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THE INFLUENCE OF DIGITAL LITERACY AND DIGITAL TECHNOLOGY ACCEPTANCE ON DIGITAL AMNESIA BEHAVIOUR AMONG DIGITAL NATIVES

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Universiti Utara Malaysia

DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
2023

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Abstrak

Kehidupan orang ramai berubah disebabkan peningkatan penggunaan Internet, yang bukan hanya mempengaruhi cara mereka bekerja, tetapi turut memberi kesan kepada cara mereka belajar, berkelakuan, menyimpan dan mengingati maklumat. Fenomena ini dianggap normal dan tidak memudaratkan dalam dunia perniagaan.Walau bagaimanapun, beberapa kajian telah mengkaji fenomena tersebut, terutamanya berkaitan dengan tingkah laku dan persepsi digital native. Oleh itu, kajian ini bertujuan untuk mengkaji pengaruh efikasi kendiri literasi digital dan penerimaan teknologi terhadap tingkah laku amnesia digital dalam kalangan digital native.Tiga kajian telah dijalankan di Universiti Islam Negeri Ar-Raniry Banda Aceh, Indonesia. Kajian pertama menggunakan pendekatan kuantitatif deskriptif melalui kaedah tinjauan untuk mengenal pasti nomofobia, kesan Google, dan amnesia digital dalam kalangan 110 orang pelajar. Kajian kedua menggunakan reka bentuk eksperimen sebenar dengan kumpulan kawalan pasca ujian untuk menyiasat kesan fenomena ke atas pengekalan ingatan dan pembinaan pengetahuan melibatkan 40 orang pelajar. Kajian ketiga melibatkan pendekatan kuantitatif inferensi dengan kaedah tinjauan telah dijalankan dalam kalangan 375 orang pelajar untuk mengkaji pengaruh efikasi kendiri literasi digital dan penerimaan teknologi digital terhadap amnesia digital. Dalam kajian pertama, borang tinjauan Google telah digunakan, manakala dalam kajian kedua, 20 soalan mudah dan klip video selama 5 minit digunakan. Pendekatan Pemodelan Persamaan Struktur telah diaplikasikan dalam kajian ketiga dan cadangan saiz sampel dalam PLS-SEM untuk kuasa statistik 80% oleh Cohen (1992) telah digunakan sebagai prosedur pensampelan. Kajian pertama mendedahkan 83.9% pelajar mengalami pergantungan Internet, dengan 72% menganggap fenomena itu sebagai normal. Kajian kedua mendedahkan nomofobia, kesan Google dan tingkah laku amnesia digital melemahkan pengekalan ingatan dan pembinaan pengetahuan. Dalam kajian ketiga, efikasi kendiri literasi digital dan penerimaan teknologi digital didapati mempengaruhi tingkah laku amnesia digital secara negatif. Kajian ini menawarkan pandangan baharu tentang cara teknologi digital boleh digunakan dalam bidang sains sosial dan pendidikan dengan cekap, berkesan dan positif.

Kata Kunci: Amnesia digital, Google effect, Efikasi kendiri literasi digital, Pengekalan memori, Pembinaan pengetahuan

Abstract

People's lives are being transformed by increasing use of the Internet, which affects not only the way they work, but also the way they learn, behave, store and remember information.In the business world, this phenomenon is considered normal and non-harmful. However, a few research have studied the phenomenon, especially with regard to digital natives' behavior and perceptions.Therefore, this study is aimed to examine the influence of digital literacy self-efficacy and technology acceptance on digital amnesia behaviour of digital natives. Three studies have been conducted at Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia.The first study used a descriptive quantitative approach by a survey method to identify nomophobia, Google effect, and digital amnesia among 110 students. The second study used a true experimental design with a post-test-only control group to investigate the effect of the phenomenon on memory retention and knowledge construction involving 40 students. The third study, an inferential quantitative approach with survey method was conducted among 375 students to examine the influence of digital literacy self-efficacy and digital technology acceptance on digital amnesia. In the first study, a Google form survey was used, while in the second study, 20 easy questions and a 5-minute video clip were used. The Structural Equation Modeling approach was applied in the third study and the sample size recommendation in PLS-SEM for a statistical power of 80% by Cohen (1992) was used as a sampling procedure. The first study revealed 83.9% of students experience Internet dependency, with 72% perceiving the phenomenon as normal. The second study revealed nomophobia, Google effect, and digital amnesia behaviour weakened memory retention and knowledge construction.In the third study, digital literacy self-efficacy and digital technology acceptance were found to negatively influence digital amnesia behaviour. These studies offer new insights into how digital technology can be used in the social sciences and educational fields efficiently, effectively, and positively.

Keywords: Digital amnesia, Google effect, Digital literacy self-efficacy, Memory retention, Knowledge construction.

Acknowledgement

Praise be to Allah for all His blessings so that I can complete this dissertation. Blessings and peace be upon Rasulullah Muhammad SAW as the Prophet of the last and the leader of all the spiritual teachers sent into the earth. He is the model for human beings to achieve happiness in this world and the hereafter. Alhamdulillah, without Allah's grace, my dreams would have turned to illusions.

My most profound appreciation and thanks are to my esteemed supervisors, Associate Professor Dr.Mohd Sobhi Bin Ishak and Associate Professor Dr.Norsiah Binti Abdul Hamid, for guidance, encouragement, help, and attention to the completion of this dissertation. I feel that all that was given was very helpful and encouraged me to complete this dissertation. The enthusiasm shown by both of them has given me high motivation and optimism to complete this thesis virtually due to the Coronavirus Disease (Covid-19) pandemic that plagued the world. On this occasion, I would also like to thank my proposal examiners Associate Professor Dr. Jamaludin Mustaffa and Associate Professor Dr. Kamal Bin Abdul Hamid for their input and instructions to make my work better.

I would also like to thank and pray to my father Almarhum Musa Adamy and my mother Almarhumah Maryam Basyah for their struggle and prayers to achieve success to this point. Likewise, a big thank you to my beloved wife Rosmanizar Zakaria, who always supported me with sincerity for the success of my education, as well as my sons Shavviel Azka, Waviz Azkya, and Tasyvin Asyva, whom I am very proud of you for your patience and understanding during my education up to the current doctoral level. Thank you and appreciation also do not forget to convey to all my relatives for their love and support. I love you all. My goal will not be achieved without them. I dedicate this dissertation to all of you.

My sincere thanks go out to Professor Dr. Awan Ismail and Professor Dr. Ali Salman as internal and external examiners who have provided invaluable feedback that helped this work become better. Thank you also to Associate Professor Dr.Siti Mahfuzah Sarif as the head of viva, who has managed this process efficiently. Furthermore, I would like to thank Dr. Gusman Nawanir, a certified Structural

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Equation Model (SEM) trainer, who helped me with quantitative data analysis. In addition, I would like to thank all my friends for their encouragement throughout my Ph.D. journey.

Last but not least, this recognition is also offered to each individual and organization, which cannot be listed individually for their valuable contributions to the completion of the dissertation and confidential respondents; without their response, this study would not have been possible.

Finally, I had a delightful study at Universiti Utara Malaysia (UUM). The university not only has a beautiful natural environment, but also has a friendly and accommodating staff.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

The increasingly intensive human involvement in technology has led to a high dependence on the internet (Kirkpatrick et al., 2020). People's information behaviour has changed due to new media technologies' effectiveness and efficiency, especially for digital natives. Most of them use digital technology devices that are always connected to the internet to represent thinking and even use it as an external memory (Boldt & Gilbert, 2019; Hu et al., 2019).

According to a survey, 91% of Americans use digital technology as a way to enhance their memory and recall, and 79.5% of Europeans use the Internet as a universal reference tool (Kaspersky, 2016). It is believed that information behaviour is shaped by the belief that information can be accessed anywhere and anytime, and this has led to a high dependency on technology or the Internet in particular. In the current relationship between humans and technology, experts claim that brains crave instant gratification constantly, and that this threat threatens society almost as much as climate change does (Kuss et al., 2018; Moreno-Guerrero et al., 2020).

According to development trends, Internet dependence will continue to grow (Regiani Bueno et al., 2019), mainly because advances in artificial intelligence (AI). It is predicted that in the next decade People's lives and careers will be significantly impacted by artificial intelligence, and they perceive the impact of digital technology

on their own lives and their work, the educational decisions they may make as a result of this economic development, and potential interventions from higher education (Aoun, 2018).

Furthermore, dependence on the Internet has caused behavioural changes as well as physiological effects (Harwood et al., 2014; Priporas et al., 2017). There are at least three phenomena of behaviour change due to Internet dependence that have been widely studied especially in developed countries, and these three phenomena will also be the focus of this research.

The first phenomenon is nomophobia, which is the human reliance on smartphones and other mobile technologies (Gonçalves et al., 2020; Han et al., 2017; Qutishat et al., 2020). Those who are addicted to smartphones express a desire to use them even after they leave them out of sight or reach (Buctot et al., 2020; Hussain and Pontes, 2019; Kuss et al., 2018). Over time, smartphones have evolved from being primarily used for communication to offering advanced features including enhanced user comfort and enjoyment. In this way, smartphones have become an indispensable tool in people's everyday lives (Parasuraman et al., 2017). Some people, however, have difficulty controlling their smartphones use and become overly dependent on it. As a result, they devote too much time to their mobile phones as well as a poor balance between their activities. Among the main concerns here is that the digital natives lose touch with humanity and empathy, and meanwhile both of these qualities that the development of human characteristics during childhood has historically been viewed as a positive thing (Elhai et al., 2018).

The second phenomenon is Google effects which is the tendency of people not to store information in their own brains because they believe it will be much easier to store it safely in Google storage media and easily re-accessible whenever needed (Heersmink, 2016; Sparrow et al., 2011b).

The third phenomenon is the digital amnesia behaviour which is referred to" *the experience of forgetting information that you trust a digital device to store and remember for you*" (Kaspersky, 2015, p. 2). Memory-sharing behaviours with close friends or spouses have long been practiced. Scientifically, this phenomenon is known as the theory of transactive memory(Dirin et al., 2019; Greenwood, Chris Quinn, 2017; Kaspersky, 2015; Perrin & Kumar, 2019).

This theory posits that individuals are not capable of knowing everything, and this is why memories must be shared. By delegating the responsibility of remembering certain types of information to others, it will increase one's capacity in some regions of knowledge that can be accessed by various other circles (Wegner, 1987). Meanwhile, There has been a trend called digital amnesia since 2007 and it has become a concept of interest that threatens human memory as a result of excessive use of digital gadgets.

In principle, these two phenomena have similarities, but the overflow of human memory into digital devices has different implications. One of the initial indications found from the results of the study is that the overflow of memory to the Internet or digital devices has caused the blurring of knowledge limits; between self-knowledge

and "knowledge" of the machine as well as increased cognition (Ward, 2013). This view then indicates the dangers of this amnesia digital phenomenon or behaviour, in particular its long-term implications for human cognition (Mason & Lamain, 2007). From the study of literature, it found that there is still no consensus between academics and scientists. Experts still look at it from their own perspectives so the conclusions are also different.

