MEASURE FACTOR OF AFFECTING DIGITAL LEARNING, AND LEARNING AND INNOVATION SKILLS AMONG UNIVERSITY STUDENT IN MALAYSIA

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DECLARATION OF ORIGINAL WORK

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DEDICATION

I would want to express my appreciation to my beloved family and friends, who were always encouraging and supportive as I worked on the research. In addition, Mrs. Nor Ratna Binti Masrom and panel, Ts. Dr. Nurulizwa Binti Abdul Rashid, supervised my research, and courses mates assisted me in completing the research path.

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ABSTRACT

Digital learning is any type of education that properly utilizes technology. Each student may plan, gather, manage, evaluate, and report information with the use of flexible digital learning tools that allow for personalization. It is an issue of achieving the same result utilizing various learning routes (Lilian Anthonysamy, et. al., 2021). The 4Cs-communication, collaboration, creativity, and critical thinking are identified by the Partnership for 21st Century Skills as the primary abilities for learning and innovation in the twenty-first century (Vacide Erdoğan, 2019). The learning and innovation skills are a set of skills that will set students ready for the world of work. Furthermore, learning and innovation skills are increasingly recognized as skills that separate students who are prepared for the increasingly complex life and work environment of the 21st century, and those who are not. Therefore, this research is a study of the measure factor of affecting digital learning, and learning and innovation skills among university student in Malaysia and also aims to determine the relationship between the dependent variables and independent variables (adaption of digital learning and effect on university students' learning and innovation skills). This research is conducted using a quantitative method. This research will focus on 300 university students who are experienced in using digital learning for teaching and learning activities. The data was collected from respondents through the questionnaire survey. Thus, the result from the Multiple Regression Analysis and Pearson's Correlation Coefficient showed that both variables in this study had significant and strong relationships together. In conclusion, through this research, it is hoped that it can provide guidelines to universities and students so they know the elements that are needed for improving effective ways to improve learning and innovation skills among students with the use of digital learning.

Keywords: Digital Learning, Learning and Innovation Skills, Students

ABSTRAK

Pembelajaran digital ialah sebarang jenis pendidikan yang menggunakan teknologi dengan betul. Setiap pelajar boleh merancang, mengumpul, mengurus, menilai dan melaporkan maklumat dengan menggunakan alat pembelajaran digital yang fleksibel yang membenarkan pemperibadian. Ia adalah isu untuk mencapai keputusan yang sama menggunakan pelbagai laluan pembelajaran (Lilian Anthonysamy, et. al., 2021). Komunikasi, kerjasama, kreativiti dan pemikiran kritis 4C dikenal pasti oleh Perkongsian untuk Kemahiran Abad Ke-21 sebagai kebolehan utama untuk pembelajaran dan inovasi dalam abad kedua puluh satu (Vacide Erdoğan, 2019). Kemahiran pembelajaran dan inovasi adalah satu set kemahiran yang akan menyediakan pelajar bersedia untuk dunia pekerjaan. Tambahan pula, kemahiran pembelajaran dan inovasi semakin diiktiraf sebagai kemahiran yang memisahkan pelajar yang bersedia untuk kehidupan yang semakin kompleks dan persekitaran kerja abad ke-21, dan mereka yang tidak. Oleh itu, kajian ini adalah kajian factor ukuran yang mempengaruhi pembelajaran digital, dan kemahiran pembelajaran dan inovasi dalam kalangan pelajar universiti di Malaysia dan juga bertujuan untuk menentukan hubungan antara pembolehubah bersandar dan pembolehubah tidak bersandar. Kajian ini dijalankan menggunakan kaedah kuantitatif. Penyelidikan ini akan memberi tumpuan kepada 300 pelajar universiti yang berpengalaman dalam menggunakan pembelajaran digital untuk aktiviti pengajaran dan pembelajaran. Data dikumpul daripada responden melalui tinjauan soal selidik. Oleh itu, hasil daripada Analisis Regresi Berganda dan Pekali Korelasi Pearson menunjukkan kedua-dua pembolehubah dalam kajian ini mempunyai hubungan yang signifikan dan kuat bersama-sama. Kesimpulannya, melalui penyelidikan ini diharap ia dapat memberi garis panduan kepada universiti dan pelajar supaya mereka mengetahui elemen-elemen yang diperlukan untuk menambah baik cara-cara berkesan meningkatkan kemahiran pembelajaran dan inovasi dalam kalangan pelajar dengan penggunaan pembelajaran digital.

Kata kunci:Pembelajaran Digital, Kemahiran Belajar dan Inovasi, Pelajar

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LIST OF ABBREVIATIONS

DL	Digital Learning
WBLRs	Web-based Learning Resources
IR 4.0	Industrial Revolution 4.0
RBV	Resources-based view
EFA	Exploratory Factor Analysis
SPSS	Statistical Package for Social Sciences
UTAUT	Unified Theory of Acceptance and Use of Technology
KMO	Kaiser-Meyer-Olkin
IV	Independent Variable
DV	Dependent Variable
MRA	Multiple Regression Analysis
H	Hypothesis

CHAPTER 1

INTRODUCTION

1.1 Introduction

The purpose of this chapter is to measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. This chapter will also cover the research background, problem statement, research question, research objectives, research scope, significance of study, limitation of study and operational definitions.

1.2 Background of research

Digital learning is a teaching and learning practice that builds on creating innovative, instructional, and engaging learning that is accompanied by tools and technological advances through student learning applications (Nada Zaki Wafa & Meghan MCGlinn Manfra, 2021). The higher education sector in Malaysia is growing rapidly towards the Industrial Revolution (IR4.0), for every institution to achieve and maintain the sustainability of its institutions, the continued improvement of the teaching and learning delivery system is an important element in producing quality graduates who are ready to step into the work environment where it is in line with the Malaysian Higher Education 4.0 framework.

Besides, digital learning is a technology trend that allows for lifetime learning while also necessitating digital learning preparation. The importance and priorities of digital literacy emphasized by the Malaysia Education Development Plan 2015 until 2025 (Higher Education) cover factors in terms of critical thinking and problem- solving. That factor is a learning skill in the 21st century where it will help students tothrive in line with IR 4.0 (Malaysian Investment Development Authority, 2021). Theunprecedented pandemic that has now turned into the endemic of Coronavirus (COVID 19) has aided the growth of digital learning. Furthermore, the spread of the pandemic COVID-19 has changed the way of teaching and learning in Malaysia education from face-to-face to virtual where digital learning platforms become the main focus for educators to impart knowledge to students. According to Professor Dr Abdul Karim Alias in 2021, he said that online learning and education are no longer achoice, but it is a necessity. However, with the use of digital learning, learning and innovation skills among students need to be emphasized to produce more creative, productive and innovation students.

Finally, digital learning is one of the benefits obtained from technology education where this platform provides opportunities and space for students and educators to communicate and interact virtually. Not only this, all forms of learning materials such as notes and videos can be accessed through a digital learning platform.

Figure 1.1: Malaysia Higher Education Framework 4.0

Source: MOHE, 2010

1.3 Problem Statement

There is some research that has been conducted on the use of digital learning for education. Siti Dianah Abdul Bujang; Ali Selamat; Ondrej Krejcar; Petra Maresova & Ngoc Thanh Nguyen, 2020, stated that digital learning is an instructional practice in any educational activity that uses technology to improve the learning experience of thestudents. It makes use of a wide range of technology-enhanced educational strategies that ultimately helps student. Moreover, the existence of IR 4.0 continues to change the world, and even Malaysia education also faces the challenge of preparing studentsto meet the demands of the IR 4.0 industry.

Besides, through the IR 4.0 revolution, the method of approach in teaching and learning known as education 4.0, has changed to a new era of the learning system. This education 4.0 has characteristics that shape students such as for self-learning, critical thinking, digital capabilities, and problem-solving. Education 4.0 is a new learning system that enables students to

develop lifelong learning and innovation skills. It provides the notion of teaching and learning innovation and uses ICT in its processes. (Joseph O. Wogu, 2021) stated that through wired or wireless networks, digital learning is a tool used to obtain digital instructional resources for either online or offline learning activities. With the advancement of information technology and related technologies, digital learning can be leveraged by lecturers to create innovative features to provide students with systematic knowledge and teaching materials. In the IR 4.0 era, digital learning has increased its field to support the various industries in Malaysia. Thus, the issues and challenges in Malaysian education through digital learning are low adoption rate, lack of quality e-content, difficulty in engaging learners and language barrier (Professor Tan Sri Datuk Anuwar Ali, 2021). Next, according to Jessie S. Barrot, et.al, in 2021, the Covid 19 pandemic had a negative impact on the development of students' learning skills and innovation to gain a more detailed understanding of learning. In addition, students face the problem of a learning environment that is less conducive to fully focusing on learning through digital learning and they also face the problem of technology literacy and competence. Besides, according to Ranasinghe, Karunarathna and Pradeepamali, 2020, Cunningham and Anzola, 2019, there is limited interaction between students and educators, it is difficult to guide students, it is tough to educate each student's unique preferences and strengths, it is impossible to provide teaching skills, and there is the limited motivation for students while they are learning online.

In conclusion, a case study was selected to identify teaching-learning exchanges from traditional or face-to-face to virtual between educators and students in measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. This quantitative method is suitable for analyzing the adaptation of technology, pedagogy and content in developing students' learning and innovation skills. This is because quantitative research is effective for studying complex interactivity, relies on information feedback systems, and offers in-depth knowledge of student problem conceptualization.

1.4 Research Questions

The following research question is being addressed in this study:

i. What is the factor affecting digital learning, and learning and innovation skills among university students in Malaysia?
ii. What is the relationship between the factor affecting digital learning, and learning and innovation skills among university students in Malaysia?
iii. What is the most significant factor affecting digital learning, and learning and innovation skills among university students in Malaysia?

1.5 Research Objectives

The research objective was to determine the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. The following are theresearch objectives:

1. To identify the factor of affecting digital learning, and learning and innovation skills among university students in Malaysia.
2. To measure the relationship between the factor affecting digital learning, and learning and innovation skills among university students in Malaysia.
3. To explore the most significant factor affecting digital learning, and learning and innovation skills among university students in Malaysia.

1.6 Scope of research

The research's scope is the distribution of questionnaires to analyze the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. The targeted respondents will be university students in Malaysia and who have experienced use of digital learning as the primary learning platform, especially during the past COVID-19 pandemic.

This research will utilize the Learning Theory. The study discovered that the Learning Theory hypothesis has become the dominant paradigm in strategic planning, allowing us to comprehend how digital learning create efficient results.

1.7 Significant of study

The findings of research would be useful to educational institute in Malaysia. The research explores the relationship between digital learning and students' learning and innovation skills. Thus, the educational institute enhanced their student's level of learning and innovation skills based on this research. Furthermore, this research contributed a value to universities student. The research acted as a reference to other researchers who carry out the similar study and students can gain knowledge from the findings of research.

1.8 Limitation of study

There is various limitation to doing this research, such as a restricted number of respondents, time limit, and respondent honesty. This research only focuses on university students in Malaysia whether from public or private university. Thus, the result is more focused on students in Malaysia University than on respondent from foreign university. Furthermore, the researcher only has three months to collect data. Whereas, one of the limitations was the respondent's honesty when answering the questionnaires regarding their experience on the use of digital learning and performance on their learning and innovation skills.

1.9 Operational definitions

A. Digital Learning

Digital learning is a major activity in education as the world is hit by the coronavirus epidemic (COVID 19). The use of applications from digital learning can improve skills, especially in technical mastery. (Kumari, Hemalatha, Ali & Naresh, 2020). Digital learning can be measured based on the success of its components. Besides, web-based training, distant learning, online learning, and network learning are all terminology used to describe digital learning (Lin, Chen & Liu, 2017). According to Lin et al. (2017), the four components of digital learning are digital tools, autonomous learning, digital tools, digital delivery, and digital teaching materials. In addition, one of the tools for enhancing the teaching and learning process in the higher education is web-based learning resources (WBLRs). These tools can give educators and students access to a variety of fresh and engaging experiences that aren't available in traditional classrooms.

B. Students' Learning and Innovation Skills

The Learning and innovation skills place a premium on higher-order cognitive abilities since they are seen as a pathway to success in the increasingly demanding, social, and complicated existence (Suheyla Demirkol Orak and Jülide İnözü, 2020). According to Ester Van Laar, et. al., in 2019, the 21st century digital skills consist of 3 main elements. The first element is learning and innovation skills. This element consists of some components which are commonly called 4C. These components are creativity, communication, critical thinking, and collaboration. The second element is called information, media, and technology skills. These skills also have some components or indicators. The indicators on the elements of information, media, and technology skills are information literacy, media literacy, and information, communication, and technology literacy. The last element of the 21st century digital skills is life and career skills. This element has 5 Indicators, including flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, leadership and responsibility. Based on the three elements of the 21st century skills, the first and foremost form of learning is the learning and innovation skills. It can be concluded that the learning and innovation skills of students are one of the 21st century skill elements that can be used for the development of the quality of human resources and have four main indicators commonly called 4C, including skills of communication, critical thinking, collaboration, and creativity.

1.10 Chapter summary

Finally, this section summarizes the description of the research analysis. The background of the study was focused on the current situation status of digital learning on Malaysia universities students' learning and innovation skills by completing the research' s background. There are also have statements on why this research is being conducted. Moreover, three research questions and objectives have been presented in this chapter. The purpose of this research is to investigate the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. Furthermore, there are various limitations to doing this study, such as a restricted number of respondent honesty. The importance of this study is that it provides information on the factor of digital learning on universities students' learning and innovation skills. It will also assist the students and institution to understand the effects of using digital learning on learning and innovation skills that can produce the quality employees when the students step in to work environment.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will examine on the literature review and relevant theoretical model. The researcher discussed about the variables, measurement and definition of digital learning, learning and innovation, technological, pedagogy and content. The independent variable, digital learning, effect and factor is clearly defined it. The dependent variable, learning and innovation skills is defined according to previous literature. After that, the relationship between the variables such as digital learning and learning and innovation skills, measure factor of affecting digital learning, and learning and innovation skills among university student in Malaysia are clearly identified. Finally, the hypothesis of the research constructed.

