerima dan menggunakan teknologi Realiti Diperkukuh (AR).

Label *Label*	Items *Item*	**1**	**2**	**3**	**4**	**5**
SA1	I tend to accept using AR technology independently (outside the classroom). *Saya cenderung untuk menerima penggunaan teknologi AR secara bebas (di luar bilik darjah).*					
SA2	I tend to accept using AR technology for other relevant subjects. *Saya cenderung untuk menerima penggunaan AR untuk mata pelajaran lain yang berkaitan.*					
SA3	I tend to accept using AR technology because it will improve my skills in education. *Saya cenderung untuk menerima penggunaan teknologi AR kerana ia akan meningkatkan kemahiran saya dalam pendidikan*					
SA4	I tend to accept using AR technology in the future. *Saya ingin menggunakan teknologi AR ini pada masa hadapan.*					
SA5	I will strongly recommend others to accept using AR technology in their studies. *Saya amat mengesyorkan agar orang lain menggunakan teknologi AR untuk pengajian mereka.*					

A very big thank you for spending your time, effort and cooperation. Have a nice day!