Among the limited available literature it can be concluded that digital amnesia behaviour tends to be at greater risk than the limited benefits it may have especially due to the lack of secure procedures for storing information digitally and the threat of addictive behaviour lurking (Lodha, 2019; Swaminathan, 2020).Several researchers such as Greenwood and Quinn (2017), Kochetkova (2015), and Swaminathan (2020b) state the importance of recognizing and investigating amnesia behaviour among the digital native in the academic environment, especially with regard to the long-term effects on the future of the educational world.

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1.2 Problems Statement

Increasing Internet dependence has changed information seeking behaviour and has diminished the digital literacy abilities of digital natives; for instance, finding, selecting, and using information correctly. It is no longer necessary for them to store information in their own brain, but rather in their mobile devices (Loh & Kanai, 2016; Milyakina et al., 2020; Swaminathan, 2020).

The fenomena of Internet dependency is considered something normal from a business perspective as it is a consequence of living in the digital age. By pouring memory into digital devices, human brain will have a greater capacity to concentrate on other more important and enjoyable things such as love (Wimber 2016). The only problem, according to them is that there were still many people (58%) who have not protected their external memory with anti-virus, and a mere 29 % of digital device users back up valuable information. So, it is feared that it will damage their memory if their equipment is suddenly damaged and inaccessible, for example due to loss, theft or virus threat (Kaspersky, 2015, 2016).

On the other hand, there are many experts who argued that this phenomenon will disrupt human memory function.It is belived that high dependency on digital technology devices that always connected to the Internet may becomes a distinct threat to humans, especially long-term effects. Therefore, the issue of Internet dependency has been the focus of research of cognitive neurologists, psychologists, and many others in the last decade for instance Bhargava (2015), Kochetkova and Matters (2015), and Aoun (2018). Significant attention is given to the potential effects of digital amnesia on brain development, behaviour, and cognitive skill (Finley et al., 2018b, 2018a) especially among digital natives (Mills, 2014; Silvana & Darmawan, 2018; Tapscott, 2009), also nalyzing short-term memory and metacognition (Hu et al., 2019). Unfortunately, most of these studies have been conducted in advanced and established societies, and these issues have rarely been examined in developing countries. Therefore, the purpose of the first study is to explore how this phenomenon perceived by the digital natives in Indonesia as a developing country.

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It is believed that this effort is required in order to overcome issues related to negative impacts of digital technology. Digital literacy competencies are amongst the core requirement for Internet users as digital natives living in this disruptive era, especially in higher education. Through the application of digital literacy in a higher education environment, Alexander et al. Digital Education Advisory Group and Van Laar (2013; 2017) encourage students to apply academic skills in thinking critically and assessing the quality of information sources or digital data needed so that the usefulness of this digital literacy application will continue to assist students in working with the academic assignment with standards. In an academic context, Miranda et al. (2018) believe that students are prepared for digital literacy to reach maturity and succeed in their academic tasks through teaching activities and studies with the ease of applying digital literacy to students.

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In addition, Santos and Serpa (2017) see the usefulness of digital literacy applications that can live, learn, and work both in the academic environment to the broader community using the convenience of digital communication technology and accessing and organizing information so that it can be used for all purposes such as learning and evaluation process. Spante et al. (2018) also prove how digital information is created, communicated, and shared so that its users are like universities to develop digital literacy knowledge and skills, for example, how to create a matching account and password, learn, understand and apply confidentially and Utilizing technology platforms such as social media, Internet sites, and mobile phones to manage information. Likewise, from school to college, digital literacy has become a widespread learning tool because of its benefits and ease of use as well as

the challenges that continue to innovate the lecture system, especially the solution to distance learning disorders due to the pandemic response (Gómez-Tejedor et al., 2020)

In other words, digital literacy refers to more than operating digital devices and using digital applications but also multiple cognitive abilities, motor skills, sociological skills, and emotional skills, it also involves a wide range of complex abilities.. Thus, they will be able to do activities effectively in a digital environment. The skills needed in this context include understanding the ethics and rules that apply in cyberspace. It also requires being able, for example, to "read" instructions from the graphical display in the user interface; use digital reproduction to create meaningful new material from existing material; building knowledge from nonlinear, hypertextual navigation; and selecting the quality, credibility and validity of information.

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There are several components of digital literacy, including reproductive literacy, developing networking skills, information literacy, and socio-emotional skill sets (Eshet-alkalai, 2004; Falloon, 2020). Thus this comprehensive digital literacy concept can be used as a benchmark for the quality of students' work in a digital environment, and develop better ways to communicate between scholars and developers to design better user-friendly environments. Based on this new digital literacy concept, this study proposes a refined and holistic conceptual framework for digital literacy adopted from Hanyang University (Noh, 2016).They are Technical Literacy (TL), Bit Literacy (BL), and Virtual Community Literacy (VCL).

Departing from this phenomenon and also the importance of the development of scientific treasures, research methods, and public intelligence, this study is firstly intended to identify the nomophobia, Google effect and digital amnesia among digital natives in academic context. Secondly, this study investigates the influence of nomophobia, Google effect and digital amnesia on memory retention and knowledge construction among digital native. Finally, the study examines the influence of digital literacy self-efficacy and digital technology acceptance on digital amnesia behaviour of digital natives.

1.3 Research Questions

Following the research problems above, the following research questions are formulated for this study:

1) How do digital natives behave and perceive the phenomenon Internet dependency (Nomophobia, Google Effect and Digital Amnesia)?
2) What is the influence of internet dependence on memory retention and knowledge construction among digital natives?
3) What is the influence Technical Literacy towards digital amnesia behavour amongst digital natives?
4) What is the influence of Bit Literacy towards digital amnesia behaviour amongst digital natives?
5) What is the influence of Virtual Community Literacy towards digital amnesia behaviour amongst digital natives?
6) What is the influence of Digital Technology Acceptance towards digital amnesia behaviour amongst digital natives?

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1.4 Research Objectives

In general, this study aims to determine the influence of digital literacy and digital technology acceptance on digital amnesia behaviour of university students. Some specific purposes of this study are:

1) to identify university students' behaviour and perceptions on the phenomenon of phenomenon of nomophobia, Google effect and digital amnesia?
2) to measure the impact of students' digital amnesia behaviour on memory retention and knowledge construction.
3) to measure the influence of technical literacy on digital amnesia behaviour amongst digital natives?
4) to measure the influence of bit literacy on digital amnesia behaviour amongst digital natives?
5) to measure the influence of virtual community literacy on digital amnesia behaviour amongst digital natives?
6) to measure the influence of digital technology acceptance on digital amnesia behaviour amongst digital natives?

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1.5 Research Hypotheses

The hypotheses of this study are:

H1: Technical literacy self-efficacy influences negatively on digital amnesia behaviour of digital natives

H2: Bit literacy self-efficacy influences negatively on digital amnesia behaviour of digital natives

H3: Virtual community literacy self-efficacy influence negatively on

digital amnesia behaviour of digital natives

H4: Digital technology acceptance influence negatively on digital amnesia behaviour of digital natives

1.6 Research Significant

This research generally has three main objectives. First, the study aimed to identify Internet dependency, especially nomophobia, Google effect and digital amnesia behaviour among behaviour digital natives in Indonesia. Geographically, this study is important to do to determine with certainty the level of dependence on the Internet among digital natives in Indonesia. Second, it aims to understand the impact of Internet dependency behaviour among digital natives on memory retention and knowledge construction. With this data, it is expected to anticipate negative impacts that have an effect on education, especially related to memory retention and knowledge construction. Third, it aims to determine the effect of digital literacy competence and digital technology acceptance on Internet dependence behaviour, and these two variables are expected to be a solution to anticipate the negative impact of Internet dependence behaviour among digital natives.

In the theoretical aspects of this research, it is important to confirm and accredit the theory of acceptance of digital technology. This study has confirmed the theoretical role of technological acceptance of digital behaviour of amnesia (Lodha, 2019; Swaminathan, 2020). As we know, the theoretical principle of the technology acceptance model (TAM) explains that a person's decision to take an action is based on his own desires driven by his own attitude and perception of the matter (Akhavan et al., 2018; Olumide, 2016; Rajabion et al., 2019).

In the application aspect, this study can give new perspectives to researchers in the field of social sciences, education and technology, on the importance of utilizing technology positively and productively. In the context of studies regarding the digital amnesia behaviour, this study will add a wealth of knowledge to the phenomenon of the use of "digital brain" (Choudhury & Mckinney, 2013; Loh & Kanai, 2016).Thus, the results of this study are expected to help the government and education stakeholders in developing educational concepts and policies such as designing curriculum and technology-related training modules relevant to development.

Furthermore, this study can also help information workers such as librarians to be able to design digital literacy programs and provide library services that suit the needs of current library users (Alexander et al., 2016; Silvana & Darmawan, 2018). This study is expected to contribute to the reference of knowledge related to the digital amnesia behaviour that is currently under-studied. Finally, this study is expected to answer the concerns of academic experts who are increasingly concerned about the Internet dependency.

Besides developing scientific treasures, this study contributes a new construct to measure the influence of digital literacy and digital technology acceptance on digital amnesia behaviour. With this new construction, it is expected to support the Indonesian government program of the National Digital Literacy Movement driven by the Ministry of Telecommunications and Communications, in efforts to educate the digital generation so that they can use technological devices positively and productively and navigate them to not getting lost in their own digital world. More

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importantly, the results of this study can also contribute to curriculum development of schools and universities in Indonesia.

1.7 Research Scope

The first study, it focuses on three phenomena: nomophobia, Google effect, and digital amnesia. The second study also focused on three aspects of digital literacy proposed by Noh (2016) namely: (1) Technical Literacy, which is the ability to use digital technology to access a variety of information distributed through the virtual world or digital network; (2) Bit Literacy , which is the ability to evaluate and assess the credibility of various information distributed through digital networks, such as selecting, editing, processing, and converting information into the required knowledge; and (3) Virtual Community Literacy, which is the ability to understand the rules of communication, netiquette ethics and unique behaviour of the virtual world that is different from the real world and actively involved in building a healthy society through sharing in the virtual world. In the concept of digital technology acceptance is also limited to two main principles of digital technology acceptance, namely the perception of perceived use of digital technology and the perception of ease of use of digital technology (Lazar et al., 2020).

Third, the focus of the third study is exclusively on digital amnesia, not Google effects and nomophobia (no mobilephone phobia). This is because although in principle the two behavioural dependencies of this technology are similar but practically different. Google effects do not depend on digital devices, but directly on Google or the Internet. .

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From the methodological aspect, this study applies survey and experimental approaches a different to previous studies which based on experimental method only (Wagner et al., 2014; Ward, 2013; Zhang et al., 2007). With this mixed method, it is possible to use more respondents and more comprehensive results as well as create a new model of measurement constructs, which is the influence of digital literacy and digital technology acceptance on the digital amnesia behaviour among the students at the Universitas Islam Negeri Ar-Raniry, Banda Aceh, Indonesia.

1.8 Conceptual Definitions

1.8.1 Internet Dependency (ID)

This study uses the term "Internet dependence" to describe a condition caused by excessive use of the Internet to the detriment of a person's physical, psychological, social, or educational well-being. In this context, Internet dependency dealt with nomophobia, Google effect and digital amnesia phenomena.