2.2 Digital Learning

2.2.1 Web-based Learning Resources (WBLRs)

Due to the tools' simplicity of use, accessibility of the ubiquity of the Web, and relative affordability, web-based technology is frequently the technology of choice for distance learning (Diana Rochintaniawati, 2020). In addition, Web-based learning is an online learning platform or website with educational objectives, and many institutions provide knowledge instructional materials as a source of all-encompassing learning resources (Yaya Wihardi, 2020). The term is defined as "interactive web-based tools that support learning by enhancing, amplifying, and guiding the cognitive processes of the learners. Furthermore, A type of learning approach that used online and internet technology was web-based learning from other people's learning methods, which had several benefits. Any device running any operating system, including Android, Windows, and others, can access it anytime and wherever (Lia Astut, 2020). Accordingly, the concept of WBLRs, can be defined as a learning object or web-based learning tool with four major features:

1. It uses web technologies and is delivered through the web
2. It teaches content that meets specific learning objectives aligned withthe curriculum.
3. It is designed on the basis of a learning strategy and pedagogicalprocedure.
4. It contains reusable elements.

2.3 Learning and Innovation Skills

Learning and innovation skills increasingly are being recognized the skills that separate students who are prepared for increasingly complex life and work environment in the 21st century. A focus on creativity, critical thinking, communication, and collaboration is essential to prepare students for future (BellevueCollege, 2016). The innovation skills that students' gain from their study make them can act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur. Therefore, these learning and innovation skills have to be developed and nurtured in universities students. Students have to encourage to think outside the proverbial box and learn it is normal to fail when breaking new ground and developing ideas (Estrellita Larias, 2016).

2.4 Measure Factor of Affecting Digital Learning, and learning and Innovation Skills Among University Student in Malaysia

2.4.1 Technology

From a technological point of view, WBLRs use web technologies and internetservices as the delivery mode. That is to say HTML, URL, browsers, e-mail, file transfer facilities and others. Through programming and the use of "plug-ins" where the programs that can be downloaded from the internet. The designers can produce interactive course materials containing online activities such as self-assessment, animations and simulations. These can improve students' learning skills and are often more enjoyable also meaningful for the students.

Besides, technology plays an important role in defining the skills that are considered crucial. In this case, the concept can consist of main part of it, such as computers, ICT, internet and multimedia in combination with

certain knowledge perspectives. This process completely makes use of technology. One of the media technologies that is often used for learning, particularly distance learning, is video media (Varga, 2020). This media has proven to be a medium that is broadly used in developing educations. The video media is an effective medium to increase student understanding in learning. The application of these media can be implemented in various methods. Media in digital form can be applied to online learning effectively (Gupta & Dileep, 2020; Kim, Wang, & Ketenci, 2019; Rusli, Rahman, & Abdullah, 2020). Online learning with appropriate media content can improve the output of learning outcomes.

Furthermore, the strategy related to innovation is “to comprehensively promote technology and apply the internet, to enhance emerging businesses and product creation with knowledge value-added, and to apply network technology to reduce costs for production, stock, and transaction to further create emerging markets.” Specific measures related to innovation were “to establish booming innovation and entrepreneurial mechanisms” and “to review current education systems, reinforce innovation, and cultivate re-learning ability” as long-term measures. “Internet + education” is a new revolution in the field of education. The application of the internet reaches the barrier and boundary of education, which makes all elements in the field of education separated but united, concentrated but dispersed. Internet information storage is large, efficient, and fast, which can fragment and integrate valuable information, and enable people to share through the electronic market, portal resources, forum resources, and personal resources

Lastly, hypermedia technology is a great success in the world of education, especially in combining incompatible elements and self-education. The appropriate conditions created by hypermedia technology facilitate the independent acquisition and assimilation of the required quality of information as well as can be easily integrated into the educational process (Olena Koliasa; Iryna Lelet; Valeriia Serebriakova & Svitlana Yukhymets, 2021).

2.4.1 Pedagogy

From a pedagogical point of view, the design of WBLRs is embedded within a pedagogical procedure or learning theory. Hence, WBLRs are associated with pedagogical value that potentially affect teaching and learning processes. A pedagogical strategy makes use of students' passions to give learning a concrete purpose. It fosters the development of skills including communications, leadership, and multidisciplinary teamwork skills. (May Portuguez Castr, et. al., 2020). The students, in turn, is no longer merely a passive recipient of the information transmitted and is included in the decision-making process regarding the students training. This inclusion makes the student co-responsible in the creation of pedagogicalinnovations.

Furthermore, digital learning educational pedagogy is currently popular in the educational system. It examines how pedagogical design affects student's development of academic proficiency in various forms of digital learning focused on technology-enhanced collaborative learning (Leovgildo Lito D. Mallillin, et. al., 2020). The student-centered learning pedagogy differs and is adaptable to both the classroom and digital learning environments. Learning, flowing, and style processes differ amongst techniques and tactics (Robinson, Al-Freih, and Kilgore, 2020). The involvement, teaching, practice, and strategy in digital learning support for students are affected by the pedagogy and principles of technology (Herodotou, Rienties, Boroowa, Zdrahal, and Hlosta, 2019).

Finally, the evolution of online education When deciding how to conduct and create an appropriate response to the educational process during the Covid-19 pandemic, pedagogy aids the various educational institutions. It offers the instructors and the students must maintain appropriate social distancing and safety precautions. It is a successful method and strategy for preserving opportunities in the teaching of online learning (Reimers, and Schleicher, 2020).

2.4.2 Content

Content also be used in WBLRs, where teaching and learning of the subject matter takes place via a combination of classroom and web-based learning. In addition,content stands for the content to be learned or the topics to be mastered (Christine Jacqmot; Francoise Docq; Yves Deville, 2020). There are many things that can be considered ‘content, what is important is that what is taught or discussed through the language not be language instruction related. The presentation of content builds on students' prior knowledge and is planned to allow for instructor and student response. Therefore, it is believed that one key component of active methods is the participation of students in the production of knowledge, both independently and collaboratively. (May Portuguez Castro, et. al., 2020).

Moreover, a digital learning system can be integrated as a content feature into a WBLRs system to publish contents or learning objects online or to operate on a standalone computer (Amos Ochayi Onojah, et. al., 2020), a true integration requires that teachers consider technology, content, and pedagogy not in isolation, butrather in the complex relationships in the system defined by three key components: (a) Knowledge of the pedagogy that is applicable to the specific content; (b) Knowledge of how technology can support pedagogical goals; and (c) Knowledge of how the subject matter is transformed by the application of the technology. Clearly, teachers’ technical knowledge alone is not sufficient to achieve learning outcomes using WBLRs.

Next, the context is the totality of relationships between the students and surrounding elements within a teaching and learning situation. Learning is described as emerging from exchanges between the students and a “milieu” organized with teaching intentions. Accordingly, milieu is everything in the situation the learnerscan act on. It can be divided into two categories: Material and non-material milieu. The material milieu includes a number of elements:

• The subject matter, its content, topics and subtopics, task-based activities, assignments, exercises, and problem statements taught in the classroom.

• The curriculum and its objectives, main subject areas, basic skills, including computer skills, competence aims in the subject, and subject assessment.

• Infrastructure (technical and non-technical), software tools available, number and place of computers, student/PC-ratio in the classroom.

• Textbooks and other study material such as teaching notes or electronic study material.

In short, the milieu forms the very basis for the process underlying the design, development, use, and evaluation of WBLRs. The milieu may change for the student when introducing a new element - the WBLR, because learning and teaching processesare then mediated by the technology. Learning happens through adaptation of the student to the milieu. The WBLR can be considered as an element of the milieu, and as such, it becomes a source of learning, by means of interaction with the student.

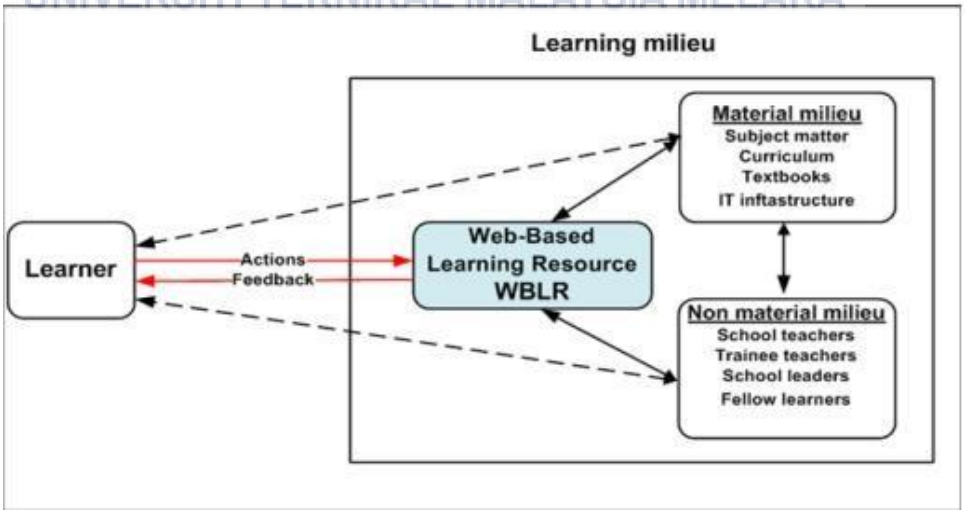

Figure 2.1: Context of use of WBLRs and relationships between various elements

Sources: Said Hadjerrouit, 2010

2.5 The Interaction of the Research

Several researchers have conducted studies aimed at determining the link between digital learning, digital learning factor and effect and learning and innovationskills. As a result, to provide sufficient evidence to explain the following link, this study provides research hypotheses based on the construction of a theoretical model supported by previous literature.

2.6 Theoretical Framework

The researcher focuses as a reference on Learning Theory. Figure 2.1 shows the theoretical model of the research that is obtained from Said Hadjerrouit, 2010. The measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia can be classified in the following indicators, namely, technological, pedagogy and content. Besides, the framework below also shown the impact of digital learning on universities students' learning and innovation skills.

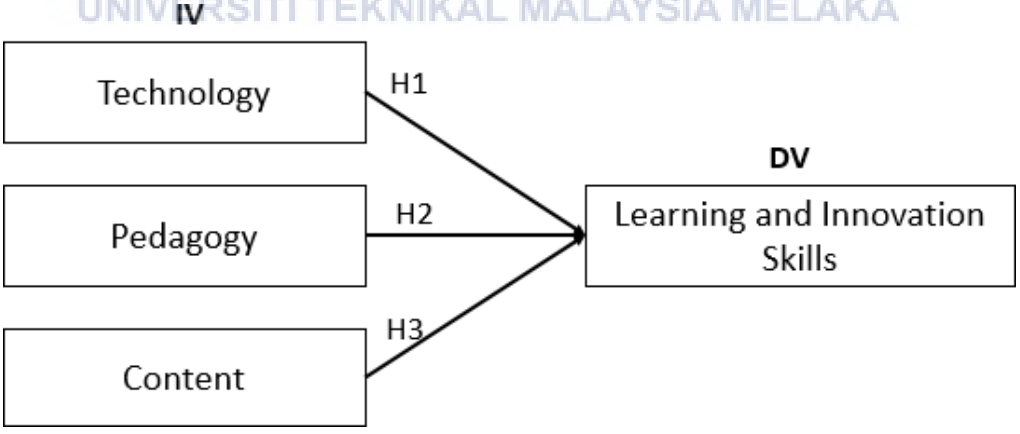

Figure 2.2: Theoretical Model of the Research

Source: Said Hadjerrouit, 2010

2.7 Conceptual Framework

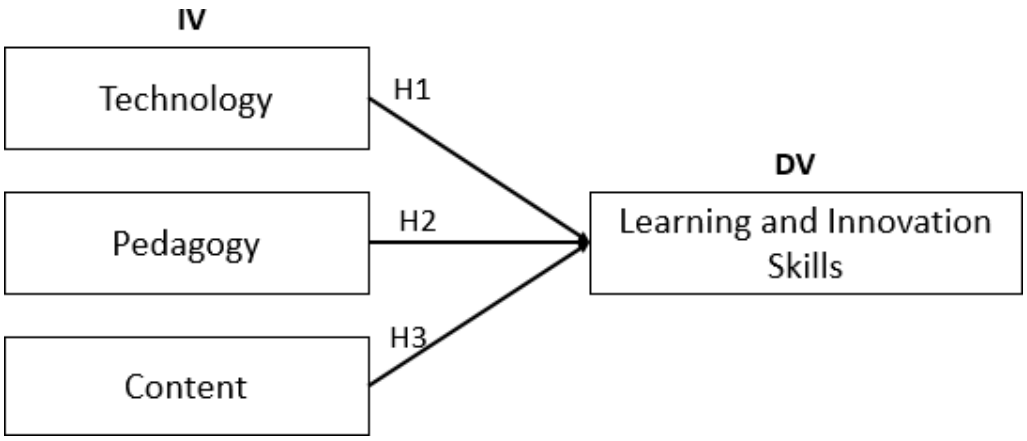

Figure 2.3: Conceptual Framework

Source: Said Hadjerrouit, 2010

Figure 2.3 shows the conceptual model of the research. Based on indicator framework Said Hadjerrouit (2010). The framework shows the relationship between technological, pedagogy and content on digital learning on universities students' learning and innovation skills. Digital learning as a dependent variable, while three independent variables are between technology, pedagogy and content. Therefore, the aim of the research is to study the factor of digital learning on universities students' learning and innovation skills.

2.8 Hypothesis

Based on research framework in Figure 2.2, there were 3 hypothesis whichcould be constructed according to the proposed framework. The hypothesis is:

Technology

H_0: There is no significant relationship between technology and learning and innovation skills.

H_1: There is a significant relationship between technology and learning and innovation skills.

Pedagogy

H_0: There is no significant relationship between pedagogy and learning and innovation skills.

H_2: There is a significant relationship between pedagogy and learning and innovation skills.

Content

H_0: There is no significant relationship between content and learning and innovation skills.

H_3: There is a significant relationship between content and learning and innovation skills.

2.9 Chapter Summary

The literature reviews that are being covered in this research topic are about the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. Furthermore, in this chapter, the researcher examined the definition of digital learning, learning and innovation skills, and factor of affecting digital learning, and learning and innovation skills among university students in Malaysia, all of which are based on previous research. Also, the researcher received the studied conceptual framework from Said Hadjerrouit, in 2010 but modified it to suit the research variables, which included three independent and one dependent variable. Both variables have been covered in the research framework. Lastly, the researcher developed the hypothesis testing to utilize the relationship between the independent variables and the dependent variables.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In Chapter 3, the research design and numerous forms of research design will be thoroughly explained. Following that, one of the research designs is picked for this study for a variety of factors. The path that researchers must take in order to perform their study is referred to as research methodology (Kassu Jilchs, 2019). As a result, theresearch method is known, which includes three types of approaches for completing the study. With justification, one of the research techniques is picked to finish this investigation. A data collection method would also outline the procedures involved in gathering associated data and information. The sample and two types of sample are defined, and one of the samples will be chosen for this study for various reasons. Following that, the sample size for this study was decided, and the pilot study's comprehensive information was presented. Finally, the technique of data analysis is described.

3.2 Research Design

The measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia was investigated in this study. The framework for collecting and analysing data fulfil the research objectives and satisfy the research aims was the search design, which provided a logical justification for selecting data sources, data collection, processes, and data analysis methodologies (Saunders et al., 2016). The importance of research design is that it enables seamless navigation of many research method, resulting in work that is as competent as feasible, giving complete informationwith the least amount of effort, time, and money (Innam, 2016). There are four types of research design: exploratory, descriptive, explanatory, and evaluative (Saunders et al., 2016). In this study, the researcher has selected explanatory research as the research design.

3.2.1 Explanatory Research

This explanatory research design was important to examine the condition of the cause-and-effect relationship between the independent variable and dependent variable. It is because the strategy is well designed through a website questionnaire that the hypothesis is considered important statements of research. As the name implies, work is done on explanatory research to answer a series of questions. It is conducted to address new concerns that have not been addressed previously. The major goal of these investigations is to formulate a question or establish operational hypotheses for a larger investigation. In addition, explanatory research can assist researchers in observing the relation to acquire a better understanding of the study. The following Figure 3.1 shows the stages of research process.

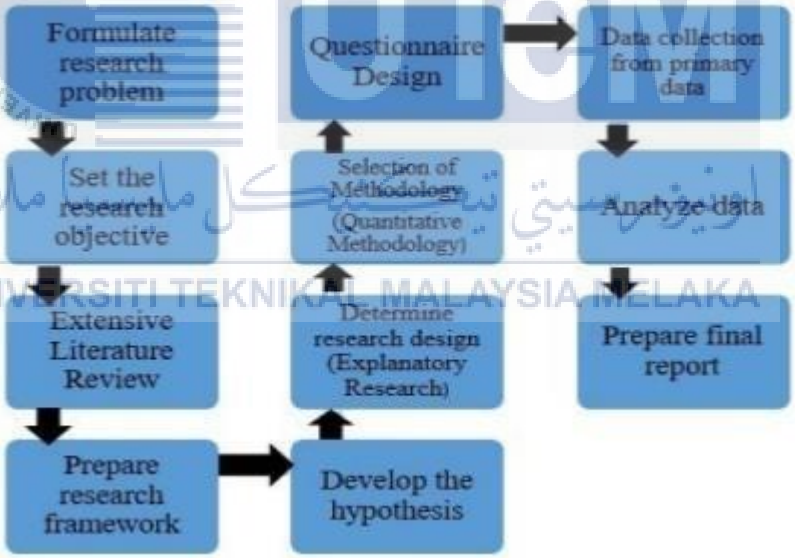

Figure 3.1: Stages of Research Process

3.3 Methodology Choice

Methodology choices may be classified into three types: quantitative methods, qualitative methods, and mixed methods. In this study, the researcher believes that a quantitative technique that employ a quantitative method is the best way to collect data. Furthermore, quantitative methods may be used to study the link between the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. The data will be gathered by the researcher using a questionnaire.

3.3.1 Quantitative Research Design

A quantitative method was suggested by Bayley et al., (2015) because it includes viewpoints such as the sample test, hypothesis test, and statistics that are important for data collecting. Besides, Mark Saunders et al., (2016) discovered that quantitative research design is closely related to positivist research philosophy since it necessitates procedures that allow data to be collected in a structured manner. Moreover, quantitative research is the process of collecting and analysing numerical data. It may be used to discover patterns and averages, make predictions, test casual correlations, and generalize results to larger groups (Pritha Bhandari, 2020).

The quantitative research will be used by the researcher to explore the link between the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. To demonstrate that, this research study is completely quantitative. The researcher will gather primary data using a trustworthy questionnaire.

3.4 Data Sources

The data collecting methods were focused on gathering the information needed to meet the goals. Secondary and primary data collections focused on quantitative data were included. There are two types of information and data sources to be processed: primary data sources and secondary data sources. In this study, the researcher will analyse both data sources, and the questionnaire technique will be used to collect data for analysis to acquire primary data.

3.4.1 Primary Data

According to Kassu Jilchs (2019), specified primary data are more trustworthy and have a greater degree of confidence in the decision-making process, with the reliable analysis being directly associated with the occurrence of events. The primary data sources, such as surveys, experiments, questionnaires, personal interviews, or observations that not filtered by second party, make up the original work (Saunders et al., 2016). The primary data for the study may be gathered by distributing questionnaires to each respondent one by one using the online questionnaire technique. A five-item Linkert-scale can be used to create an online questionnaire. Each argument received a five-point Linkert-type scale response, with 1 indicating “strong disagree” and 5 indicating “strongly agree.” The Linkert-Scale is shown below:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Table 3.1: Linkert-Scale Survey

3.4.2 Secondary Data

Secondary data is the usual approach that most researchers have always used to acquire data in their research. Secondary data was defined as information gathered previously by someone else. They can be assessed for more or specific data, clarify, or inference (Saunders et al., 2016). Furthermore, secondary data are data obtained by a person unrelated to the research study but also who collected these data for another reason and at a separate period in the past (Oluwatosin et al., 2017). In addition, Saunders et al., (2016) describes that journals, articles, internal documents, novels and government publications online is a secondary data source. By reading articles and journals, the researcher analyse the data is linked to the topic of research. To meet the research objectives purpose, the researcher collected secondary data using the Google Scholar web page, and library databases such as Mendeley and Science Direct.

3.5 Location of Research

Malaysia is a country in southern Asia that is part of the Malay Peninsula, nearto the island of Borneo. As a result, Malaysia was chosen as the research location since Malaysia has a large number of universities. The location will be particular to the Malaysia universities.

3.6 Research Strategy

The plan to respond to the investigator's query was referred to as a research strategy. The research strategy is significant because it allows researchers to plan the flow and structure of their studies. Moreover, the research strategy determines the overall direction of the study, as well as the method by which it is carried out. The overall direction of the research, including the process by which the research, ethnography, action research, grounded theory, narrative inquiry, survey, and case study are all the examples of research strategies (Saunders et al., 2016). The research technique discovered that the research strategy is the research main introduction (Bryman, 2018).

According to Saunders et al., (2015), the proper research method must be decided based on research questions and aims at the tendency of the study's information. Thus, it is accessible resources, along with logical support for research, as well as the duration of the research. Then, examine and apply the key to the data. According to Yin (2016), a research method should be determined based on three factors, which are the degree of control on real-life behaviour occurrences, and the amount to which the researchers are focused on current or historical events. Some of the most prevalent research methodologies utilized in trade and management are theory, study, and participatory inquiry (Collis & hussy, 2015).

3.6.1 Survey Design

The researcher has chosen to utilize the survey strategy as the research strategy in this study. The survey strategy allows the researcher to acquire quantitative data through the examination of descriptive and constructive statistic, as well as reveal potential relationship between the variables (Saunders et al., 2016). The survey method was to collect data from an interview sample via response from a distribution form. A survey approach can be used to demonstrate and implement human behavior (Ponto, 2015).

The questionnaire is used in the survey strategy to obtain quantitative data. Thequestionnaires are quantitative data that allow researcher to obtain a huge amount of data and information from a wide group of respondents. The survey strategy is suitable for the researcher carry out the data gathering procedure to analyse the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. A surveystrategy is typically associated with a deductive approach using online Questionnaire. The web questionnaire shows Google Form as a survey from that any responded may access, fill out, and submit online.

3.6.2 Questionnaires Design

In order to collect data for this research, a questionnaire will be sent to undergraduates that studying in Malaysia public or private institutions. The questionnaire will be designed by the researcher to assess the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. In the questionnaire design for the survey study, there are three section. The questions on this page are setup in a close ended multiple choices format.

The questionnaire is separated into three sections (Section A, Section B, and Section C). The first section of the questionnaire focused on the demographic profile of the responded, such as gender, age, race, educational level, and period of experience using digital learning. The purpose of the first section was to determine the general characteristics of respondents. The second section focuses on the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. The final section of the questionnaire focused on learning and innovation skills on universities students' in Malaysia. The Linkert-Scale was represented by 1: "Strongly disagree", 2: "Disagree", 3: "Neutral", 4: "Agree", 5: "Strongly Agree". The table below shows the research design questionnaire. The Linkert-Scale is shown in Table 3.1.

Table 3.2: Questionnaire Design

SECTION	CONTENT
A	Respondent Background • Gender • Age • Race • Educational Level • Period of Experience Using in Digital Learning
B	Assessment of Independent Variables • The Measure Factor of Affecting Digital Learning (Technology, Pedagogy, and Content)
C	Assessment of Dependent Variables • Learning and Innovation Skills (4'C)

3.7 Pilot Testing

A pilot study is carried out that replicates all of the procedures of the main study and validates the feasibility of the study by evaluating the inclusion andexclusion criteria of the participants, preparation of the drugs and intervention, storage and testing of the instruments used for measurements in the study, and training of researchers and research assistants (Benger, Coates, Davies, Greenwood, Nolan & Rhys, 2016).

According to Dikko (2016), using a questionnaire in a pilot context can help with interpretation of the questions and reduce the risk of misunderstandings in the research agreement. The pilot test may reveal errors and weaknesses in the questionnaire, allowing the questionnaire to be changed before it is distributed to respondents. The pilot test would collect recommendations and information from respondents in order to create a final survey questionnaire. Due to scheduling constraints, at least 30 individuals have been recruited for the pilot test.

3.8 Sampling design

A sampling design is a strategy that utilizes a subset of a population to make a choice that is representative of the full population. The sampling process is used to characterize the research's target population, to establish sample size and sampling strategy, and to choose the most appropriate method (Crossman, 2019). For this investigation, sampling probability was used as the sampling design. The sampling population, sampling technique, and sampling size are all examples of sampling designapproaches.

3.8.1 Sampling Population

The study's target population is university students in Malaysia. The individuals who studied in Malaysia only included in the sampling frame.

3.8.2 Sampling Technique

There are two kinds of sampling techniques: probability sampling and non- probability sampling. In this study, the researcher will use probability sampling as the sample technique. The researcher will utilize probability sampling, which requires the researcher to assume based on the sample in order to answer the research question. Furthermore, simple random sampling which is included in the probability sample, is employed as a strategy to limit the target population to manageable size. According to Mark Saunders et al., (2016), simple random sampling is a technique that uses a computer or a random number table to randomly choose a sample from a target population. To make sample selection easier, an online random number generator might be utilized.

3.8.3 Sample size

Krejcie and Morgan (1970) choose the sample size for this study. A total of 1.32 million students pursued their tertiary education in Malaysia, whereby 52.1% registered in public universities while 47.9% were in private higher education institutions (PHEIs), (Malaysian Investment Development Authority, 2021). A total of 384 sample sizes were utilized according to the sample size chart from Krejcie and Morgan (1970), with a population size of 92 universities responding to the questionnaire survey in Malaysia. The sample size was kept small due to timerestrictions and the need for extremely precise data.

Note:

N is population size

S is sample size

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

Figures 3.2: Sample Size for Different Sizes and Population

3.9 Reliability

According to Mark Saunders et al., (2016), reliability is defined as the capacity to get the same outcome as previous research and the research is considered reliable. The researcher also defined reliability as the consistency with which the same result was reached using the data obtained. Cronbach's Alpha will be used by the researcherto calculate reliability. Cronbach's Alpha is a statistic that indicates if the test and scales used for a research are acceptable. Cronbach's Alpha is made up of an alpha coefficient with a value between 0 and 1. Cronbach's Alpha will display the CoefficientRange and the Strength of Association. If the Cronbach's Alpha is more than 0.7, it is acceptable. If the Cronbach's Alpha is more than 0.8, it is regarded good, while 0.9 andabove is considered excellent. While Cronbach's Alpha less than 0.6 is regarded bad, Cronbach's Alpha less than 0.5 is considered unacceptable.

Table 3.3: Cronbach's Alpha Coefficient Range and Strength of Association

Source: (Saunders, Lewis & Thornhill, 2016)

Cronbach's Alpha Coefficient Range	Strength of Association
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3.10 Validity

The design of questionnaires is essential in research because it can affect the validity and reliability of the data obtained. The questionnaire design has to be abstract in order to avoid prompting inaccurate responses or obtaining data later on. Exploration may employ several strategies to improve the quality of information obtained. The legitimacy or validity of data might be improved by discussing the solution at several areas (Mark Saunders et al., 2016). Three will be three form of legitimacy which are inside legitimacy, outer legitimacy, and develop legitimacy.

3.11 Data Analysis Method

Data analysis is a method of focusing on raw data collection methods and procedures, mining for insights related to primary business objectives, and digging into this information to translate measurements, statistics, and figures into improvement initiatives (Sandra Durcevic 2020). The researcher will evaluate the dataafter collecting it using the Statistical Package for Social Sciences (SPSS) software version 20.0 as a statistical tool. SPSS is used by the researcher to analyze and explainmany types of data.