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1.8.2 No Mobilphone Phobia (Nomophobia)

Nomophobia is the behaviour of high dependence on smartphones and other mobile technology devices (Han et al., 2017), feelings of fear or anxiety because of not using a smartphone (Bian & Leung, 2015; Hajdinjak et al., 2016; Yildirim & Correia, 2015). Some of the characteristics of nomophobia that have been identified by researchers is a person who use smartphones for long periods of time constantly carry a smartphone charger, and are always concerned that their smartphone could be lost and their network coverage could be lost (Bragazzi & Del Puente, 2014), carrying the phone everywhere, using the phone at the wrong time and missing

opportunities for face-to-face interaction (Kanmani et al., 2017) ignored the harmful consequences, preoccupation with smartphone use (Bian & Leung, 2015). In this study, however, the scope of nomophobia is limited to the academic context. It is intended to measure the degree of digital native's dependence on smartphones in academic use that is characterized by excessive use of smartphones for all academic purposes.

1.8.3 Google Effect (GE)

The Google effect is a concept about the behaviour of information. The Google effect is the behaviour of people's tendency to no longer store information in their own memory, but switch to "Internet memory" because of the belief that the information will always be available on the Internet whenever needed and can be accessed again easily whenever needed (Sparrow et al., 2011b). The scope of the characteristics of the Google effect is meant here the level of tendency and perception of students towards the use of Google in an academic context, especially in doing college assignments.

1.8.4 Memory Retention (MR)

Memory and retention are two interrelated things in the process of information retrieval. These two things are related because the information stored in human memory is encoded, stored and retrieved by the brain. This process allows humans to recall information and make it an important material for the learning process (Amin & Malik, 2014; Prasad et al., 2020). Houston adds that the retention process is part of

an integral process that is defined as “the relatively permanent change in behavioural potential that occurs as a result of reinforced exercise” (2001, p. 4).

In this study what is meant by memory retention is not only intended to test students' memory retention to recall previously known facts and information (20 trivia questions about knowledge of Islam and general knowledge) with their own mind or memory but also their tendency to switch the use of internal memory to external memory (Internet memory) when they want to answer questions.

1.8.5 Knowledge Construction (KC)

Construction is a mental activity in which a learner takes many separate pieces of information and uses them to build a comprehensive understanding or interpretation. Knowledge construction is defined as a process of building new knowledge through the learner's mental process by taking many separate pieces of information and manipulating them to form a new understanding or interpretation of the world around them (National Academies of Sciences, Engineering, 2018; Pundir & Surana, 2016). Knowledge construction is the core of cognitive theory about learning (Ormrod, 2008). In this study, knowledge construction is intended as a student activity in constructing new knowledge through four stages of construction proses, namely interpretation, analysis, synthesis, and evaluation of data or separate pieces of information.

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1.8.6 Digital amnesia behaviour (DAB)

Kaspersky defines digital amnesia behaviouras “the experience of forgetting the information you trust digital devices to store and remember for you” (Kaspersky, 2015, p. 3). In this context, the concept of digital amnesia behaviouris operated as the information behaviour of students who have a tendency to be highly dependent on digital devices so that they ignore the information search process starting from awareness of information needs, selection, evaluation, and extracting, utilizing, storing and presenting information appropriately for their academic needs.

1.8.7 Digital Technology Acceptance (DTA)

The concept of digital technology acceptance is based on the main principles of the Technology Acceptance Model (TAM), namely the perception of digital technology is useful and the perception of digital technology is easy to use (Lazar et al., 2020; Park, 2009). the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) toward digital technology device in this context, is based on the concept offered by Rajabion et al.,(2019) and Scherer et al.,(2019) which examines the relationship between students' attitudes towards digital technology acceptance. As a result, digital technology acceptance is measured by the degree to which digital natives accept and use digital technology to assist them in their learning process.

1.8.8 Digital Literacy Self-efficacy

Research on digital literacy deals with broader aspects related to learning how to find, use, summarize, evaluate, create, and communicate information effectively when using digital technology. Digital technology includes all digital devices, such

as computer hardware, software, Internet, and smartphones. Someone uses this skill to interact with the community, or can be called a digital citizen (Hasanah, 2019).The concept of self-efficacy is defined as one's confidence in his or her abilities to perform tasks successfully (Bandura, 1986, 1993). In this study context, the digital literacy self-efficacy concept is concerned with students' confidence in their ability in the following three categories of digital literacy, particularly technical literacy, bit literacy and virtual community literacy.

1.8.8.1 Technical Literacy (TL)

Technical literacy is the ability to access a wide range of information using digital devices distributed through the virtual world or digital network. The scope of technical literacy in this study is the level of self-efficacy of the UIN Ar-Raniry's students on their ability to use Internet, smartphone, computer and library's online catalogue to find, edit and distribute information online using digital devices.

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1.8.8.2 Bit Literacy (BL)

Bit literacy is the ability to evaluate and assess the credibility of information distributed through digital networks such as selecting, editing, processing, and converting information into the required knowledge (Noh, 2016). As suggested by Noh (2016), bit literacy skills in the context of this study are the skill to find for information virtually, the capability to evaluate accurate information, edit information, process information, use information, and create information using digital devices.

1.8.8.3 Virtual Community Literacy (VCL)

Virtual community literacy is the ability to understand the rules of communication, ethics of the Internet (netiquette) and unique behaviour of the virtual world that builds a civil society by sharing information in a way different from the real world (Noh, 2015, 2016). As for the literacy skills of the virtual community referred to in this literacy are the ability to participate in the virtual community, maintain self-identity in the virtual world, establish virtual relationships, solve digital problems collectively, create cyber culture, and manage virtual meetings (webinars, teleconferences or videoconferences) using digital meeting tolls such as Zoom Meeting, Cisco WebEx, Google Classroom, etc.

1.8.9 Digital Natives

Digital native is a term coined by Mark Prensky (2001b) to describe the generation of people who grew up in the era of ubiquitous technology, including computers and the internet. In this study, the digital natives referred to the first-year students at Ar-Raniry State Islamic University Banda Aceh.

1.9 Chapter Summary

This chapter has discussed the entire scope of this research, starting from the study background, problem, questions, objectives, hypothesis, significance, scope, to operational terms. With this comprehensive explanation, it is hoped that it can help understand the scope of this study thoroughly and in detail. The phenomenon of Internet dependency is the central issue of this research. Then it focuses on three recent phenomena, namely, nomophobia, Google effect and digital amnesia. To find

out comprehensively about this phenomenon in an academic context, two approaches have been taken, namely survey and experiment.The results of this study are expected to have a significant impact on the positive and productive use of technology to support the teaching and learning process in universities. The findings of this study are also expected to be able to educate and navigate the community, especially the younger generation through digital literacy programs, both formally and informally.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter generally discusses the literature review relating to Internet dependency among digital natives, and their perspective on nomophobia, Google Effect, and digital amnesia behaviour phenomena. In addition, this section explores the concept of digital literacy starting from the definition, history, to digital literacy competencies. Then, it will continue with a discussion of the behaviour of digital amnesia. This chapter will further discuss digital amnesia, memory retention, and knowledge construction. In the end, this chapter discusses the concept of digital literacy, digital technology acceptance, and digital amnesia behaviour. These concepts are principles in building the conceptual framework and constructs of this study.

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2.2 Internet Dependency

Literature review identified Goldberg (1996) as the first person to coin the phrase Internet dependent. He described Internet dependence as Internet Addiction Disorder (IAD). As part of his diagnosis, he provides seven main diagnostic criteria: dreaming about networking, persistent physical, social, or psychological problems, and more. Many other studies in this field have cited Goldberg's 1996 paper as the keystone (Goldberg, 1996).

The Internet addiction problem is an important research topic because it is such a new type of addiction.The Internet provides global access to information and enables

individuals to collaborate and interact with their computers regardless of geographical distance. In terms of research and development, this is an outstanding example of government, industry, and university collaboration in information technology. Like the presence of other new technologies, the presence of the internet also has both positive and negative sides for society.

In educational sector for example, Internet access has made teaching and learning easier for both students and teachers, because information is now accessible at their fingertips. Aside from thepossitive effects, internet can have negative effects on students' lives, such as emotional instability, depression, poor time management and addcition.

Research conducted at UiTM, Sabah by Ambad et al., (2017) suggests that internet addiction is positively correlated with emotional instability. A negative impact of instability and internet addiction can also be seen on academic performance. This study provides university policy makers with empirical evidence that can be incorporated into new policies on internet use on campus. Additionally, this finding can also raise awareness of parents so that they can increase digital literacy in order to reduce their children's internet dependence. Furthermore, this finding could raise students' awareness about the negative effects of excessive Internet use. In order to be effective in their educational endeavors, students must use the internet wisely (Ambad et al., 2017).

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2.2.1 Nomophobia

Nomophobia, an abbreviation of “No mobile phone phobia”, is characterized by the illogical fear of being detached from the mobile phone or unable to use it. Research have provided evidence of an association between increased cellular phone use and multiple health issues, such as anxiety, depression, insomnia, and others.A person suffering from this phobia is unable to access information, to have direct contact with others, and to make contact with them. It is predicted that these factors interfere with the development of a person's daily life (physical, physiological, psychological, social problems).

A study conducted by Moreno-Guerrero (2020) using the NMP-Q nomophobia questionnaire to analyze nomophobia prevalence among pre-primary and primary education teacher candidates found that most variables had an average level of nomophobia. According to the researcher, although the results are not alarming, it is important to recognize that some variables have slightly higher prevalence than others, so it is crucial to implement educational interventions that promote responsible and efficient use of media and technology (Moreno-Guerrero et al., 2020).

The above finding is consistent with another study measuring the negative effects of nomophobia on academic performance. This study revealed that strestrictions on mobile phone access increase anxiety and provide empirical evidence that Internet dependence negatively impacts student academic achievement (Cutino, 2017; Wilmer et al., 2020).

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Furthermore, a recent study on the issue of nomophobia conducted by Farchakh (2021) also confirmed that there is a positive correlation between nomophobia and psychological conditions. The researcher also reveals the need for longitudinal and prospective studies that furnish information with regards of the impact of time on the variables measured, in order to better understand the nature, causes, and attributes of nomophobia (Farchakh et al., 2021).

Another fact about the prevalence of Nomophobia was also stated by Qutishat 2020. According to the results of this study, the prevalence of nomophobia among digital natives was 99.33%, mostly with moderate nomophobia. Students with severe nomophobia reported poorer academic performance although it was not statistically significant (p=0.706). It was found that nomophobia was highly prevalent in this study, while the relationship between academic achievement and nomophobia was weak. Further research should be conducted in this area to inform mobile phone policy in educational settings and to avoid significant side effects of chronic use (Qutishat et al., 2020).

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2.2.2 Google Effect

Like nomophobia, the Google effect and digital amnesia behaviourare three interrelated psychological phenomena. All three have in common in terms of the tendency of people to fail to recall information that is accessible virtually or stored digitally. The tendency of people to store information in this digital format is increasing from time to time. This phenomenon is important to understand as it plays an increasingly large role in human cognition. Thus the phenomenon of the Google

effect needs to be studied further; for example understand why people can experience it, and see how they understand this phenomenon, so that these results can be useful in academic practice (Heersmink, 2016).