This program can handle enormous volumes of data effectively, allowing for the evaluation of data collection and inquiry for quantitative research. SPSS can also grasp a large amount of data and make data collecting and organization easier with a variety of internal administration impacts. SPSS, for example, will use its regular relapse to guarantee that the data collected is consistent, correct, and genuine. When conducting the survey, it will also put supposition to the test. Exploratory factor analysis, descriptive analysis, Pearson's correlation coefficient, and multipleregression analysis are among the analysis approaches used.

3.11.1 Exploratory Factor Analysis (EFA)

The purpose of the factor analysis was to look into the pattern of correlations between the variables. In this study, the researcher will use explanatory factor analysis. The KMO's test has a range of values from 0 to 1, with a value of 0 implying that the sum of partial correlations is large compared to the sum of correlations, implying that factor analysis is unlikely to be useful, and a value close to 1 implying that correlation patterns are relatively compact and factor analysis yields distinct and reliable factors. Factor analysis is used to determine the construct validity of independent and dependent variable measurements so that they can be used in later studies. It also allows the researcher to reduce the amount of data collected to make it more manageable. According to the findings of this study, three underlying common characteristics influence each observed response to 28 questions. Because the strength of the link between each component and each measured item varies, some dimensions may be influenced more than others. If comparable things are grouped together under the same dimension and if items are grouped together under the same dimension, factor analysis will group them together.

3.11.2 Descriptive Analysis

The purpose of descriptive analysis is to determine the core trend and dispersion by numerically describing and analyzing variables (Saunders et al., 2016). The demographics of targeted respondents in both frequency and percentage terms were determined using descriptive analysis tools in this study. To put it another way, descriptive analysis is also used to classify and split people into groups. Every descriptive statistic makes a large amount of data easier to comprehend. The researcher will utilize descriptive analysis to distinguish between respondents who studied in Malaysia universities based on gender, age, race, level of education, and period of experience using digital learning. The most well-known types of descriptive statistics are center measures such as mode, mean and median, which are used at practically all levels of mathematics and statistics. This could be expressed using terminology like mode, mean, median, and standard deviation to describe independent and dependent variables.

3.11.3 Pearson's Correlation Coefficient

In Malaysia universities, Pearson's Correlation Coefficient (r) is used to assess the strength of the link between the independent and dependent variables. In this study, Pearson's Correlation Coefficient will be utilized to examine whether the relationship between the dependent variables and independent variable of digital learning on learning and innovation skills is significant. Pearson's correlation coefficient has a value between -1 and +1, indicating perfect negative and perfect positive correlations, respectively, according to Saunders et al., (2016), however a value of 0 shows no relationship correlation. If the Pearson's correlation coefficient is negative, there is a negative relationship between the independent and dependent variables, which means that when one variable rises, the result of the other declines. If the Pearson correlation coefficient is positive, there is a positive relationship between the independent and dependent variables, implying that as one rises, the other rises as well.

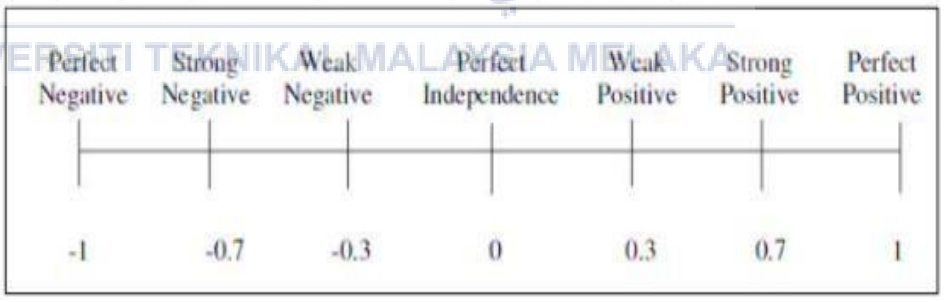

Figure 3.3: Pearson's Correlation Coefficients

Sources: (Sauders, Lewis & Thornill, 2016)

3.11.4 Multiple Regression Analysis

Multiple Regression Analysis is a useful tool for statisticians and researchers. The impact intensity and cause will be investigated in this study, as well as two or more linkages between an independent and an independent variable (Saunders et al., 2016). Using multiple regression analysis in this study, it will be feasible to establish which independent variables, such as the factor affecting digital learning that have the greatest impact on university students' learning and innovation skills. The following is an example of a multiple regression formula:

Equation: $Y = \alpha + \beta 1\ (X1) + \beta 2(X2) + \beta 3(X3)$

Y stands for the dependent variable, which is the digital learning affecting on universities students' learning and innovation skills in Malaysia is the constant value/other effects, and is the coefficient. The independent variables represented by the letters X1, X2, and X3. R is the coefficient of correlation and the square root of R- squared in the multiple regression analysis model. The variance in the dependent variable that can be explained later by independent variables is represented by R square.

3.12 Time Horizon

The time horizon, according to Saunders et al. (2016), is the time required by researcher to complete the investigation. The cross-sectional time horizon and the longitudinal time horizon are two different methods. Due to the limited time available for data analysis and the requirement needed to complete this research as soon as possible, the researcher will perform this study as a cross-sectional study. According to Saunders et al., (2016), most research projects in academic courses are essentially time-constrained. A cross-sectional study is one in which data is examined at a single point in time. Then, the type of data collected and the hypothesis to be investigated are used to classify this inquiry. In this case, the researcher used short-term research and respondents will receive the questionnaire between July until September 2022. Then, the investigation will be finished in October 2022, and the results of the collected data will be presented in November 2022.

3.13 Chapter Summary

In this chapter, the researcher demonstrated the methodology for gathering data and information about the variables. It also takes a look at the methods that were employed to answer the research questions. The researcher will use an explanatory research design and a quantitative technique for this study assignment. Both primary and secondary data sources were used in this investigation. To collect responses for this study, the survey approach and questionnaire design will be used as the research strategy. Responses from respondents who studied in Malaysia universities will be collected via a digital questionnaire that called as Google Form. The researcher chose Malaysia as the site of the investigation because of the large number of universities in these areas. In this study, the researcher will use cross-sectional sample design and pilot testing. The researcher will examine the data utilizing Exploratory Factor Analysis, Descriptive Analysis, Multiple Regression Analysis, and Pearson's Correlation in the data analysis phase using the Statistical Package for Social Science (SPSS). In the data analysis part, the coefficient will also be described. The numerous procedures that will be used to verify the research study's dependability can be trusted.

CHAPTER 4

ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter consists of the outcome of quantitative analysis. This research aims to investigate the relationship between technology, pedagogy, and content that affecting digital learning, and learning and innovation skills among university students in Malaysia. This study used a quantitative research approach and data has been collected through a quantitative questionnaire around Malaysian universities.

Data is collected only through the questionnaire filled out by the respondent to fulfil the requirements. In this chapter, the data from the respondent was analysed through the SPSS software version 25 based on three variables. The variables consist of technology, pedagogy, and content. Then, the result of the analysis of 300 sets of questionnaires will be presented in the following order: results of the Pilot Test, Descriptive Analysis, Reliability Analysis, Pearson's Correlation Analysis, and Multiple Regression Analysis.

4.2 Pilot Test

A Pilot Test is characterized as a form of software testing that verifies in real-time a component of the system or the entire system. A pilot test promotes decision-making and thus acts as a small-scale experiment or collection of observations conducted to assess how and when a full-scale project should be launched (Collins English Dictionary, 2014). Furthermore, the pilot test ensures that the respondents understand the questions and complete the questionnaires that had been submitted. Pilot testing is essential to ensure the research's performance was running smoothly.

All the associations between all independent variables and dependent variables were revealed by the pilot test. There had 30 respondents chosen by using a survey questionnaire to perform the pilot test. Table 4.2 show the Cronbach's Alpha of the pilot test and the first output (Case Processing Summary) shows the valid data was 30 respondents while the missing data was zero. It showed that all data was processed.

Table 4.1: Case Processing Summary

(Source: SPSS Output)

Case Processing Summary			
		N	%
Cases	Valid	30	96.8
	Excluded[a]	1	3.2
	Total	31	100.0
a. Listwise deletion based on all variables in the procedure.			

Table 4.2: Reliability Statistics

(Source: SPSS Output)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.959	.964	28

The questionnaire's result of 0.959 over 0.70 demonstrated its reliability. Saunders et al. (2016) stated that values of 0.70 or above indicate that the questions are being measured on the same scale. The value of 0.959 > 0.70, showed the questionnaire was reliable. The 3 independent variables items are listed in Table 4.2 below, along with each item's Cronbach's Alpha. The average number of correlations ranges from 0.787 to 0.950. this demonstrated that all items have significant associations. Once the reliability is valid, the independent and dependent variables can be used in the survey questionnaire itself.

Table 4.3: Cronbach's Alpha Test of Reliability

(Source: SPSS Output)

Variables	Cronbach's Alpha	Number of Items	Result
Technology	0.787	5	Good
Pedagogy	0.903	4	Excellent
Content	0.868	4	Good
Learning and innovation skills	0.950	15	Excellent

4.2.1 Respondent Rate

The questionnaire was distributed online via a google form. The duration to collect the questionnaire is from September to the end of November. A total of 384 respondents were selected for this study but only 300 respondents or 80% of respondents answered the survey questionnaire. This means that 84 or 20% of respondents refused to answer this survey questionnaire. There have 300 or 80% of the respondent completed the survey by answering the online google survey form.

4.2.2 Descriptive Statistics Analysis of Respondents' Background

The researcher used descriptive statistics to illustrate through the questionnaire and explain the fundamental characteristics of the research. The details of the demographic from 300 respondents, which involved the results of the measure factor of affecting digital learning, learning and innovation skills among university students in Malaysia will define by the data analysis. Descriptive statistics are one of the methods that used table, graph, and overview calculation to evaluate, define, display, and explain the collection of data from the study. Based on their demographic, the respondents were classified into different categories to provide the data collected which is shown in Table 4.4.

Table 4.4: Summary of the Demographic Details of the Respondents

(Source: SPSS Output)

Demographic	Demographic Details	Frequency	Percentage (%)
Gender	Male	187	62.3
	Female	113	37.7
Age	18-22 years old	114	38
	23-27 years old	150	50
	28-32 years old	30	10
	Above 32 years old	6	2
Race	Malay	171	57
	Chinese	76	25.3
	Indian	49	16.3
	Others	4	1.4
Educational Level	STPM/Diploma	121	40.3
	Degree	131	43.7
	Master	33	11
	PhD	2	0.7
	Others	13	4.3
Period of Experience Digital Learning	1-2 years	125	41.7
	3-4 years	120	40
	Above 5 years	55	18.3

4.3 Respondent Profile

The respondent's background is important to the value of the research as it is an important position that will affect the outcomes of the research. The background of respondents was gender, age, race, educational level, and period of experience digital learning which can affect the digital learning and innovation skills among university students in Malaysia.

4.3.1 Gender

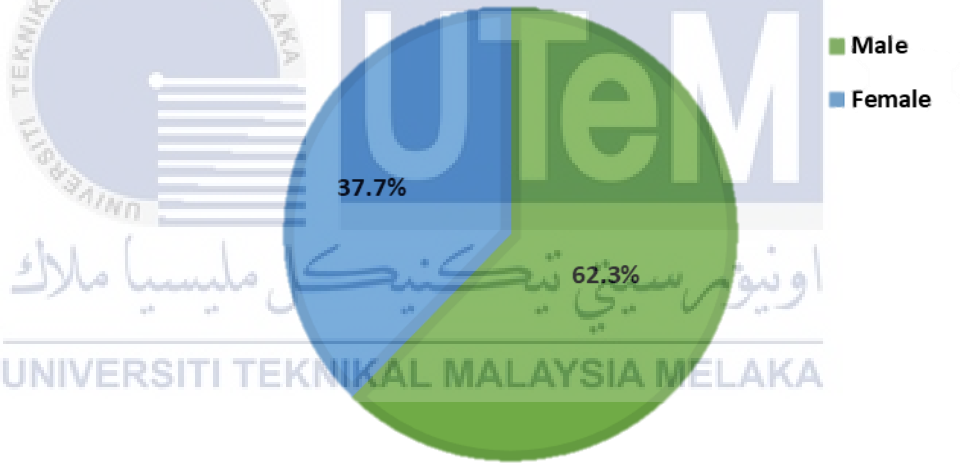

Figure 4.1: Gender

The gender distribution of the respondents who answered the questionnaire had shown in figure 4.1. it revealed that there are 187 or 62.3 per cent of male respondents and 113 or 37.7 per cent of female respondents. From the data analysis of this research, the male respondents participated more than the female respondents. However, this research is randomly distributed and does not select the gender of respondents systematically.

4.3.2 Age

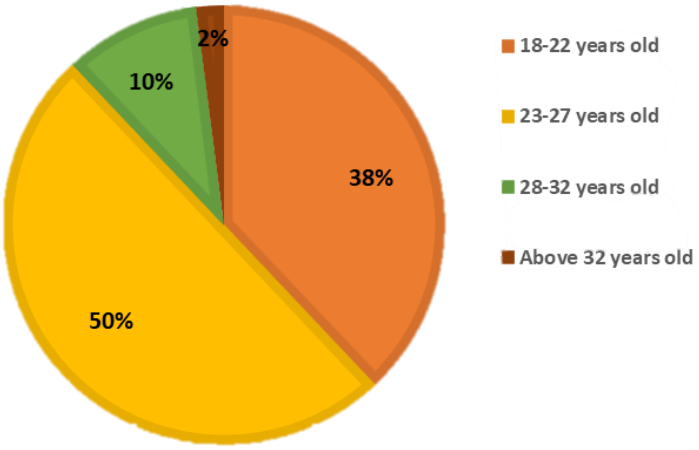

Figure 4.2: Age

Figure 4.2 shows the age range of 23-27 years old with 150 or 50 per cent being the most of the respondents participating in this research. The least respondent was in the range of above 32 years old with 6 respondents or 2 per cent only. Furthermore, there are 114 or 38 per cent of respondents from the age range 18-22 years old and 30 or 10 per cent of respondents 28-32 years old had completed answered the questionnaire in this research.

4.3.3 Race

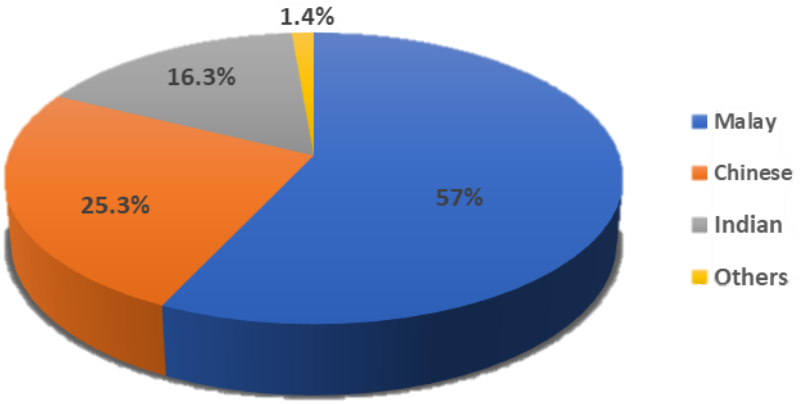

Figure 4.3: Race

Figure 4.3 shows the race of respondents that took part in this survey. Based on the pie chart above, there were 57% (n=171) the Malay respondents while 25.3% (n=76) were Chinese respondents. For Indian, there were 49 (16.3%) of them who participated in this survey. Besides, there were only 4 (1.4%) which consists of Bidayuh, Kadazan Dusun and Indonesian respondents from the survey.

4.3.4 Educational Level

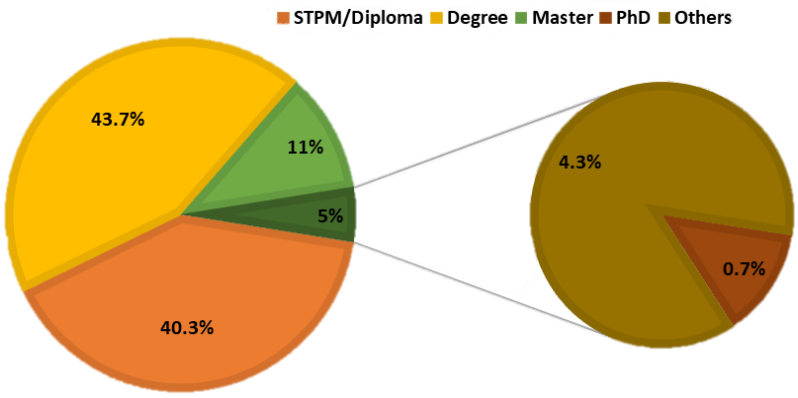

Figure 4.4: Educational Level

Figure 4.4 refers to the educational level of respondents from a total of 300 university students in Malaysia. The findings show that most of the respondents were degree and diploma students where a total of each 131 (43.7%) for degrees and 121 (40.3%) for diplomas. Moreover, there were 33 (11%) respondents from the master level and the least were 2 (0.7%) respondents from the PhD level while there were also 13 (4.3%) respondents from Malaysian Skills Certificate (SKM).

4.3.5 Period of Experience Using Digital Learning

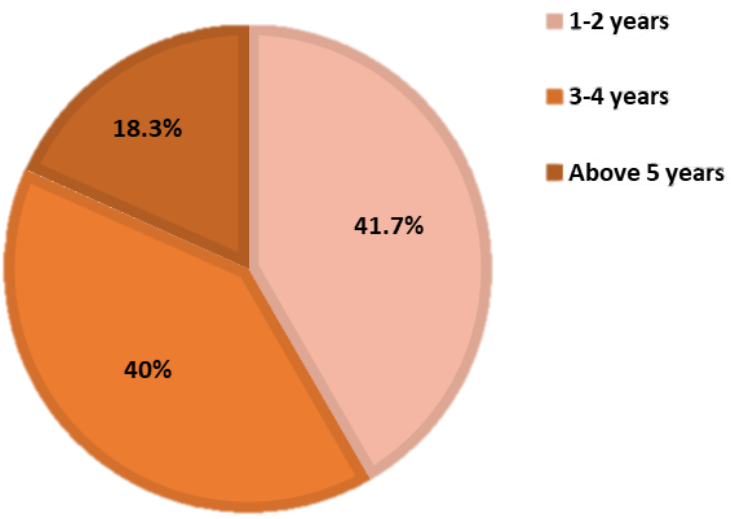

Figure 4.5: Period of Digital Learning

Based on the figure above, shows the period of respondents' experience using digital learning in their learning and teaching mode. The result shows that a total of 125 respondents (41.7%) experienced using digital learning for 1-2 years and it is mostly because of the pandemic COVID-19 which causes limited face-to-face learning and teaching activities. Besides, it follows by 120 respondents (40%) experienced using digital learning for 3-4 years. Last but least, there were 55 respondents (18.3%) experienced using digital learning above 5 years.

4.4 Descriptive Statistics on Independent Variables and Dependent Variable

Table 4.5: Descriptive Statistics on Each Independent Variable

(Source: SPSS Output)

Descriptive Statistics

Independent Variables	N	Mean	Std. Deviation
Technology	300	4.4980	.54263
Pedagogy	300	4.3800	.66173
Content	300	4.4017	.55425

The descriptive statistics in Table 4.5 showed technology, pedagogy, and content as the independent variable to contributing learning and innovation skills. Technology has the highest mean of 4.49. However, the second and third are followed by content and pedagogy contributing learning and innovation skills which are 4.40 and 4.38 respectively.

Furthermore, standard deviation indicates how close the interpretation of the data is and how the answer gathers. In this research, pedagogy has the highest standard deviation, which is 0.66. the lowest standard deviation is technology at 0.54. Then, another variable is content at 0.55. All the standard deviations showed that the respondent does not deviate from the mean value.

Table 4.6: Descriptive Statistics on Dependent Variable

(Source: SPSS Output)

Descriptive Statistics

Dependent Variable	N	Mean	Std. Deviation
Learning and innovation skills	300	4.3193	.48342

Table 4.6 shows the descriptive statistic of the dependent variable which is learning and innovation skills.

4.4.1 Descriptive Statistic of Technology (IV 1)

Table 4.7: Independent Variable 1 (Technology)

(Source: SPSS Output)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Know how to solve my own technical problems	300	1	5	4.37	.740
Can learn technology easily	300	1	5	4.50	.734
Keep up with important technology	300	1	5	4.59	.666
Knowing about basic computer software (ex; Windows), hardware (ex; RAM, CD-ROM) and their functions	300	1	5	4.49	.725
Using an electronic spreadsheet program (ex; MS Excel)	300	1	5	4.54	.700
Valid N (listwise)	300				

Table 4.7 shows that the characteristics of technology acting as the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. Based on the Table 4.7, it shows the value of mean of every item is quite nearest to each other. It showed from the table that the mean values of each problem are as similar as possible and that the standard deviations are also the same condition. The respondent answers the ranking questions from 1 (strongly disagree) to 5 (strongly agree).

The highest value of mean was scored by items “keep up with important technology” with the value of 4.59. This can be described as most of the students are sensitive to keeping up with the development of technological change as time goes by. The second and third highest values of mean were scored by item “Using an electronic spreadsheet program (ex; MS Excel)” and “Can learn technology easily” with the value of 4.54 and 4.50. The fourth highest value of mean was scored by item “Knowing about basic computer software (ex; Windows), hardware (ex; RAM, CD-ROM) and their functions” with the value of 4.49. Meanwhile, the lowest value of mean was scored by the item on “Know how to solve my own technical problems” with the value of 4.37, it has the lowest mean value as respondents were less agreed that they can solve the technical problems by itself.

The highest standard deviation value was score by the item “Know how to solve my own technical problems” with the value of 0.740. The second highest standard deviation value was score by item “Can learn technology easily” with the value of 0.734. Meanwhile, the third and fourth highest standard deviation was score by items “Knowing about basic computer software (ex; Windows), hardware (ex; RAM, CD-ROM) and their functions” then followed by item “Using an electronic spreadsheet program (ex; MS Excel)” with the value of 0.725 and 0.700. Then, the lowest standard deviation value was score by item “Keep up with important technology” with the value of 0.666. however, the average standard deviation of these five questions was about 0.666 to 0.740.

4.4.2 Descriptive Statistics of Pedagogy (IV 2)

Table 4.8: Independent Variable 2 (Pedagogy)

(Source: SPSS Output)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Know how to assess my study performance although learning using digital learning	300	1	5	4.36	.786
Can adapt my learning style to different lecturers	300	1	5	4.32	.837
Using different evaluation methods and techniques in learning	300	1	5	4.39	.771
Can use a wide range of learning approaches in a digital learning setting	300	1	5	4.45	.754
Valid N (listwise)	300				

Table 4.8 shows that the characteristic of pedagogy acting as the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. Based on the Table 4.7, it shows that the value of mean of every item is quite nearest to each other. It showed from the table that the mean value of each problem is as similar as possible and that the standard deviation is also the same condition. The respondent answers the ranking questions from 1 (Strongly Disagree) to 5 (Strongly Agree).

The highest value of mean was scored by the item “Can use a wide range of learning approaches in a digital learning setting” with a value of 4.45. The majority of respondents agree that they have the ability to use various learning approaches in a digital learning environment or setting. The second and third highest value mean was scored by item “Using different evaluation methods and techniques in learning” and “Know how to assess my study performance although learning using digital learning” with value of mean 4.39 and 4.36. lastly, the lowest value mean was scored by the item “Can adapt my learning style to different lecturers” with a value of 4.32, it has the lowest mean value as the respondent found out that they difficult to adapt their learning style to different lecturers.

Besides, the highest standard deviation value was scored by the item “Can adapt my learning style to different lecturers” with the value of 0.837. The second highest standard deviation value was scored by the item “Know how to assess my study performance although learning using digital learning” with the value of 0.786. meanwhile, the third highest standard deviation value was scored by the item “Using different evaluation methods and techniques in learning” with a value of 0.771. Lastly, the lowest standard deviation value was score by item “Can use a wide range of learning approaches in a digital learning setting” with the value of 0.754. however, the average standard deviation of these four items was about 0.837 to 0.754.

4.4.3 Descriptive Statistics of Content (IV 3)

Table 4.9: Independent Variable 3 (Content)

(Source: SPSS Output)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Knowing about key subjects studied in my syllabus	300	2	5	4.34	.664
Developing class activities and projects	300	1	5	4.39	.762
Following recent developments and applications for learning purposes	300	2	5	4.51	.646
Following up-to-date resources (ex; books, journals) for learning purposes	300	2	5	4.36	.667
Valid N (listwise)	300				

Table 4.9 shows the characteristics of content acting as the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia. Based on Table 4.9, shows that the value of the mean of every item is quite nearest to each other. Showed the table that the mean value of each problem is as possible and that the standard deviation is the same condition. The respondent answers the ranking questions from 1 (Strongly Disagree) to 5 (Strongly Agree).

The highest value of the mean was scored by the item “Following recent developments and applications for learning purposes” with a value of 4.51. the majority of respondents agreed that they following recent developments and applications for learning purposes. The second and third highest values of mean were scored by the item “Developing class activities

and projects" and "Following up-to-date resources (ex; books, journals) for learning purposes" with the values of the mean of 4.39 and 4.36 respectively. Lastly, the lowest value of mean was scored by the item "Knowing about key subjects studied in my syllabus" with a value of 4.34, it has the lowest mean as the respondents did not know well about key subjects studied in their syllabus.

Furthermore, the highest standard deviation value was scored by the item "Developing class activities and projects" with a value of 0.762. The second highest standard deviation value was scored by the item "Following up-to-date resources (ex; books, journals) for learning purposes" with a value of 0.667. Next, the third highest standard deviation value was scored by the item "Knowing about key subjects studied in my syllabus" with a value of 0.664. lastly, the lowest standard deviation value was scored by the item "Following recent developments and applications for learning purposes" with a value 0f 0.646. however, the average standard deviation of these four items was about 0.762 to 0.646.

4.4.4 Descriptive Statistics of Dependent Variable (DV)

Table 4.10: Descriptive Statistics of Learning and Innovation Skills

(Source: SPSS Output)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
CREATIVITY AND INNOVATION Use a wide range of idea-generation techniques (such as brainstorming)	300	2	5	4.22	.672
CREATIVITY AND INNOVATION Elaborate, refine, analyze, and evaluate their ideas to improve and maximize creative efforts	300	1	5	4.26	.690
CREATIVITY AND INNOVATION Demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas	300	1	5	4.31	.703
CREATIVITY AND INNOVATION View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	300	1	5	4.36	.686
CRITICAL THINKING AND PROBLEM SOLVING	300	1	5	4.30	.697

Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems					
CRITICAL THINKING AND PROBLEM SOLVING 2. Interpret information and draw conclusions based on the best analysis	300	1	5	4.38	.686
CRITICAL THINKING AND PROBLEM SOLVING Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	300	1	5	4.32	.743
CRITICAL THINKING AND PROBLEM SOLVING Identify and ask significant questions that clarify various points of view and lead to better solutions	300	1	5	4.36	.702
COMMUNICATION Articulate thoughts and ideas effectively using oral, written, and nonverbal communication skills in a variety of forms and contexts	300	1	5	4.31	.694
COMMUNICATION Utilize multiple media and technologies, and know-how to judge their effectiveness as a priority as well as	300	1	5	4.38	.691

assess their impact					
COMMUNICATION Use communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade)	300	1	5	4.44	.708
COMMUNICATION Cannot listen effectively to interpret meaning including knowledge, values, attitudes, and intentions	300	3	5	4.25	.500
COLLABORATION Demonstrate the ability to work effectively and respectfully with diverse teams	300	1	5	4.34	.682
COLLABORATION Inflexible and unwilling to make compromises to achieve a common goal	300	2	5	4.23	.701
COLLABORATION Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	300	1	5	4.33	.699
Valid N (listwise)	300				

Table 4.10 shows the students' learning and innovation skills. Based on table 4.10, shows that the value of the mean and standard deviation of every item is near to each other. The respondent answers the ranking items from 1 (Strongly Disagree) to 5 (Strongly Agree).