In some cases, the tendency to rely on Google to store and remember information can be problematic. For example, access network problems in situations where Internet network disruption occurs, or conditions that do not allow using the Internet, such as taking an exam. This kind of condition requires a person to remember certain information by himself, and must be able to internalize and understand it well. (Effectiviology.com, 2020)

2.2.3 Digital Amnesia

From a conceptual standpoint, digital amnesia is not a new idea. Since 2007, it has been discussed and first introduced in a study conducted in Dublin discussing the threat to human memory caused by excessive use of technologies (O'Gorman, 2015). The phenomenon of digital amnesia is well-established and well-documented as an experience of forgetting information that digital devices are trusted to store and remember. However, the term digital amnesia behaviourhas been used over the past few years and is consistently associated with identifying discovery and information storage resulting in a shift from analogue or print data storage to a reliance on digital devices to store information and to access information for retrieval one's trust in a connected device to perform the role of an information guardian exists in parallel with another phenomenon, namely the "Google Effect" (Greenwood & Quinn, 2017).

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Although the term digital amnesia behaviourhas been around for a long time, this term became more popular in 2015 after Kaspersky Laboratory Research, a well-known anti-virus company based in Moscow published the results of their study in 2015 and 2016 (Kaspersky, 2015, 2016). Another synonym is 'Digital Dementia' coined by German neurologist Manfred Spitzer. Digital dementia is used to describe cognitive impairment as a result of excessive use of digital technology (O'Gorman, 2015).

Regarding the phenomenon of digital amnesia, three major universities, namely Harvard University, Columbia University and the University of Wisconsin, have conducted serious studies. Researchers from these universities are interested in studying the impact of technology, especially on young people. The results of their research then gave birth to a new synonym, namely 'Google Effect'; namely the tendency to forget information due to the belief that information will always be easily found online through search engines such as 'Google' (Sparrow et al., 2011a). The terms digital amnesia behaviourand the Google effect are used interchangeably; although in principle there are differences between the concepts of digital amnesia behaviourand the Google effect, digital amnesia behaviourrefers to the tendency to forget information that has been stored on digital devices such as smartphones and tablets, in contrast to the Google effect which does not depend on the storage device.

These two phenomena are similar in that a person forgets, whether intentionally or not, the information that is available digitally. Another reason for forgetting information in this digital age is the belief that technology will be good at remembering and finding information easier and faster than humans. In other words,

information is always available at their fingertips and whenever someone wants to access information all they need to do is click a button.

2.2.3.1 Digital amnesia behaviourImplications

Undoubtedly, excessive dependence on digital devices connected to the Internet ranging from smartphones, laptops, tablets, computers to various other technological devices contributes to the behaviour of digital amnesia. However, study on digital amnesia behaviourin general often refers to smartphone devices because smartphones are generally always connected to the Internet and are always used. This phenomenon also gave rise to the term nomophobia (no mobile phone phobia).

The symbiotic life with digital devices, as a result of the evolution of technology, changes the way we think, learn, behave, remember, live and grow. Kaspersky Lab with the help of Opinion Matters reveals how far dependence on technology has come and its impact on people's daily lives .Their study found that many people struggle to recall simple memories and information they trust on their devices, including the phone numbers of their spouses and parents. Based on these findings, Kaspersky Lab coined the term digital amnesia behaviourwhich is the experience of forgetting information that digital devices trust you to store and remember for you. Kaspersky Lab conducted study across Europe, India and the US in 2015-2016 (Kaspersky, 2016).

The emergence of the Internet with very sophisticated and complex algorithms has made access to information easier by just lifting a finger. Everything is done quickly

and practically without spending a lot of money and time consuming. Everything can be on Google, from searching for news, making friends, searching for articles and other activities. So this has an effect on human dependence in accessing information to Google and of course this is a bit worrying where the withdrawal of personal information will be lower because everything is stored in the form of technological sophistication. The Internet becomes the main external form or main memory where all information is stored both collectively and individually (Sparrow et al, 2011).

Nowadays, if we are faced with a demand for information that we know about, then the first motivation is to find out via the Internet. Reliance on search results on smartphone screens is starting to blur the lines between personal memory and digital memory. These results suggest that the increase in cognitive self-esteem after using Google is not only from positive feedback that comes from giving correct answers. In contrast, the use of Google gives people the feeling that the Internet has become part of their cognitive device (Wegner and Ward, 2013). In a study that tries to exploit how the Internet can change the way people handle information. It was found that the growing belief that people use the Internet as a personal memory bank to obtain information is called the effect of Google (Lodha, 2019)

In a study conducted by Ngafifi (2014) regarding Internet activities carried out by respondents, it was found that people's daily activities are never separated from technology and the Internet, in which 22% of the study participants admitted to accessing Facebook when surfing the Internet and 10% visiting the Google site. If it continues, humans will tend to depend on existing technology; a popular term is nomophobia which is an advanced form of the Google effect. Nomophobia are

feelings of discomfort or anxiety experienced by individuals when they are unable to use cell phones or make use of available devices (Arpaci, 2016)

The implications of digital amnesia behaviour can be a valuable opportunity to engage uninvolved people. As consumers become more and more dependent on technology, tourism businesses may become more technically savvy to get consumers' attention. The convergence of matter in human memory with silicon memory information will be very important to think about how the philosophical discourse that underpins the theory of digital memory. The concept of digital memory intersects with the same problem. Not just a metaphor but a shared image of organic and inorganic. When a computer virus infects there is memory loss and digital amnesia behaviourwhich makes digital memory as erroneous and unstable as human memory which tends to forget easily.

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The article written by Haskins (2017) which discusses the function of Internet warnings remembers that the policies and weaknesses of archival memory are closely related to the paradox between contemporary public obsession with memory and the acceleration of one's amnesia. One cannot ignore that the obsolescence of events and the loss of historical awareness are the result of many communications with computers that are only used for commercial and entertainment purposes. Then this is where technology offers the ability to remember instantaneously, but if this is allowed, there will be amnesia due to technology. At the same time, in exploring the promise of the Internet as a medium of public memory, it is important to recognize that the contemporary Western obsession with past traces is a cultural trend that is

ambivalent to signalling not only the “democratization” of memory work but also the acceleration of amnesia.

It is also predicted that the presence of artificial intelligence-based applications, such as social media platforms, entertainment, and games, will further increase dependence on digital devices. From a psychological and sociological perspective, greater dependence will negatively impact individuals. In order to minimize the negative impact of digital amnesia, awareness and digital literacy need to be increased (Dirin et al., 2019). Regardless of the adverse effects on memory, mental health professionals argue that dependence on digital devices can affect behavioural problems such as attention deficits, high irritability, and increased levels of aggression (Dirin et al., 2019; Kuss et al., 2018).

Recent studies have found that digital amnesia behaviouris associated with presentations of depression, anxiety, panic attacks, and post-traumatic stress disorder (Duke and Montag, 2017; Harris et al., 2020). These behavioural and psychological symptoms appear in individuals who lose or are disconnected from their smartphone so that access to their personal data and information is cut off as well. Therefore, these psychosocial variables such as low self-esteem, low self-confidence and lack of self-identity also seem to be of concern to researchers in this field in the last decade.

For digital natives, smartphones are not only a means of communication and searching for information but are like close friends to store various information (transactive memory partners) (Hartanto & Yang, 2016; Mouslim Cherkaoui, 2017). The tendency of people to store memory on smartphones is generally due to

effectiveness and efficiency reasons. Smartphones can store unlimited information, are always available and updated, and can find information quickly whenever needed by simply removing the smartphone from its pocket (Bhargava, 2015; Wilmer et al., 2019). Besides access to infrequently used information, technological external memories are accurate, precise, long-lasting, and capable of fidelity (Finley et al., 2018a, 2018b)

The problem of obscuring the boundaries of knowledge has become a new issue that is starting to be a lot of concern. Many countries have paid serious attention to evaluating the integration of technology in education. In other words, the Internet and mobile technology are directed so that they can become an effective and safe solution to support the increase of public information literacy which was previously plagued by digital inequality problems. This is indicated by the emergence of the current global movement called 21st century skills which focuses on the integration of technology in education.

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The Government of Malaysia, for example, has initiated a 2020 Vision Initiative to support programs and projects related to information and communication technology (ICT) in the 7th Malaysia Plan 2006-2010. Furthermore, a national project called the 1bestarinet project was launched several years ago, precisely One of the key targets of the broad national project, 1bestarinet, in December 2011 was to connect 10,000 schools across the country with 4G network infrastructure (IaaS) utilizing cloud- based integrated platform as a service (PaaS). Although the project was reviewed due to infrastructure development issues, this initiative indicates that Malaysia is well aware of the future challenges of education especially to provide integrated

educational technology for all (*IaaS PaaS, SaaS (Explained and Compared)*, 2017). This kind of program or movement to care about the impact of information technology on the younger generation is very important in every country.

2.2.4 Internet penetration among digital natives

In the most recent case regarding literacy in Indonesia, for example, although there has been no specific study on the correlation between the use of information technology and the level of information literacy in Indonesia, the results of a survey on literacy levels conducted by Central Connecticut State University in New Britain in 2016 put Indonesia in 60th place. The 61 countries surveyed (The World's Most Literate Nations study, 2016) should be evaluated to find solutions.

There is an interesting fact that Internet penetration among digital natives in Indonesia is very high, but the literacy rate is still very low. It is evocative to investigate why this contradiction occurs. In other words, it must be investigated why "the same technology can produce a different society" as mentioned by Indonesian library science expert Pendit (2009). Meanwhile the results of a survey conducted by We are Social: Digital 2021 as shown in Figure 2.3 and 2.4 shown that Internet penetration in Indonesia in January 2021 was 202.6 million (73.7 %), mobile connections 345.3 million (125.6%), and active social media users are 170 million (61%) of the 274.9 million total population of Indonesia in 2021, and it is estimated that this number will continue to increase mainly because mobile networks and mobile devices are becoming very affordable.