The highest value mean was scored by an item from communication that states "Use communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade)" with a value of 4.44. The majority of respondents agreed that they use communication for a range of such as to inform, instruct, motivate, and persuade. The second highest values of mean were scored by items from critical thinking and problem-solving that state "Interpret information and draw conclusions based on the best analysis" and items from communication that state "Utilize multiple media and technologies, and know-how to judge their effectiveness as a priority as well as assess their impact" with the value of 4.38 respectively. The third highest value of mean was scored by item from creative and innovation that state "View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes" and from critical thinking and problem-solving that states "Identify and ask significant questions that clarify various points of view and lead to better solutions" with the value of 4.36 respectively. The fourth highest value of mean was scored by an item from collaboration that states "Demonstrate the ability to work effectively and respectfully with diverse teams" with a value of 4.34. The fifth highest value of mean was scored by item from collaboration that state "Shared responsibility for collaborative work, and value the individual contributions made by each team member" with a value of 4.33. The sixth highest value of mean was scored by item from critical thinking and problem-solving that state "Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems" with a value of 4.32. The seventh highest value of mean was scored by the item from creative and innovation that state "Demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas" and item from communication that state "Articulate thought and ideas

effectively using oral, written, and non-verbal communication skills in a variety of forms and context" with the value of 4.31. The eight highest value of mean was scored by the item from critical thinking and problem-solving that state "Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems" with a value of 4.30. The ninth highest value of mean was scored by item from creative and innovation that state "Elaborate, refine, analyze, and evaluate their ideas to improve and maximize creative efforts" with a value of 4.26. The tenth highest value of mean was scored by item from communication that state "Cannot listen effectively to interpret meaning including knowledge, values, attitudes, and intentions" with a value of 4.25. Lastly the lowest value of mean was scored by item from collaboration that state "Inflexible and unwilling to make compromises to achieve a common goal" with value of 4.23 and the item from creative and innovation that state "Use a wide range of idea-generation techniques (such as brainstorming) with a value of 4.22, it has the lowest mean value as the respondent were disagree that they inflexible and unwilling to make compromises to achieve a common goal and use a wide range of idea-generation techniques such as brainstorming.

Besides, the highest standard deviation value was scored by the item from critical thinking and problem-solving that state "Use a wide range of idea-generation techniques (such as brainstorming)" with the value of 0.743. The second highest standard deviation was scored by item from communication that state "Use communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade)" with the value of 0.708. The third highest standard deviation was scored by the item from creative and innovation that state "Demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas" with the value of 0.703. The fourth highest standard deviation was scored by the item from critical thinking and problem-solving that state "Identify and ask significant questions that clarify various points of view and lead to better solutions" with the value of 0.702. The fifth highest standard deviation was scored by the item from collaboration that state "Inflexible and unwilling to make compromises to achieve a common goal" with the value of 0.701. The sixth

highest standard deviation was scored by the item from collaboration that state “Assume shared responsibility for collaborative work, and value the individual contributions made by each team member” with the value of 0.699. The seventh standard deviation was scored by the items from critical thinking and problem-solving that state “Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems” with the value of 0.697. The eighth standard deviation was scored by the item from communication that state “Articulate thoughts and ideas effectively using oral, written, and nonverbal communication skills in a variety of forms and contexts” with the value of 0.694. The ninth highest standard deviation was scored by the item from collaboration that state “Utilize multiple media and technologies, and know-how to judge their effectiveness as a priority as well as assess their impact” with a value of 0.691. The tenth highest standard deviation was scored by the item from creative and innovation that state “Elaborate, refine, analyze, and evaluate their ideas to improve and maximize creative efforts” with a value of 0.690. The eleventh highest standard deviation was scored by the item from creative and innovation that state “View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes” and item from critical thinking and problem-solving that state “Interpret information and draw conclusions based on the best analyses with a value of 0.686 respectively. The twelfth high standard deviation was scored by item from collaboration that state “Demonstrate the ability to work effectively and respectfully with diverse teams” with a value of 0.682. Meanwhile, the second last lowest standard deviation was scored by item from creative and innovation that state “Use a wide range of idea-generation techniques (such as brainstorming)” with a value of 0.672. Lastly, the lowest standard deviation was scored by item from communication that state “Cannot listen effectively to interpret meaning including knowledge, values, attitudes, and intentions” with a value of 0.500. However, the average standard deviation of these 15 items was about 0.500 to 0.743.

4.5 Result of Measurement

Researchers were supervised by this section to examine the relationship between the dependent variable and independent variable used in this study. The connection was rendered by the validity and reliability of the dependent variable and independent variable that had been used.

4.5.1 Validity Test

With the aim of describing the link between the independent variables and the dependent variable, a validity test using Pearson correlation was performed. According to Saunders et al. (2016), the correlation coefficient can be used to gauge how strongly independent variables and dependent variables are related. Pearson's Correlation Coefficients for understanding the correlation range of the R Values are shown in Table 4.11 below.

Table 4.11: Range of Pearson's Correlation Coefficients and the Interpretation

(Source: SPSS Output)

Correlations					
		IV1	IV2	IV3	DV
IV1	Pearson Correlation	1	.737**	.766**	.762**
	Sig. (2-tailed)		.000	.000	.000
	N	300	300	300	300
IV2	Pearson Correlation	.737**	1	.703**	.693**
	Sig. (2-tailed)	.000		.000	.000
	N	300	300	300	300
IV3	Pearson Correlation	.766**	.703**	1	.777**
	Sig. (2-tailed)	.000	.000		.000
	N	300	300	300	300
DV	Pearson Correlation	.762**	.693**	.777**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	300	300	300	300
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 4.12: Pearson's correlation Coefficient

(Source: Saunders et. al., 2016)

Pearson's Correlation Coefficient (R)	Interpretation
±0.70 to ±1.00	Very Strong Relationship
±0.40 to ±0.69	Strong Relationship
±0.30 to ±0.39	Moderate Relationship
±0.20 to ±0.29	Weak Relationship
±0.01 to ±0.19	No Relationship

Table 4.12 showed the correlations between the dependent variable and independent variables. The relationship between independent variables and dependent variables was defined using Pearson's Correlation. Saunders et al, (2012) stated that the correlation coefficient may describe the strength of the relationship between independent variables and dependent variable. The correlation of technology, pedagogy, and content towards university students' learning and innovation skills as correlation values are 0.762,0.693, and 0.777 respectively.

The first independent variable was technology with the 0.762 correlation coefficient (r) value. The second correlation between the pedagogy was 0.693. The correlation of third independent variable was the content with 0.777. All the three of the independent variables had strong positive relationship with dependent variable because the results showed the correlation coefficient (r) value were higher than 0.05. Meanwhile, the significant level was 0.000 which was ($p<0.05$)

In conclusion, based on the Table 4.12, there were very strong relationship between the three independent variables and dependent variable which showed that all the independent variables were correlated to the dependent variable.

4.5.2 Reliability Test

Saunders et. al (2016) define the reliability as the replication and consistency. Reliability is the accuracy of the sample, which the survey questionnaire may classify. Reliability test performs the result of Cronbach's Alpha to assess whether or how strongly the elements in the questionnaire have been positively linked to each other. The level of reliability was measured by the set of values in Cronbach's Alpha Coefficient. The table below showed the range and the strength of association.

Table 4.13: Cronbach's Alpha Coefficient Range and Strength of Association

(Source: Saunders et. al., 2016)

Cronbach's Alpha Coefficient Range	Strength of Association
$\alpha \geq 0.9$	Excellent
$0.7 \leq \alpha < 0.8$	Good
$0.6 \leq \alpha < 0.7$	Acceptable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

This research was composed of 28 questions that used Likert scales to assess the level of agreement. The scale started from 1 = Strongly Disagree, 2 = Disagree, 3 = Natural, 4 = Agree, and 5 = Strongly agree. The reliability test was completed for all questions. The result of the reliability was listed below.

Table 4.14: Case Processing Summary

(Source: SPSS Output)

Case Processing Summary			
		N	%
Cases	Valid	300	100.0
	Excluded[a]	0	.0
	Total	300	100.0
a. Listwise deletion based on all variables in the procedure.			

Table 4.15: Reliability Test for Dependent Variable and Independent Variables

(Source: SPSS Output)

Reliability Statistics	
Cronbach's Alpha	N of Items
.957	28

Table 4.15 above showed the reliability test for the both dependent variable and independent variables for this research. The total of items was 28 items which were 13 items for three independent variables and 15 items for dependent variable. The Cronbach Alpha value on these items was 0.957. Based on the table of Cronbach's Alpha coefficient range and strength of association, these questions were excellent and has high reliable.

4.6 Hypothesis Testing

The research needs hypothesis testing to determine whether or not this research could accept or reject the constructed hypothesis. The multiple regression analysis was used as hypothesis testing of the research. To evaluate the relationship between a dependent variable and an independent variable, multiple regression analysis was required. The significant level was resulting from multiple regression analysis. Besides, the significant level of research was presented by a range of values. Meaning it was important if the mean value was below 0.05. if the mean level is not relevant. The most significant level of the variable was 0.00.

4.6.1 Multiple Regression Analysis (Model Summary)

Table 4.16 Multiple Regression Analysis (Model Summary)

(Source: SPSS Output)

Model Summary[b]				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.826[a]	.682	.679	.27385
a. Predictors: (Constant), Content (IV1), Pedagogy (IV2), Technology (IV3)				
b. Dependent Variable: Learning and Innovation skills (DV)				

Table 4.16 shows that the result of model summary demonstrated that the relationship between the independent variables and dependent variable. The value of correlation coefficient(R) was 0.826, which it means that there was strong relation between the variables.

Therefore, the value of the coefficient of determination (R square) is 0.682. The suggested that learning and innovation skills got 68.2% influenced by technology, pedagogy, and content. The rest (100%-68.25%=31.8%) was influenced by other factors that not been done in this research.

4.6.2 Multiple Regression Analysis (ANOVA)

Table 4.17: Multiple Regression Analysis (ANOVA)

(Source: SPSS Output)

ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	47.676	3	15.892	211.912	.000[b]
	Residual	22.198	296	.075		
	Total	69.875	299			
a. Dependent Variable: Learning and innovation skill (DV)						
b. Predictors: (Constant), Content (IV3), Pedagogy (IV2), Technology (IV1)						

Multiple Regression Analysis (MRA) is a model that good fits the data and results from the output. It can help the researcher to predict the value of a variable based on two or more others variables. Based on Table 4.17 above, the result of the F-test value was 211.912 with a significant level of p=0.000(p<0.05). The F-test value was 211.912 which showed that a higher value, indicated that the overall regression is a good fit for the data and can conclude that there was a significant relationship between independent variables and dependent variable. The factor of independent variables of technology, pedagogy, and content contribute the learning and innovation skills.

4.6.3 Multiple Regression Analysis (Coefficients)

Table 4.18: Multiple Regression Analysis

(Source: SPSS Output)

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.906	.138		6.571	.000
	IV1	.290	.050	.326	5.762	.000
	IV2	.117	.037	.161	3.145	.002
	IV3	.362	.047	.415	7.712	.000
a. Dependent Variable: Learning and innovation skills (DV)						

Table 4.18 above indicates the result of the Coefficient for multiple regression analysis. The beta value of technology was 0.326 with a significant value of 0.000, while the beta value of pedagogy was 0.161 with a significant value of 0.002. Lastly, the beta value of content was 0.415 with a significant value of 0.000. The content has the highest beta value compared with the other two variables, so it shows that content has the greatest effect on learning and innovation skills.

Based on Table 4.18, the linear equation was developed as follows:

Learning and innovation skills

$Y = 0.906 + 0.290X_1 + 0.117X_2 + 0.362X_3$

Where Y = Learning and innovation skills

X_1 = Technology

X_2 = Pedagogy

X_3 = Content

Based on the linear equation above, all the independent variables had a positive relationship which was technology, pedagogy, and content the digital learning contributing factors towards learning and innovation skills.

1. Technology

H_0: There is no significant relationship between technology and learning and innovation skills.
H_1: There is a significant relationship between technology and learning and innovation skills

From the table above, the result of regression for technology against the learning and innovation skills was shown. The significant value for technology was 0.000 < 0.05. So, that the multiple regression analysis can be assumed technology had a significant relationship with learning and innovation skills. In conclusion, the researcher accepted the alternative hypothesis (H_1) and rejected the null hypothesis (H_0).

2. Pedagogy

H_0: There is no significant relationship between pedagogy and learning and innovation skills.
H_1: There is a significant relationship between pedagogy and learning and innovation skills.

From the table above, the result of regression for pedagogy against learning and innovation skills was shown. The significant value for pedagogy was 0.002 < 0.05. So, the multiple regression analysis can be assumed pedagogy had a significant relationship with learning and innovation skills. In conclusion, the researcher accepted the alternative (H_2) and rejected the null hypothesis (H_0).

3. Content

H_0: There is no significant relationship between content and learning and innovation skills.
H_1: There is a significant relationship between content and learning and innovation skills.

From the table above, the result of regression for content against the learning and innovation skills was shown. The significant value for content was 0.000 < 0.05. So, the multiple regression analysis can be assumed content had a significant relationship with learning and innovation skills. In conclusion, the researcher accepted the alternative hypothesis (H_3) and rejected the null hypothesis (H_0).

4.6.4 Summary for Hypothesis

Table 4.19: Summary of Hypothesis

Hypothesis	Results
H_1: There is a significant relationship between technology and learning and innovation skills.	Accepted
H_2: There is a significant relationship between pedagogy and learning and innovation skills.	Accepted
H_3: There is a significant relationship between content and learning and innovation skills.	Accepted

4.7 Summary

In this chapter, all the data that had been collected was analysed by the researcher by using the SPSS software version 25 and was been presented the data by using table and figure. Descriptive statistics, validity test reliability testing and hypotheses testing had been done by analysing the data collected in this chapter. The researcher found out that all three of the hypotheses have been acceptable which is technology, pedagogy, and content.

CHAPTER 5

DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

5.1 Introduction

Chapter 5 will discuss the overall conclusion of the findings in these studies of the measure factor of affecting digital learning, learning and innovation skills among university students in Malaysia based on the data analysis in Chapter 4. In this chapter, the researcher will conclude whether the research questions meet the research objectives that have been constructed. This chapter would also provide a reflection on the hypotheses of whether to consider or reject the theories in this study. Next, the researcher will construct the limitations of the study and present it in the study and lastly propose the significant implications and the recommendation of the research.

5.2 Summary of Study

The aim of this research was to examine the measure factor of affecting digital learning, learning and innovation skills among university students in Malaysia. There were three independent variables, such as technology, pedagogy, and content which contributed to students' learning and innovation skills. The things that need to be achieved from the results and findings of the research are the three research objectives.

The research objectives were stated below:

1. To identify the factor affecting digital learning, learning and innovation skills among university students in Malaysia.
2. To measure the relationship between the factors affecting digital learning, and learning and innovation skills among university students in Malaysia.
3. To analyse most significant factor affecting digital learning, and learning and innovation skills among university students in Malaysia.

The hypothesis to analyse the relationship between the dependent variable and independent variables was discussed in Chapter 4. The relationship had been analysed was between the technology, pedagogy, content, and learning and innovation skills.

5.3 Discussion on the Demographic of Respondents

The total number of respondents from this research was 300. The male respondents are 187 or 62.3% and 113 or 37.7% female respondents. The questionnaire is not selective and randomly distributed although the male respondents are more than female respondents in the research.

The most of respondents are 150 which is 50% in the age range of 23-27 years old. The least respondent was in the range of above 32 years old with 6 respondents or 2% only. Furthermore, there are 114which is 38% of respondents from the age range 18-22 years old and 30 or 10% of respondents 28-32 years old had completed and answered the questionnaire in this research. **The age around 23-27 years old was the most students in the age range as the researcher was sent the survey questionnaire by email and social media This is because email and social media allows them to read and answer whenever they want. The research was not specific focus in any state since the survey is sent through online.

Besides, the race of the 300 respondents that took part in this survey there were 171 or 57%) of them are Malay respondents. Meanwhile, 76 which is 25.3% were Chinese respondents. For Indian, there were 49 or 16.3% of them who participated in this survey. Besides, there were only 4 or 1.4% which consists of Bidayuh, Kadazan Dusun and Indonesian respondents from the survey.

Next, the educational level of respondents from a total of 300 university students in Malaysia. The findings show that most of the respondents were degree and diploma students where a total of each 131 (43.7%) for degrees and 121 (40.3%) for diplomas. Moreover, there were 33 (11%) respondents from the master level and the least were 2 (0.7%) respondents from the PhD level while there were also 13 (4.3%) respondents from Malaysian Skills Certificate (SKM).

Lastly, the period of respondents' experience using digital learning in their learning and teaching mode. The result shows that a total of 125 respondents (41.7%) experienced using digital learning for 1-2 years and it is mostly because of the pandemic COVID-19 which causes limited face-to-face learning and teaching activities. Besides, it follows by 120 respondents (40%) experienced using digital learning for 3-4 years. Last but least, there were 55 respondents (18.3%) experienced using digital learning above 5 years.

5.4 Discussion on the Research Objectives

Objective 1: To identify the factor affecting digital learning, and learning and innovations skills among university students in Malaysia.

The researcher has found out the component that influences on university students' learning and innovation skills for the first research aim. In this study, the researcher has applied Learning Theory. The measure factor of affecting digital learning, learning and innovation skills among university students in Malaysia was explained in reference to the independent variables by the researcher. All the independent variables which are technology, pedagogy, and content were positive determinants from the previous research. According to Md Nazirul Islam Sarker, et. al., 2019 stated that learning-focused engagement and capacity for creative thought are enhanced by a digital learning environment. The digital learning environment has the ability to improve competence, creativity, collaboration, independence, and personalization. Therefore, objective 1 had been achieved.

Objective 2: To measure the relationship between factor affecting digital learning, learning and innovation skills among university students in Malaysia.

In the second objective, the researcher used SPSS software to prove the results of the explanatory factor with the Multiple Regression Analysis (MRA). There were three factors that affect students' learning and innovation which is technology, pedagogy, and content.

Through hypothesis testing, all three factors are accepted which are significant to university students' learning and innovation skills in Malaysia. The table below showed that the significant value of technology, pedagogy, and content were 0.000 < 0.05, 0.002 < 0.05, and 0.000 < 0.05. So, the multiple regression analysis can be assumed that technology, pedagogy, and content had a significant relationship with learning and innovation skills. Both active and passive learners can find what they're looking for in digital learning. It strives to give students comprehensive knowledge that is available anytime and anyplace. Outside of the lecture, students and educators can connect and communicate with one another. Beyond the lecture, this management of instruction and learning enables students to develop their critical thinking and research abilities as well as gain new information that may be used for innovation (Natalya Lomovtseva, et. al., 2020). Therefore, research objective 2 has been achieved.

Table 5.1: Summary of Hypothesis Testing

Hypothesis	Sig.	Result
$\boldsymbol{H_1}$: There is a relationship between technology and learning and innovation skills	0.000 < 0.05	Accepted
$\boldsymbol{H_2}$: There is a relationship between pedagogy and learning and innovation skills	0.002 < 0.05	Accepted
$\boldsymbol{H_3}$: There is a relationship between content and learning and innovation skills	0.000 < 0.05	Accepted

Technology

$\boldsymbol{H_1}$: There is a relationship between technology and learning and innovation skills.

The result showed that technology was able to affect learning and innovation skills in hypothesis 1. The p-value of technology was 0.000 and it is lower than 0.05 according to the multiple regression analysis result in Chapter 4. The result showed that technology has a significant relationship with learning and innovation skills.

The use of technology can enhance educational experiences by allowing students to access a wide range of learning tools and resources. Its use has also expanded beyond just hardware and software to include a variety of educational activities and practices (Zamira Gashi Shatri, 2020), through the use of technology, students can enhance their learning by making it more practical and relevant. Different information technology applications fascinate students, advance their growth of relief and independence, and provide enormous benefits for learning. Students' ability to communicate effectively, analyse critically, solve problems, work in teams, and do research are just a few of the abilities that are promoted and developed through the

right use of information technology (Reinhold et al., 2020). Furthermore, according to Shadiev et al., 2018, to succeed in the future in a technologically advanced environment, students acquire new skills and get familiar with new technology. Global interactions are made possible by information technologies. Using global networks, students can gain knowledge from encounters with the information, interface, teachers, and co-learners.

In conclusion, the significant value was less than 0.05. In conclusion, the significant value was less than 0.05. So, the null hypothesis (H_0) was rejected, the alternative hypothesis (H_1) was accepted. There is a significant relationship between technology and learning and innovation skills.

Pedagogy

$\boldsymbol{H_2}$**:** There is a relationship between pedagogy and learning and innovation skills.

The result showed that pedagogy was able to influence university students' learning and innovation skills in hypothesis 2. The p-value of job satisfaction was 0.002 and it is lower than 0.05 according by the multiple regression analysis result in Chapter 4. From the result showed that technology have a significant relationship with learning and innovation skills.

The Covid-19 pandemic crises have made digital learning education pedagogy the current trend in the educational system. It examines how pedagogical design affects students' development of academic proficiency in various forms of digital learning focused on technology-enhanced collaborative learning (Leovgildo Lito D. Mallillin et al., 2020). Next, a focus on the student from a classroom context to an online learning environment, pedagogy differs and is sensitive. In terms of learning, flow, and style, techniques and tactics differ. It discusses how the pedagogy of learning works in setting up context learning and in implementing preparedness and ethics in online environments. It offers a learning perspective that emphasises methods of instruction and behaviour in the modules, subjects, and course structures used in online learning. This may help students learn more effectively when attending classes online (Robinson, Al-Freih, & Kilgore, 2020). The conversion of traditional teaching methods to digital learning processes. However, this transition offers lecturers and professors an alternate pedagogy and modality that is appropriate for education and struggle in the digital learning process (Henriksen, Creely, & Henderson, 2020).

In conclusion, the significant value was less than 0.05. So, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. There is significant relationship between pedagogy and learning and innovation skills.

Content

$\boldsymbol{H_3}$: There is a relationship between pedagogy and learning and innovation skills.

The result showed that content was able to affect the learning and innovation skills in the hypothesis 2. The p-value of career development was 0.000 and it is lower than 0.05 according by the multiple regression analysis result in Chapter 4. From the result showed that pedagogy have a significant relationship with learning and innovation skills.

The idea of creative potential motivates educators to evaluate many viewpoints on creativity and to reflect on various and individualized ways that they may support and nurture it in their students, creativity can be cultivated in the content areas where it is a key concept (Cuéllar, D., 2020). Students' enthusiasm to learn and their ability to learn independently have been successfully increased by pre-content courses through the online video taken outside of class and by using a quiz method beforehand (Chuang et al., 2018). Tian Luo, et. al., 2021 reported that an emphasis on active learning and student participation would be part of excellent course content for online learning. The execution of good digital learning is significantly impacted by the development of appropriate course content.

In conclusion, the significant value was less than 0.05. So, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. There is a significant relationship between content and learning and innovation skills.

Objective 3: To analyse most significant factor affecting digital learning, learning and innovation skills among university students in Malaysia.

For the third research objective, the researcher has found the most significant impact of technology, pedagogy, and content on university students' learning and innovation skills in Malaysia from the literature review. According to Ryan Hidayat Rafiola (2020), technology plays a supportive role in the teaching and learning process by empowering students to become independent learners. By clicking on various features or platforms on the internet connection to the subjects they are learning, students can learn anything and anywhere. Educators use a variety of platforms to assist their teaching and learning activities, including how they assign tasks, where they concentrate on building students' skills, and how they grade students. Besides, pedagogical skills are crucial for education management among knowledge, experience, situation, environment, and learning goals, with reference to the instructional design model, which has analysis, design, development, implementation, and evaluation (Miftachul Huda, Azmil Hashim, et. al, 2019). Next, unspecified content knowledge was interpreted to include learning from other disciplines and industries as well as applying one's own subject knowledge to a new situation. It was thought that using prior disciplinary knowledge in practice would be beneficial and would create new kinds of content knowledge in the new setting. A student can speak of gaining knowledge in a wide range of subject areas (Eila Lindfors, et al., 2019). Therefore, the objective 3 had been achieving

5.5 Implications of the Study

The result of this study is relevant because the factor of technology, pedagogy, and content is crucial to develop students' learning and innovation skills in Malaysia. According to Nurul Ratnawati and Idris (2020) in Jawa Timur Indonesia, students have the chance to discover their potential through digital learning, which may adapt to their demands and give them the experience they'll need for their future life. Additionally, the integrative learning process through digital learning and with a research-based approach offers an effective, efficient learning strategy and can help students become better at navigating real-world situations. By having this skill, students will be able to adjust to the demands and difficulties of the workplace in the future.

Furthermore, online learning and digital schooling that utilizes smartphones and tablets are both examples of digital learning that may be accessed. As a result, learning can be carried out via a web-based or online paradigm, allowing for independent study by the students. There are numerous digital learning tools and platforms that can encourage and engage students in their academic work to support education 4.0. A sustainable learning lifestyle is determined by the choice of digital learning.

In conclusion, the education 4.0 approach to teaching and learning has moved to a new era of the learning system as a result of the IR 4.0 revolution. Students that receive a 4.0 education are more likely to be self-learners, critical thinkers, digital natives, and problem solvers. A new educational system called "education 4.0" enables students to acquire knowledge and skills that they can use throughout their lives.

5.6 Limitations of the Study

There are some limitations to this research. The first limitation faced when doing this research was a time constraint; the researcher had a restricted time period of three months to collect data from the respondents, thus the researcher was unable to obtain further replies from the respondents. Due to the time limitation, the researcher only can distribute the survey questionnaire by using Google Forms. The researcher sent the survey questionnaire by using e-mail, WhatsApp and Instagram to different the institution of respondents. This is because different institutions of respondents will have different experiences and evaluations.

From September 2022 until the end of November 2022, the researcher gathered data by delivering a questionnaire via online platform which is Google Forms, email and social media such as Instagram and WhatsApp. The method of conducting the survey was the second constraint that the researcher faced while doing this research. Thus, the researcher's survey method was more for the online platform. The final constraint was the number of responses. In this study, only 300 respondents' data was obtained by the researcher.

Then, the other limitation of this study is the researcher believes that the respondents know the research conducted. The respondent also might simply fill up the questionnaire and some might answer the question without fully understanding. These also happen due to the respondents are forced to answer of questionnaire or not in a suitable time. Indirectly this will affect the wrong data to insert into the SPSS. This will cause the survey was repeated distributed to get sufficient and correct data to process in SPSS.

5.7 Recommendations for Future Research

In this research, the measure factor of affecting digital learning, and learning and innovation skills among university students in Malaysia was investigated by the researcher. There are a number of recommendations that the researcher can provide to the next researcher.

The first suggestion is that future researchers perform future studies using the qualitative technique to gain better knowledge of the user's perspective. For data gathering, the researcher may interview the respondents. This approach may improve respondent engagement and allow the researcher to obtain additional opinions from the respondent from various viewpoints. This will assist the university in determining the students' knowledge and ability about their learning and innovation skills.

Besides, the researcher also can-do research on this digital learning effectiveness at all Malaysian institutions. Then, the researcher might get a different result than research at certain institutions only. All the institutions in Malaysia including secondary and primary schools need to improve their education system to improve students learning and innovation skills Lastly, funding from the government for implementing the concept and improve the knowledge on the concept is necessary. As a result, more study in these fields is possible.

5.8 Conclusion

In conclusion, this study examines the measure factor of affecting digital learning, learning and innovation skills among university students in Malaysia. This study's goal is to uncover the variables that may have an effect on university students' learning and innovation skills to learn through digital learning, as well as the relationships that exist between those variables and their effectiveness.