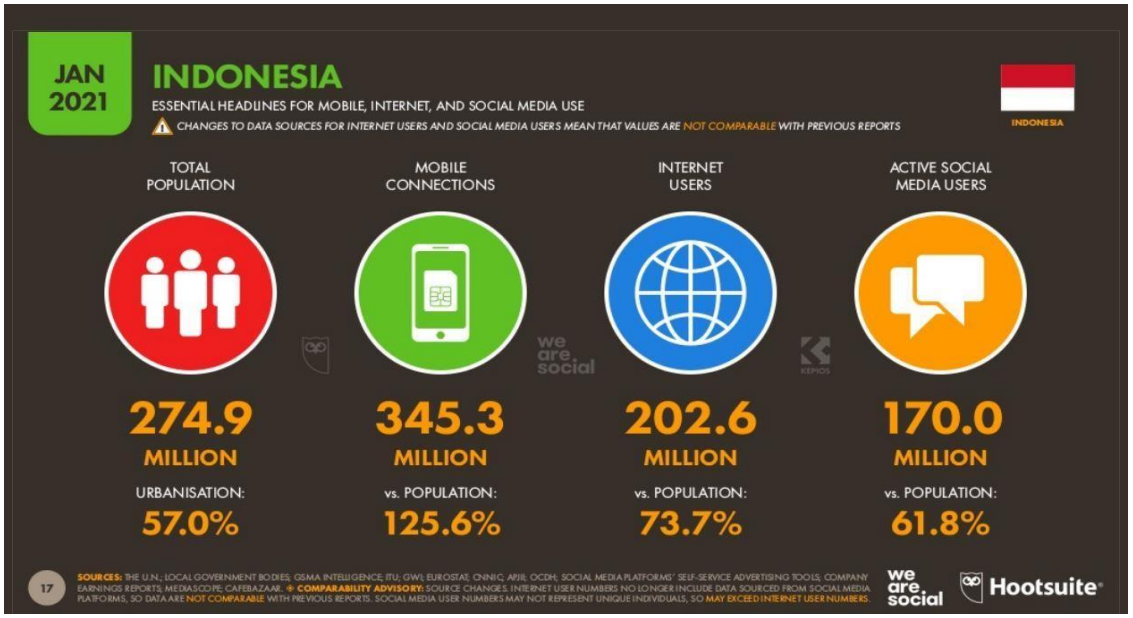

Figure 2.1 : Digital in Indonesia 2021.

This phenomenon of course should also be a lesson for the people and the Indonesian government to ensure that technology has a positive and productive impact on the cognitive development of Indonesia's millennial generation.

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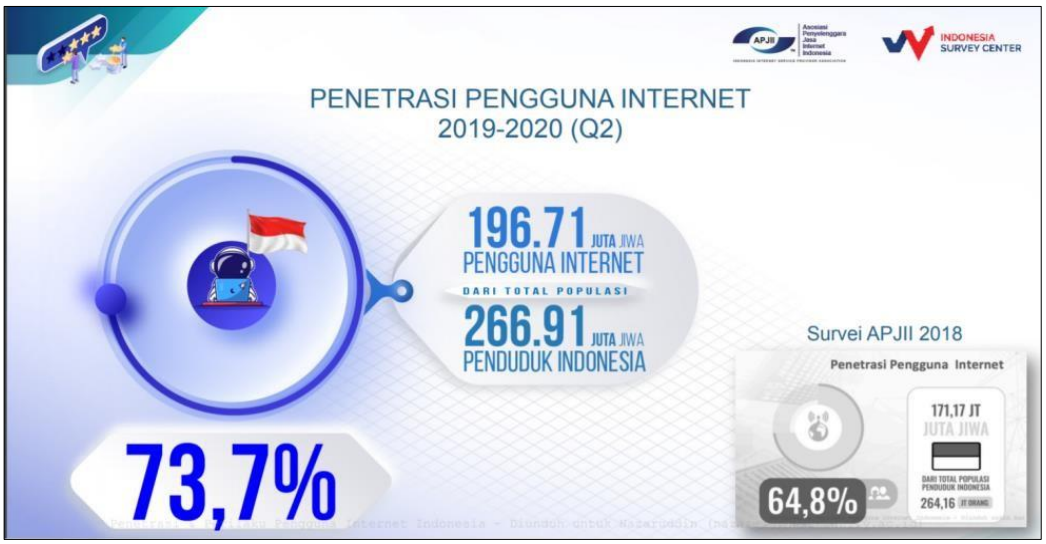

Figure 2.2: Indonesian Internet user penetration 2019-2020 by APJII

Based on the phenomenon of changes in information behaviour described above, it is argued that today information is very widespread and abundant, but knowledgeable people seem to be shrinking. It seems that many are not knowledgeable, only informed. One of the main causes is thought to be due to miss use of technological media. It seems that information is only stored in technological tools such as Google, YouTube, online databases, cloud storage and so on, which can be easily retrieved at any time of need. Thus, the tendency to master knowledge so as to be called knowledgeable people at the real stage through the process of searching, researching, integrating, abusing and applying does not apply. The impression is only the form of individuals and society who are said to be information and communication technology literacy, not to the level of knowledgeable individuals as described by Bender et al., (2016).

2.3 Knowledge Construction

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Knowledge is defined in many ways in the literature, but each definition has context that renders it inapplicable to everyone. As a result, in order to clarify the meaning of knowledge in the context of this study, the researcher refers to various views as follows: Knowledge in principle arises from the individual's head, built up of information that is modified and interpreted by beliefs and values with experience that is relevant to the actions and goals needed by the individual who receive the same information. Thus it is concluded that knowledge is "a mental state of ideas, facts, concepts, data and techniques, which are recorded in the memory of the individual". This is why experts emphasize the importance of distinguishing between data, information and knowledge because the difference is often not clear (Huseman & Goodman, 1998)

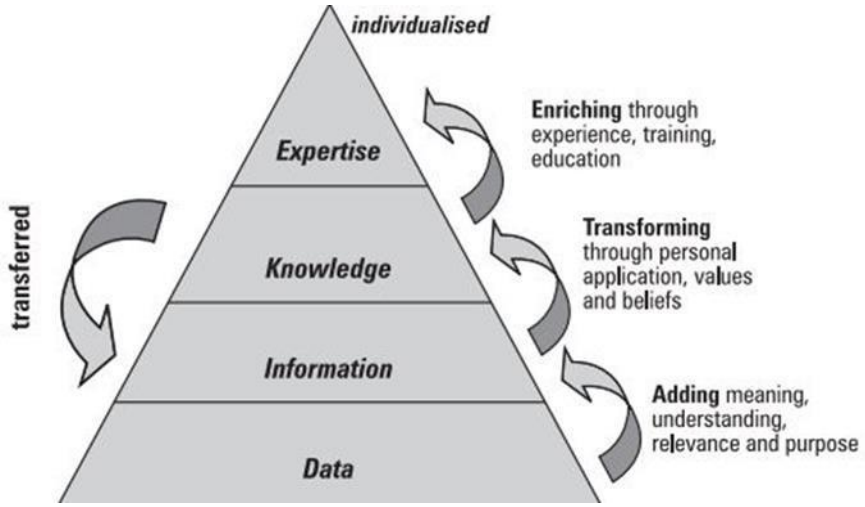

Figure 2.3 Experimental Treatment and Condition (Bender & Fish, 2000)

As shown in the hierarchical figure 2.5, expertise is part of the highest knowledge hierarchy where it is also built from data into information, then into knowledge and finally into expertise. The figure shows that the data are discrete and objective about facts and events; the data do not imply anything about the importance or irrelevance of the data themselves (Bender & Fish, 2000). In other words, data is only an important raw material for constructing information. Furthermore, Huseman and Goodman (1998) also assert that data are objective facts that explain an event that is independent of any judgment, perspective, or context.

By adding meaning and understanding to the data, then information is created that has a form and is organized for several purposes (Wiig, 1994). This view is supported by Druker (1988) who says that information is data that has relevance and purpose. Meanwhile, Huseman and Goodman define information as "data points,

drawn together, put into context, added to perspective and conveyed to people's minds" (1998, p. 105).

2.4 Memory Retention

Memory is a comprehensive concept to describe a number of abilities of a person's brain ranging from storing information to retrieving information when needed. Memory in general has two types, namely short-term memory and long-term memory with three working processes; information coding, information storage and information retrieval (Amin & Malik, 2014). The coding process takes place by learning, understanding and connecting information with past knowledge; the information storage process is the process of maintaining information over time in the individual's brain, while information retrieval is the process of accessing information when needed (Lawless, 2019; Swaminathan, 2020).

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The process of retrieving information or facts that have been encoded and stored is called memory retention. Memory retention is the ability of individuals to recall previously known facts, information and events and to use them as a source of current information (Gordon et al., 2016).

2.5 Digital Literacy

In order to gain an understanding of the major concepts of literacy, a lot has been done. However, with the rapid development of the digital world, the concept of digital literacy must continue to be evaluated and improved. Tracing the use of the

term digital literacy, it was found that the term was first written by Paul Gilster in the title of his book 'Digital Literacy', published in 1997. He defines 'digital literacy as the ability to understand and use information in a variety of formats from a variety of sources when presented via a computer' (Pool, 2007). Then the concept of digital literacy continues to grow along with the development of digital tools for digital culture. In 2011, the American Library Association defined digital literacy as; Digital literacy is the ability to use information and communication technology to find, understand, evaluate, create, and communicate digital information, an ability that requires technical and cognitive skills (American Library Association Office for Information Technology Policy, 2013).

2.5.1 Digital Literacy Competency

Digital culture has required digital citizens to be digitally literate. Digital literacy has become an important skill that is needed not only in an academic context but also in various aspects of people's lives such as in the workplace and other social lives. Then the definition and framework of digital literacy needs to reflect all these aspects. Littlejohn, Beetham, and McGill (2012, p. 547) defined digital literacy as "the skills needed to flourish both inside and outside of the classroom, in an age where digital forms of information and communication are the norm.

Furthermore, in the digital literacy framework developed by La Trobe University Digital Literacies Reference Group (2019), digital literacy is described as several interconnected components which cover; information literacy, data literacy, media literacy and digital identity, communication and collaboration as well as innovation and creativity (Latrobe University). Likewise with the Open University in the UK, they explain a more comprehensive concept of digital literacy which includes communication, collaboration and teamwork, social awareness in the digital

environment, understanding of electronic security and the creation of new information. Both digital and information literacy are supported by critical thinking and evaluation (Baro et al., 2019; The Open University, 2012).

The same was later developed by the Digital Library ECU. They designed the literacy framework by incorporating all of these important digital literacy concepts to meet the digital needs of current and future students and staff at ECU. Then the ECU Library defines digital literacy as 'the ability to use digital technology to access, evaluate, create and communicate information in a socially responsible and ethical manner'. These include elements of information, media and data literacy, digital creation and communication, digital citizenship and identity, digital technology and digital learning (Johnston, 2020).

ALA's Digital Literacy Task Force (2013) defines digital literacy as the ability to use technology to find, evaluate, create, and communicate information, which involves cognitive and technical abilities.In addition, Techataweewan (2018) defines digital literacy as a set of abilities to utilize and monitor information, technology, and digital media to find, evaluate, create, and communicate as needed.

From a series of understandings and concepts of digital literacy discussed above, the concept of digital literacy used as a construct or variable in this study is the concept of Hanyang University. The concept of digital literacy at Hanyang University is based on three main indicators, namely technical literacy, bit literacy, and virtual community literacy. These indicators were developed from the results of a

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comprehensive research conducted by the study team financed by Hanyang University, chaired by Noh (2016).

The definition of digital literacy has changed in the last decade. This is influenced by technological developments and the context of their use. As stated by Kementerian Komunikasi dan Informasi Republik Indonesia (2017), the rapid development of technology must be accompanied by an increase in digital literacy. Several previous studies have indicated this, including Van Deursen et al. (2017), who classified digital literacy into four categories, including operational skills, formal skills, information skills, and strategic skills. There are also Li and Ranieri (2010) and Cartelli (2010) who divide it into three dimensions of digital literacy, namely, technology, cognitive domains, and ethics. In addition, Ustundag et al. (2017) which categorizes technical, cognitive, and socio-emotional factors. Further, Hall, Nix, and Baker (2013), Leu at al. (2013) defined it as the ability to access, evaluate, and create information effectively and critically by combining various digital technologies.

It is necessary to recognize and use that power, to manipulate and transform digital media, to spread it widely, and easily adapt it to new forms. The Digital Literacy Task Force (2013) defines digital literacy as the ability to use information and communication technology to find, evaluate, create, and communicate information, which requires cognitive and technical skills. Ozdemir et al. (2018) define digital literacy as the ability to use digital learning tools, manage digital learning platforms, the ability to use advanced digital tools, and security and ethics.

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From the many definitions and dimensions of digital literacy above, it was found that digital literacy is more focused on technical factors or the ability to use hardware or software. This emphasis on technical aspects will lead to unbalanced digital literacy skills. Digital literacy requires more than just operational capabilities but also requires intellectual intelligence and social ethics (Techataweewan and Prasertsin, 2018). Moreover, the application of digital literacy in an academic context is very important to pay attention to so that technology tools can be used positively and productively as lifelong learning tools.

Based on the above considerations, the meaning and scope of digital literacy is now being refined. For example Maureen et al (2018) and Phuapan et al. (2016) which defines the elements of digital literacy as the ability to define, access, evaluate, manage, integrate, create, and communicate, while Techataweewan (2018) defines digital literacy as a set of abilities to utilize and be aware of information, technology, and digital media to seek, evaluate, create, and communicate as needed. It can be seen here that the notion of digital literacy has been expanded by combining technological literacy and information literacy so that there is a dynamic combination of knowledge, behaviour and skills in the use of digital media.

Along with the development of digital literacy study technology, it is discussed in broader aspects related to learning such as how to find, use, summarize, evaluate, create, and communicate information effectively when using digital technology (Blevins, 2018; Techataweewan & Prasertsin, 2018; Vélez et al., 2017). In other words, having a strong understanding of digital technologies, such as computers,

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software, the Internet, and cell phones, is part of the definition of digital literacy. (Greene, 2018; Somabut & Chaijaroen, 2017).

Digital literacy includes an understanding of the Web and search engines. Users understand that not all information available on the Web is of the same quality; so that the user can gradually recognize which websites are reliable and legitimate and which situations are not trustworthy and the user can select the user's engine that suits his information needs, can use the search engine effectively; for example by using *"advanced search"* (Baro et al., 2019; Hallaq, 2016).

This brief defines digital literacy and describes the ways in which digital literacy activities can be embedded in digital natives' instruction to foster digital literacy competencies. Specifically, this brief addresses four aspects of digital literacy: (1) using basic digital skills, (2) creating and communicating information, (3) finding and evaluating information, and (4) solving problems in technology-rich environments. In digital literacy, the main competencies include: (1) Understanding of digital format and non-digital, (2) Creation and communication of digital information, (3) Evaluation of information, (4) gathering or assembling knowledge, (5) information literacy and (6) media literacy (Davis, & Shaw, 2011).

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2.5.2 Digital Literacy Indicators

The digital literacy evaluation indicators selected in this study were from Hanyang University with the following three categories. This selection was based on two main considerations. First, these indicators proposed by Noh are the latest digital literacy

evaluation indicator. Second, the indicators are also very suitable for assessing the level of digital literacy of students and have been implemented well at Hanyang University. The digital literacy is focused on the digital literacy indicators adopted from Hanyang University.

Table 2.1

Digital Literacy Indicators adopted from Hanyang University (2016)

Categories	Sub-categories	Factors
Digital Literacy Indicators	Technical Literacy	Ability to operate hardware and tools Ability to use Windows Ability to edit documents and use tools Ability to use web browsers Ability to communicate
	Bit Literacy	Ability to search for information Ability to judge appropriate information Ability to edit information Ability to process information Ability to use information
	Virtual Community Literacy	Ability to participate in community Ability to form self-identity Ability to have relationships Ability to problem solve collectively Ability to create cyber culture

2.5.3 Digital Literacy Self-Efficacy

Ensuring that students have confidence in their ability to manage information, starting from selecting information, extracting information, using information by manipulating library electronic information resources is one important aspect for an educator. This concept is known as self-efficacy. The main expert who introduced

this concept is (Bandura, 1986). He previously defined self-efficacy as people's belief in their ability to organize and carry out the actions needed to achieve a goal.

Toha Tohara (2021) defines self-efficacy as "the degree to which students feel able to perform electronic information searches to find relevant sources and information for academic or study purposes"(p. 324).Research findings indicate that faculty influence (Olumide, 2016), frequency of computer use and level of self-efficacy are all factors that influence student use of library electronic resources (Hasanah, 2019; Tang & Tseng, 2017)

In particular, self-efficacy in electronic information retrieval can directly affect students' self-confidence, which in turn affects their learning and achievement. While general study on self-efficacy is essential, study focused specifically on the relationship between self-efficacy for online learning and distance learners' information literacy skills has not received broad coverage. It is important to study the relationship between distance learners 'self-efficacy and information literacy skills to determine the extent to which information literacy skills influence students' self-efficacy for online learning (Rosman et al., 2016).

Digital self-effectiveness in a simple understanding refers to a person's efforts to take actions related to digital tools effectively according to what is needed (no more and no less) to achieve optimal work results on specific tasks (Prior et al., 2016). In this case, digital efficacy is closely related to the efficacy of motivation, self-confidence, friendly manner, and the individual's social environment shows self-confidence in the capacity and ability to manage and control independently.

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Similar understanding, Prior et al. (2016) can also be seen in digital technology self-efficacy. Individuals who have confidence in their ability to fulfil their duties and responsibilities related to new tasks have a relationship with high technology truly efficient in digital.According to Pumptow and Brahm (2020), it is not about one's innate ability but something one can achieve with confidence in one's abilities. Lemon and Garvis (2016) see that individual abilities in digital can change circumstances that affect their lives in a self-efficacy manner.

The study by Shen et al. (2013) demonstrates that every individual with a better sense of control over their lives has a higher quality of life. Likewise, Wang et al. (2013) opined that almost every individual acquires a level of self-automatism in specific jobs and responsibilities. Now, what can we do to improve self-efficacy in digital in the educational environment? The way to increase the level of effectiveness, especially for students (Komarraju and Nadler, 2013), is to get used to completing academic tasks that are pretty challenging and demanding. For example, lecturers may assign students to colleges based on their ability to use digital literacy to complete their college assignments. Another way, according to Hatlevik et al. (2015), is by fostering confidence and prioritizing the interests of students. Next, let the students determine their way of finding solutions. Perhaps the teacher's job is to encourage students to strive for academic efficiency, which is one of the main drivers in achieving academic achievement. In other words, Zee and Koomen (2016) believe that students who are used to their intuitive way usually attribute their failure to a bit of effort so that their little skills will produce little results.

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Meanwhile, students who have very low digital self-efficacy will lack the capacity to succeed in new tasks. Another way, for example, the teacher can do by providing regular and concentrated feedback on each result of their work. So that academic independence is one of the main variables that will determine results in learning achievement (Gültekin et al., 2020). So students who are highly digital self-efficient will attribute their failure to lower effort rather than more inadequate abilities, while students with low self-efficiency attribute their failure to lower skills (Van Dinther et al., 2011).

Moreover, Helaluddin (2019) suggested some ways on how to improve digital technology literacy skills to develop technological innovation among students, including (1) new student selection processes based on information technology, (2) online library management, campus academic systems, (3) journal management electronics, and (4) blended learning or technology-based learning. Another finding from new evidence by Fitryarini (2017) regarding the level of digital media literacy in Communication Science students at Mulawarman University, Indonesia emphasizes that digital media literacy skills among the samples are better than students from other study programs at the same level.

2.6 Theoretical Foundations

Taherdoost (2018) has provided an explanation of adoption theories and models that are presented in full to provide a better understanding of the theory and models of user acceptance of technology and demonstrate how inventors and scholars estimate the level of acceptance that information technology will be achieved. Recognition of

individual needs and acceptance is the initial stage of any business and this understanding will be of great help in finding future ways of development, so that academics are interested in being aware of the factors that drive user acceptance or rejection of technology. A number of models and frameworks have been developed to explain user adoption of new technologies, as well as introduce factors that can influence user acceptance (Rajabion et al., 2019; Taherdoost, 2018).

Technology acceptance models theory have been applied in various domains to understand and predict user behaviour such as choice, diet, family planning, blood donation, women's work orientation, breast cancer screening, choice of transportation mode, turnover, use of birth control pills, education, consumer purchasing behaviour, and computer use. Several studies in the field of technology acceptance develop frameworks for assessing the use of certain developed and applied technologies. A number of models and frameworks have been developed to explain user adoption of new technologies and these models introduce factors that can influence user acceptance such as the Technology Acceptance Model (TAM) (Ofori, 2019).

To provide a complete and clear understanding of the problems involved, more than one theoretical approach is needed. Therefore, a general description of the available adoption models is required for this field. An overview of models and theories of adoption is presented in this study to provide a better understanding of them.The following section will discuss the development of a conceptual research model based on four main theoretical frameworks: Three Dimensional Model (3D), Socio-Cultural Literacy, Information Processing Theory, Technology Acceptance Model, and Transactive Memory Theory.

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2.6.1 Technical Literacy and Three-Dimensional Model (3D)

By its technical name, technical literacy tends to be discussed using work skills related to digital products, such as household tools that are now increasingly widely used (Meyers et al., 2013) For example, Bian and Leung (2015) said that equipment application functions in the office (TV, computers, and supporting equipment). So are the tools that businesses and banks need when they serve their customers and internal staff. For example, the technical use of ATMs for automated self-transactions such as cash, electronic data transfers, and even deposits (Priporas et al., 2017)

Along with the development of digital itself, now all devices have been integrated into a mobile phone through additional functions such as e-banking and digital remote control. All devices are now beautiful with convenient applications, all related to digital techniques. For this reason, Bughin et al., (2017) suggest that correct steps seek to understand the operating tools of technology devices or office work equipment marked with practical instructions or symbols that are very practical for the user of technology with the most straightforward possible technique. So those efforts to send or receive text messages on mobile phones are becoming an increasingly global trend in technical digital literacy and usage intelligence (Rahmah, 2015).

The three-dimensional or '3D' model is a concept for understanding digital literacy competencies and guiding curriculum design developed by Bill Green and Beavis

(2013). The initial purpose of the model was to look at writing across school subjects, and it 'has been applied in various contexts, including drama, ESL, mathematics, numeracy, ICT, English, and media studies. In this model, digital literacy is defined as a holistic, integrated concept consisting of three interconnected dimensions: operational, cultural, and critical.