The findings of this study assist students and educators or lecturers in institutions to concentrate on students' ability and skill development so they know how to adapt and control the use of technology, pedagogy, and content in learning. This benefits them to be able to achieve learning and innovation skills well for their future interests when they are in the world of work or otherwise. Moreover, technology had the highest mean among the factors in this research, according to the results of the descriptive analysis, which also indicated that this factor has a major effect on how technology can be used in education to hone students' abilities in learning and innovation skills. Additionally, the results of the Pearson Correlation analysis revealed that each of the three factors technology, pedagogy, and content was strongly associated with university students' learning and innovation skills.

Furthermore, to conduct online or offline learning activities across wired or wireless networks, digital learning is a method for accessing digital educational resources. In addition, lecturers or educators can use digital learning to offer novel features that give students organized knowledge and instructional materials. Digital learning has expanded its scope to help Malaysia's various industries in the IR 4.0 age. In the meantime, digital learning may also accommodate the soft skills necessary to improve the caliber of human resources in the modern world.

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QUESTIONNAIRE

MEASURE FACTOR OF AFFECTING DIGITAL LEARNING, AND LEARNING AND INNOVATION SKILLS AMONG UNIVERSITY STUDENTS IN MALAYSIA

INSTRUCTIONS:

Purpose of Survey:	The main purpose of this study is to examine the effectiveness of digital learning on university students' learning and innovation skills in Malaysia. The result from this study will benefit the universities by improving their competitiveness in students learning and innovation skills performance.
Note:	This questionnaire consists of 3 sections: Section A, Section B, and Section C. You are kindly required to answer all. Your time and responses are highly appreciated. All the given information will be strictly kept confidential and only be used for research
For further clarification and/ or instructions, please contact:	Name: Nur Hazirah 'Izzah Binti Nordin E-mail: b061910154@student.utem.edu.my Tel: 011-61212941 Supervisor: Mrs. Nor Ratna Binti Masrom E-mail: norratna@utem.edu.my Address: Faculty of Technology Manageent and Technopreneurship, Universiti Teknikal Malaysia Melaka, Jalan TU 62, 75350 Ayer Keroh, Melaka.

STATEMENT OF CONFIDENTIALITY

The information you provide will be held strictly confidential. We will neither publish, release, nor disclosure any information on or identifiable with, individual persons, organizations or companies.

MEASURE FACTORS OF AFFECTING DIGITAL LEARNING, LEARNING AND INNOVATION AMONG UNIVERSITY STUDENTS IN MALAYSIA

UKURAN FAKTOR MEMPENGARUHI PEMBELAJARAN DIGITAL, PEMBELAJARAN DAN KEMAHIRAN INOVASI DALAM KALANGAN PELAJAR UNIVERSITI DI MALAYSIA

Digital learning is a term used to describe acquiring knowledge through a computer network-based environment. In the past decade, the development and implementation of digital learning have become necessary for academic institution (Waleed Mugahed Al-rahmi, 2015). The learning and innovation skills are a set of skills that will set students ready for the world of work. These learning and innovation skills focused on creativity, critical thinking, communication and collaboration are essential to prepare students for the future (Estrellita Larias, 2016).

Pembelajaran digital adalah istilah yang digunakan untuk menggambarkan pemerolehan pengetahuan melalui persekitaran berasaskan rangkaian komputer. Dalam dekad yang lalu, pembangunan dan pelaksanaan pembelajaran digital menjadi keperluan bagi institusi akademik (Waleed Mugahed Al-rahmi, 2015). Kemahiran pembelajaran dan inovasi adalah satu set kemahiran yang akan menyediakan pelajar bersedia untuk dunia pekerjaan. Kemahiran pembelajaran dan inovasi ini tertumpu kepada kreativiti, pemikiran kritis, komunikasi dan kerjasama adalah penting untuk menyediakan pelajar untuk masa depan (Estrellita Larias, 2016).

SECTION A: DEMOGRAPHIC PROFILE
BAHAGIAN A: PROFIL DEMOGRAFIK

This section is related to your background and the information will be managed in strict confidentiality. Please select one and tick (√) the appropriate option in the box provided.

Bahagian ini berkaitan dengan latar belakang anda dan maklumat akan diuruskan secara sulit. Sila pilih satu dan tandakan (√) pada pilihan yang sesuai di kotak yang disediakan.

A) Demographic Profile/Profil Demografik

1. Gender/Jantina
   - ☐ Male/Lelaki
   - ☐ Female/Perempuan

2. Age/Umur
   - ☐ 18-22 years old/18-22 tahun
   - ☐ 23-27 years old/23-27 tahun
   - ☐ 28-32 years old and above/28-32 tahun dan keatas

3. Race/Bangsa
   - ☐ Malay/Melayu
   - ☐ Chinese/Cina
   - ☐ Indian/India
   - ☐ Other/Lain-lain: _____

4. Educational Level/Tahap Pendidikan

   ☐ STPM/Diploma

   ☐ Degree

   ☐ Master

   ☐ PhD

   ☐ Other/Lain-lain: _____

5. Period of experience using digital learning/Tempoh menggunakan pembelajaran digital

   ☐ 1-2 years/1-2 tahun

   ☐ 3-4 years/3-4 tahun

   ☐ 5 years and above/5 tahun dan keatas

SECTION B: THE EFFECTIVENESS OF DIGITAL LEARNING ON UNIVERSITIES STUDENTS' LEARNING AND INNOVATION SKILLS IN MALAYSIA

BAHAGIAN B: KEBERKESANAN PEMBELAJARAN DIGITAL TERHADAP PEMBELAJARAN DAN KEMAHIRAN INOVASI PELAJAR UNIVERSITI DI MALAYSIA

This section is seeking your opinion regarding the effectiveness of digital learning on universities students' learning and innovation skills in Malaysia. Based on the scale given, please tick (√) one which represents your answer.
Bahagian ini mencari pendapat anda mengenai penerimaan keberkesanan pembelajaran digital terhadap kemahiran pembelajaran dan inovasi pelajar university di Malaysia. Berdasarkan skala yang diberikan, sila tandakan (√) yang mewakili jawapan anda.

Scale/Skala

Strongly Disagree/ Sangat Tidak Setuju	**Disagree/ Tidak setuju**	**Neutral/ Biasa**	**Agree/ Setuju**	**Strongly Agree/ Sangat Setuju**
1	2	3	4	5

A) The Factor Affecting Digital Learning/ Faktor Mempengaruhi Pembelajaran Digital

Part 1: Technology/Teknologi

	STATEMENT	1	2	3	4	5
T1.	Know how to solve my own technical problems *Mengetahui cara menyelesaikan masalah teknikal saya sendiri*					
T2.	Can learn technology easily *Boleh belajar teknologi dengan mudah*					
T.3	Keep up with important technology *Mengikuti perkembangan teknologi penting*					
T4.	Knowing about basic computer software (ex; Windows), hardware (ex; RAM, CD-ROM) and their functions *Mengetahui tentang perisian komputer asas (cth; Windows), perkakasan (cth; RAM, CD-ROM) dan fungsinya*					
T5.	Using an electronic spreadsheet program (ex; MS Excel) *Menggunakan program hamparan elektronik (cth; MS Excel)*					

Part 1: Pedagogy/Pedagogi

NO	STATEMENT	1	2	3	4	5
P1.	Know how to assess my study performance although learning using digital learning *Mengetahui cara menilai prestasi pengajian saya walaupun belajar menggunakan pembelajaran digital*					
P2.	Can adapt my learning style to different lecturers *Boleh menyesuaikan gaya pembelajaran saya kepada pensyarah yang berbeza*					
P3.	Using different evaluation methods and techniques in learning Menggunakan kaedah dan teknik penilaian yang berbeza dalam pembelajaran					
P4.	Can use a wide range of learning approaches in a digital learning setting *Boleh menggunakan pelbagai pendekatan pembelajaran dalam persekitaran pembelajaran digital*					

Part 3: Content/Kandungan

NO	STATEMENT	1	2	3	4	5
C1.	Knowing about key subjects studied in my syllabus *Mengetahui tentang mata pelajaran utama yang dipelajari dalam sukatan pelajaran saya*					
C2.	Developing class activities and projects *Membangunkan aktiviti dan projek kelas*					
C3.	Following recent developments and applications for learning purposes *Mengikuti perkembangan terkini dan aplikasi untuk tujuan pembelajaran*					
C4.	Following up-to-date resources (ex; books,journalsl) for learning purposes *Mengikuti sumber terkini (cth; buku, jurnal) untuk tujuan pembelajaran*					

SECTION C: THE IMPACT OF UNIVERSITIES STUDENTS' LEARNING AND INNOVATION SKILLS IN MALAYSIA
BAHAGIAN C: KESAN KEMAHIRAN PEMBELAJARAN DAN INOVASI PELAJAR UNIVERSITI DI MALAYSIA

This section is to seek your opinion regarding the impact of universities students' learning and innovation skills in Malaysia. Based on the scale given, please tick (√) represents your answer.

Bahagian ini adalah untuk mendapatkan pendapat anda mengenai kesan kemahiran pembelajaran dan inovasi pelajae university di Malaysia. Berdasarkan skala yang diberi sila tandakan (√) yang mewakili jawapan anda.

Scale/skala:

Strongly Disagree/ Sangat Tidak Setuju	**Disagree/ Tidak setuju**	**Neutral/ Biasa**	**Agree/ Setuju**	**Strongly Agree/ Sangat Setuju**
1	2	3	4	5

C) Universities Students' Learning and Innovation Skills/ Kemahiran Pembelajaran dan Inovasi Pelajar Universiti

Part 1: Creativity and Innovation/*Kreatif dan Inovasi*

NO	STATEMENTS	1	2	3	4	5
CI1.	Use a wide range of idea-generation techniques (such as brainstorming) *Menggunakan pelbagai teknik penjanaan idea (seperti sumbangsaran)*					
CI2.	Elaborate, refine, analyze, and evaluate their ideas to improve and maximize creative efforts *Menghuraikan, memperhalusi, menganalisis dan menilai idea mereka untuk menambah baik dan memaksimumkan usaha kreatif*					
CI3.	Demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas *Menunjukkan keaslian dan daya cipta dalam kerja dan fahami had dunia sebenar untuk menerima pakai idea baharu*					
CI4.	View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes *Melihat kegagalan sebagai peluang untuk belajar; memahami bahawa kreativiti dan inovasi adalah proses jangka panjang, kitaran kejayaan kecil dan kesilapan yang kerap*					

Part 2: Critical Thinking and Problem Solving/*Pemikiran Kritis dan Penyelesaian Masalah*

NO	STATEMENT	1	2	3	4	5
CP1.	Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems *Menganalisis bagaimana bahagian keseluruhan berinteraksi antara satu sama lain untuk menghasilkan hasil keseluruhan dalam sistem yang kompleks*					
CP2.	Interpret information and draw conclusions based on the best analysis *Mentafsir maklumat dan membuat kesimpulan berdasarkan analisis terbaik*					
CP3.	Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems *Menganalisis bagaimana bahagian keseluruhan berinteraksi antara satu sama lain untuk menghasilkan hasil keseluruhan dalam sistem yang kompleks*					
CP4.	Identify and ask significant questions that clarify various points of view and lead to better solutions *Mengenal pasti dan bertanya soalan penting yang menjelaskan pelbagai sudut pandangan dan membawa kepada penyelesaian yang lebih baik*					

Part 3: Communication/*Komunikasi*

NO	STATEMENT	1	2	3	4	5
C1	Articulate thoughts and ideas effectively using oral, written, and nonverbal communication skills in a variety of forms and contexts *Menyatakan pemikiran dan idea dengan berkesan menggunakan kemahiran komunikasi lisan, bertulis dan bukan lisan dalam pelbagai bentuk dan konteks*					
C2	Utilize multiple media and technologies, and know-how to judge their effectiveness as a priority as well as assess their impact *Menggunakan pelbagai media dan teknologi, dan pengetahuan untuk menilai keberkesanannya sebagai keutamaan serta menilai kesannya*					
C3	Use communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade) *Menggunakan komunikasi untuk pelbagai tujuan (cth. untuk memaklumkan, mengarahkan, memotivasikan dan memujuk)*					
C4	Cannot listen effectively to interpret meaning including knowledge, values, attitudes, and intentions *Tidak boleh mendengar dengan berkesan untuk mentafsir makna termasuk pengetahuan, nilai, sikap, dan niat*					

Part 4: Collaboration/*Kolaborasi*

NO	STATEMENT	1	2	3	4	5
C1	Demonstrate the ability to work effectively and respectfully with diverse teams *Menunjukkan keupayaan untuk bekerja secara berkesan dan hormat dengan pasukan yang pelbagai*					
C2	Inflexible and unwilling to make compromises to achieve a common goal *Tidak fleksibel dan tidak bersedia untuk membuat kompromi untuk mencapai matlamat bersama*					
C3	Assume shared responsibility for collaborative work, and value the individual contributions made by each team member *Memikul tanggungjawab bersama untuk kerja kolaboratif, dan nilai sumbangan individu yang dibuat oleh setiap ahli pasukan*					

I sincerely thank you for your precious time and participation in this survey. I can ensure you that your information will be kept strictly confidential.

-END OF QUESTION-

GANTT CHART FYP 1

PROCEDURE FOR FYP 1	WEEK														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FYP Briefing Season															
Topic and Supervisor and Confirmation															
1st Meeting with Supervisor															
Modify Research Topic															
Briefing on the Content of Chapter 1															
Discussing about LR and Research Framework															
Finding Research Problem Statement															
Completion of Chapter 1															
Chapter 1 cheeking and Correction by SV															
Chapter 2															

Briefing															
Completion of Chapter 2															
Chapter 3 Briefing															
Completion of Chapter 3															
Submission of FYP 1															

GANTT CHART FYP 2

PROCEDURE FOR FYP 2	WEEK														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Create Questionnaire															
Distribute Questionnaire															
Data Gathering															
Data Analysing															
Complete Chapter 4															
Complete Chapter 5															
FYP Submission															
FYP 2 Presentation															