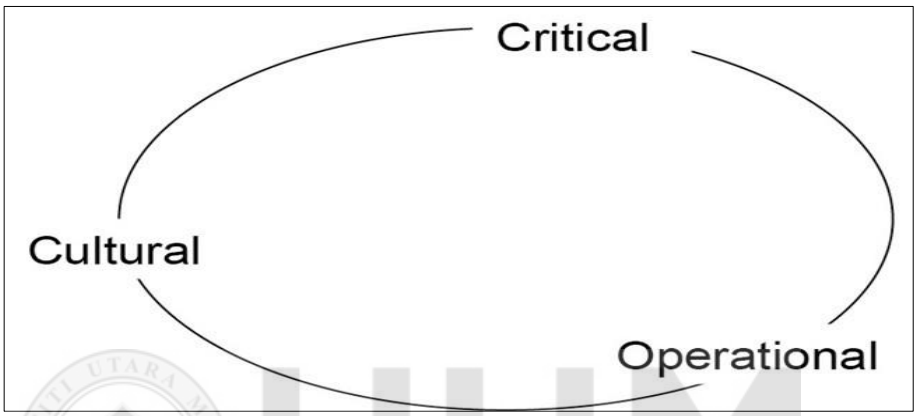

Figure 2.4 The 3D model and its dimensions by Bill Green and Beavis (2013)

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This concept implies that the three dimensions should be seen as a unified integrity. A comprehensive approach to digital literacy must take into account all dimensions, with no priority given to one over the other. As part of the operational dimension, competency is required not only with the 'tools' but also with the procedures and techniques involved in handling the task proficiently. Having a good understanding of how to read and write effectively in various settings, including online ones, are crucial in order to work in the operational dimension. This dimension may also include 'functional' capabilities such as the ability to operate electronic devices, to use Microsoft Office to edit documents, to use a web browser, to send email, or to upload videos to YouTube (Green & Beavis, 2013).

Likewise with the cultural dimension, he is not limited to having the ability to understand programming languages in the context of technology but also being literate towards "social meaning" in a cultural context. In other words, people who are digitally literate never only read in a neutral sense, but always read something in a certain way, situated in a certain context and discourse, or a way of seeing the world. It shapes the way we read and make meaning (Green & Beavis, 2013).

Furthermore, Teachers can help students develop authentic opportunities by creating authentic experiences that are connected to their everyday lives, experiences, and knowledge, rather than decontextualized exercises and skills, or the unhelpful list of school-type digital literacy skills noted above. The cultural dimension is a reminder of aspects that are more difficult to understand such as meanings, values, motivations, desires, beliefs, ideologies that are integrated into one action, situation, and relationship that aims to create a specific identity, and digital literacy identity.

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Finally, the critical dimension begins with the realization that "all literacy is socially constructed, that is, created or created through social activities". As a consequence, they are also partial or selective, including some types of knowledge, ways of thinking, and representations while excluding others. A critical perspective looks more at how some forms of literacy are dominant, or more powerful, than others in particular contexts. The emphasis on critical aspects helps educators and students to think about the implications of dominant and marginal digital literacy use, as well as to ensuring that all persons and groups can participate, produce meaning, and modify and remake social practices (Green & Beavis, 2013).

2.6.2 Bit Literacy and Information Processing Theory

Bit Literacy is the ability to evaluate and judge the credibility of various information distributed through digital networks, select, edit, process, and convert it to the knowledge (Noh, 2016). A simple understanding of bit literacy related to the capacity to utilize information, including information retrieval, information awareness, information editing, information processing, and information use, is an exciting study in the realm of language literacy and digital skills. The study of specific elements of this bit literacy shows that a person's capacity to process data is highly related to behaviour, followed by affirmation, information editing, community analysis, document editing, and the use of instruments to create cyberculture" (Noh 2016). Another understanding is that acquiring the necessary skills for the healthy and efficient use of technology is bit literacy (Kaufman, 2013; Prensky, 2008). The more a person is technologically dependent, the more valuable the literacy he acquires, the more excellent his skills.

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Information Processing Theory

Information Processing Theory (IPT) is a theory that explains how the process of encoding information in human memory starts from the process of filtering information from what is drawn first to what is stored in short-term memory, then to what is in working memory, and finally to our long-term memory. In the 1950s, George A. Miller developed a framework for understanding information processing and cognitive psychology in general. The first concept is `chunking' and short-term (working) memory capacity. According to Miller (1956), the short-term memory is only able to store up to five to nine chunks of information (plus or minus two). Several types of pieces can be used, such as numbers, words, chess positions, or

faces of people. All future memory theories are based on chunking and short-term memory limits. As Miller compares the human brain to a computer, it takes in input, processes it, changes its form and content, stores and places the data, then generates a response to it. So it is clear here that, information processing includes the collection and presentation of information, or coding; information holding or retention; and obtains information when needed or retrieval.

Information processing theory proposes that memory is divided into three categories: the sensory register, which stores all sensory information, the working memory, and the static memory. Second, short-term memory (STM), which is also often called working memory. The STM serves as a temporary storage area for new information until it is lost or entered into long-term memory. The third is long-term memory (LTM). In LTM, data can be stored in an unlimited amount of capacity and can be retrieved at any time (Miller, 1956).

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According to this theory, to code information effectively, it is important to ensure that the material is meaningful and that prior knowledge is activated. Strategies to aid coding include chunking (breaking down information into manageable chunks), rehearsal, imagery, mnemonics, schema activation, and processing levels.

Since the advent of computers in the 1950s, Information Processing Theory is known as the computer analogy, namely the use of computers as a tool to compare the human brain with computers in handling information. Information 'input' is what we provide to our computer - or our brain - while short-term memory is what the CPU stores and long-term memory is what the hard drive stores (Lawless, 2019). The

imputing process is the process of entering information into a computer as if it were to our brain - CPUs can be compared to our shortterm memory, while hard drives can be compared to our long-term memory. It is comprised of three main stages: encoding, storage, and retrieval (Lawless, 2019). For example, visual information that the eye receives is then a neural activity is encoded in electrical signals, which are transmitted back to the brain where it is "stored" and "encoded". This information can be used by other parts of the brain related to mental activities such as memory, perception and attention. This cognitive process filters information, decides what is important enough to be 'stored' in our sensory memory to our short term memory, and finally to encode it into our long term memory. These cognitive processes include thinking, perception, remembering, recognition, logical reasoning, imagination, problem solving, our sense of judgment, and planning (Lawless, 2019).

Nonetheless, Mcleod (2008) argues that the analogy between human cognition and computer functioning adopted by the information processing approach is limited. According to him, a new computer can be considered as an information processing system if the computer can 1) combine the information presented (2) Most computers have centralized processors with restricted capacity, and it is usually presumed that volume restrictions affect the human attention system, but (1) a parallel processing capability is present in the human brain (Mcleod, 2008).

Memory is closely related to the learning process, which is concerned with acquiring skills or knowledge. Memory is also a representation of the learning that has been obtained. In the process of memory formation and learning, various parts of the brain

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are involved. Therefore, memory performance is strongly influenced by a person's mental and physical factors.

In everyday life, new information received will be stored and maintained in the brain, and will only be recalled when needed. This happens because the brain is capable of learning new skills, storing learned information, and using what it has stored. This ability to store and reuse experiences and skills is informally known as the human memory system. This human memory is a source of impetus for the birth of one's actions or thoughts. It is the seed for the growth and development of a person's cognitive function (Amin & Malik, 2014).

Unfortunately, due to the complexity of the human brain system, neuroscientists have only uncovered some cognitive and mental activities in select parts of the human brain. They have not succeeded in finding the location of certain memory storage areas in the human brain and also have not found the exact location to know what kind of memory that was there (Amin & Malik, 2014; Steffes & Duverger, 2012).

Some of the research findings related to IPT are: (1) Exercise helps to prevent knowledge from being lost from short-term memory. Most children do not begin practicing independently until they are around seven years old; (2) breaking down information into chunks makes it easier to remember; (3) meaningful learning occurs when students connect new information to previous ideas and experiences; and (4) visual images are easier to remember than abstractions.

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Some of the implications are: (1) Generally young adolescents can benefit from being taught exercise techniques; (2) Teachers must serve as learning mediators by linking new information with students' cultural knowledge and help students learn; (3) Teachers must present material in logical chunks and teach students how to organize information on their own.

2.6.3 Virtual Community Literacy and Socio-Emotional Literacy Theory

Virtual Community Literacy is the ability to participate in community to form self-identity, to have relationships, to solve problem collectively and to create cyber culture (Noh, 2016). The concept of online learning in college continues to increase in popularity. Many universities want to provide students with contemporary and flexible educational options and provide interactive learning experiences in attractive virtual classrooms. While digital education is a person's capacity to connect and learn scientists and practitioners need to understand how this dynamic transformation is managed (Bates, 2015).

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A simple understanding of the community literacy is "a social environment that continues to change rapidly between social interactions, partnerships, and collaborations that involve speaking, understanding, reading, thinking, and conveying thoughts in writing" (Meyers et al., 2013). Along with the presence of technology, the association of the digital literacy community has now become multi-system, real and virtual. According to Tang and Chaw (2016), digital community literacy skills can make a person able to transform literacy activities through digital technology devices. Since then, the digital literacy community is no longer limited. So the skills and opportunities to be active in the virtual community are increasingly

widespread and complex. Tohara (2021) concludes that this virtual nature literacy community is an important advance in developing reading, writing, arithmetic, and other scientific disciplines compared to the era before the virtual community came into existence.

Socio-Emotional Literacy Theory

Basically, socio-emotional literacy theory is a branch of media literacy. This theory emphasizes the ability, not only to share formal knowledge but also to understand the emotional aspect through visual communication. Briefly, socio-emotional digital literacy theory can be defined as the ability to engage on an emotional level in a non-face-to-face environment (Koc & Barut, 2016)

As society is increasingly dependent on technological devices, especially in the aspect of digital communication, socio-emotional digital literacy is becoming increasingly important. It is very important for the community to understand and maintain ethics in cyberspace so that they are not trapped by deception and avoid attacks by dangerous viruses deliberately distributed in cyberspace. More specifically, this competency is very important to be taught to students, they are very intensive in communicating in cyberspace, even from an early age. Many students access information without being aware of the background, context or responsibility that accompanies many technologies tools they use on a daily basis (Komlayut & Srivatanakul, 2017).

According to The Center for Media Literacy's MediaLit Kit (2011), when critically analysing media, there are five key questions to ask in the process: Who created this

piece of media? What are the techniques used to attract my attention? How might different people interpret this piece differently than I do? What lifestyles, values, and points of view are expressed in this piece of media? Why is this piece of media being produced?

2.6.4 Digital Technology Acceptance (DTA)

Technology Acceptance Model (TAM) was developed by Davis (1985) to determine computer acceptance by focusing on the use of email technology among organizational staff. Until now, TAM has been widely used in research related to technology adoption. TAM is an adaptation of Theory of Reasoned Action (TRA) which was founded by Ajzen and Fishbein (1975). TRA says that an individual's beliefs about technology will influence attitudes. Attitudes will shape individual desires and attitudes towards technology (Ajzen and Fishbein, 1975). In the TAM framework, An individual uses a technology when he or she desires to do so. A person's attitude toward technology contributes to this desire. Attitude formation often starts with hypothesis that technology is user-friendly and useful.

The concept of usefulness refers to how much people believe that using technology will increase their performance, whereas the concept of ease of use refers to how much people believe that using technology will make their work easier (Davis et al., 1989). Davis found that there are external variables that will stimulate the formation of a person's perception of a technology such as organizational factors, individual factors and technological systems. This TAM theoretical framework can be explained through Figure 2.7.

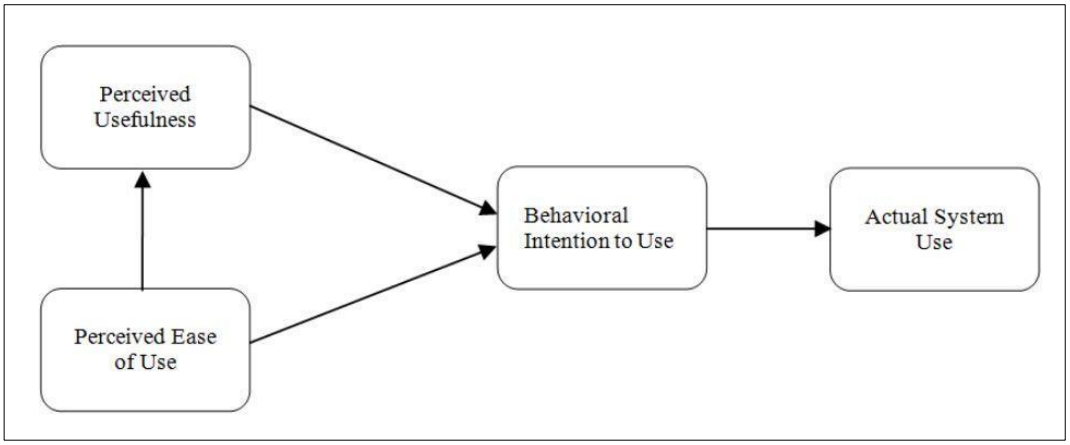

Figure 2.5 Technology Acceptance Model (TAM). Source: Davis (1989).

Perceived definition is defined as the extent to which a person believes that using a particular system will improve his work performance (Davis, 1985, p. 320). The use of technology acceptance models has shown that perceived use and use are determinants of acceptance and use (Davis, 1985, 1989; Ofori, 2019; Park, 2009). Previous research has also shown that perceptions of use influence, either directly or indirectly, a person's behaviour through perception (Davis et al., 1989; (Jackson and Moreland, 2009). Since its inception, much attention to technology acceptance models has detected models for cooking technology. and making comparisons between specific technology user groups (Dehgani and Jafari Navimipour, 2019; Duke and Montag, 2017; Navimipour et al., 2018).

Previous research has also shown that perceptions of ease of use affect, both directly and indirectly, one's behavioural intentions through perceptions of usability (Davis et al., 1989; (Jackson and Moreland, 2009). From the beginning a great deal of attention has been paid to the technology acceptance model as a model for evaluating technology and making comparisons between specific technology user groups (Navimipour et al., 2018).

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In the study context, the concept of digital technology acceptance is operationalized based on the main principles of the technology acceptance model which focuses on the use of digital technology in an academic perspective. A number of studies using technological acceptance models have shown that perceptions of ease of use and perceptions of usability are determining factors of acceptance and use (Davis, 1989; Ofori, 2019; Olumide, 2016).

2.6.5 Digital amnesia behaviour and Transactive Memory Theory

Wegner (1987) described the transactive process as much like human memory. The process of developing a transactive memory system occurs in three stages: encoding, storage, and retrieval. As stated by Wegner (1987) "this process is transactive, meaning it is updated as members exchange information" (p. 187).Alosaimi (2016) studied how smartphone addiction among digital nativeshas given a new looked to students, both universities and schools. Proving his study, he reported 27.2% of survey participants spent more than 8 hours using their smartphone a day. Because of using tablets, at least 43 % experienced a reduction in hours of sleep and experienced a lack of energy the next day. 30 % have an unhealthy lifestyle (eating more fast food, gaining weight, and exercising less). This is an example, among other aspects, of how the technology adoption model affects technology consumers rather than amnesia and cognitive disabilities.

2.6.5.1 Encoding

The coding stage is the stage of introducing teammates to get information about the knowledge domain of each team member. Sometimes this domain of knowledge can

emerge through “who did what” or “who knows what” conversations, or even through direct instructions such as by telling teammates to remember certain information. There may also be discussions and negotiations about where and in what form to store information in groups (Wegner, 1987).

The development of this transactive memory is largely determined by the encoding process. Coding occurs through interactions between teammates: through sharing knowledge and seeking information from other team members, teammates learn the expertise of each team member as an important first step towards specialization. These experts are then responsible for continuously coding new and relevant information in their knowledge domain (Wegner, 1987).

2.6.5.2 Storage

The storage stage is the stage of storing information relevant to the expertise of each member. With transactive memory storage, team members only need to remember information in their domain of expertise, and remember what other members' skill domains are in the future (Wegner, 1987).

2.6.5.3 Retrieval

Retrieval is the stage of retrieving information from another member's domain of expertise. Retrieval can be started by asking other members to tell who is an expert in a particular field and then connecting them with that expert after a series of consultations. If the linked domain is able to provide accurate and useful information, the relationship will be stronger. But if not, then the coding stage is re-entered in such a way that information about knowledge inaccuracies given by a

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particular member is re-encoded and stored in the transactive memory system (Wegner, 1987).

Transactive memory was further developed by Diane Liang and her colleagues into the realm of workgroups. In this work, the development of transactive memory was conceived as a way to improve group performance when engaged in interdependent tasks. After this extension, transactive memory became more productive in organizational behaviour among other disciplines(Hu et al., 2019; Liang et al., 1995).

2.7 Conceptual Framework

A conceptual framework in a study is a diagram of a series of relationships between certain factors that are believed to influence or deliver to a desired condition. A good conceptual model shows an approximate relationship between factors affecting target conditions or dependent variables (LinkarLSM, 2019). Figure 2.8 shows the conceptual framework of the influence of digital literacy and the acceptance of digital technology on digital amnesia behaviour.

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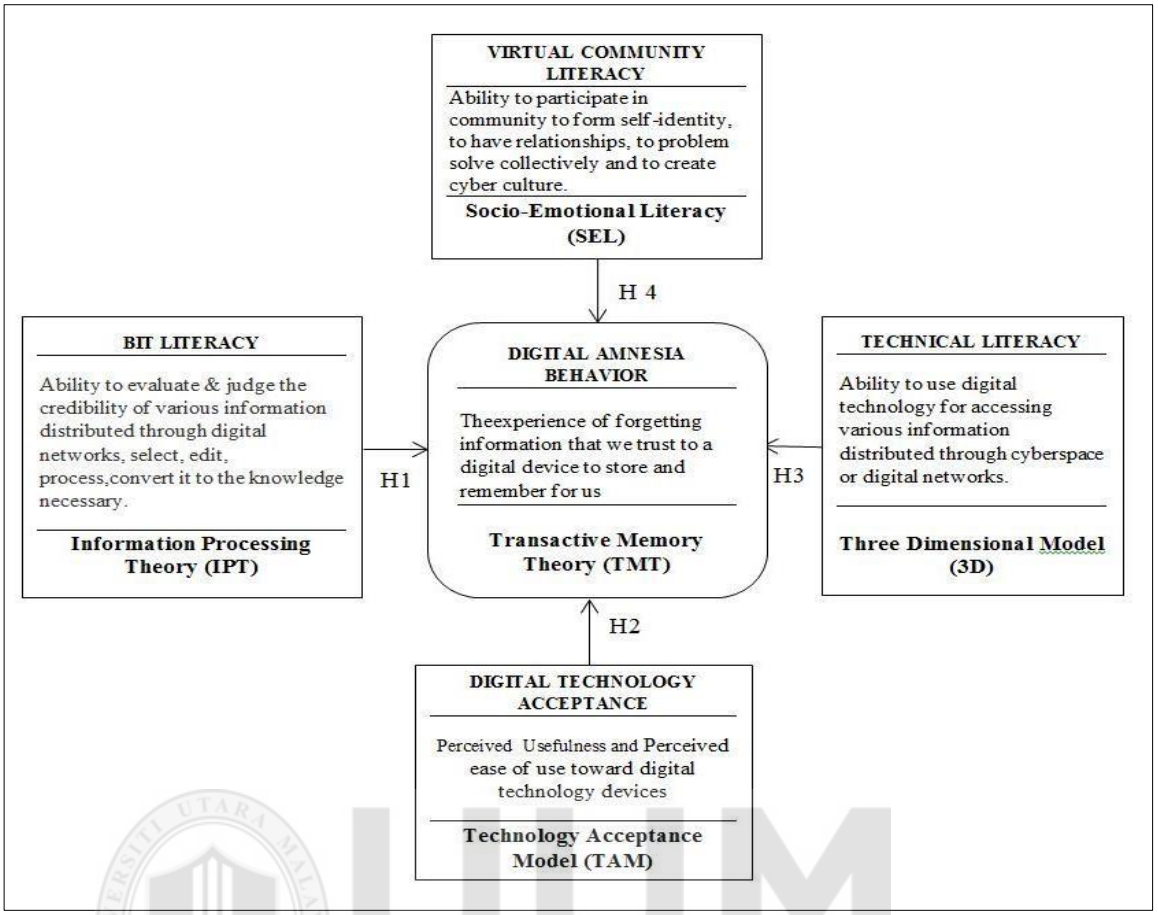

Figure 2.6 Conceptual framework

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2.8 Chapter Summary

This chapter has discussed the background and problems that led to this research. It cannot be denied that the presence of the Internet and mobile digital devices has provided efficiency and effectiveness in almost all human activities. Furthermore, the efficient and effective use of digital technology today does not only change the way we live and work; it also changes the way people think, learn, behave and remember. Changes in information behaviour occur globally, both in developed and developing countries. The phenomenon of digital amnesia, Google effect and nomophobia are considered common in the digital era, including by university students. They sometimes prefer quantity over quality of information. Quick access to information

sources anytime and anywhere is a necessity. Digital devices have really become part of extending themselves to store and remember information.

On the other hand, many studies revealed that high intensity of use of digital technology devices poses a separate threat to humans, especially long-term effects, so this issue has become the focus of research by cognitive neuroscientists, psychologists, and many others in the last decade. Considerable attention is paid to the potential effects of reliance on digital technology devices on brain development, behaviour and cognitive especially among young people.

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CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discusses the overall framework of research implementation which includes population and sampling, research design, research, research instruments, research data collection, measurement of research variables, and analysis of research data.

3.1.1 Research Population

The population of this study are students of Universitas Islam Negeri (UIN) Ar- Raniry Banda Aceh-Indonesia who have been registered for the 2018/2019 academic year.There are several reasons why this university was chosen. First, UIN Ar-Raniry Banda Aceh is the largest Islamic university in Aceh so it has a large population. Second, this university has technological facilities and has implemented it in the learning process.Third, the researcher is one of the lecturers at this University, and so he has experience in observing the state of the population. Fourth, the data collection process is easier to do because colleagues can help, especially in distributing survey questionnaires.

The table below illustrates that in this study, there are three studies were conducted. The first study aimed to identify and understand student perceptions of Internet dependence behaviour. This second study aims to examine the effect of Internet dependency on memory retention and knowledge construction. The third study was conducted using a survey method. This study aimed to further investigate the effect

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of digital literacy self-efficacy levels and students' acceptance of digital technology on digital amnesia.

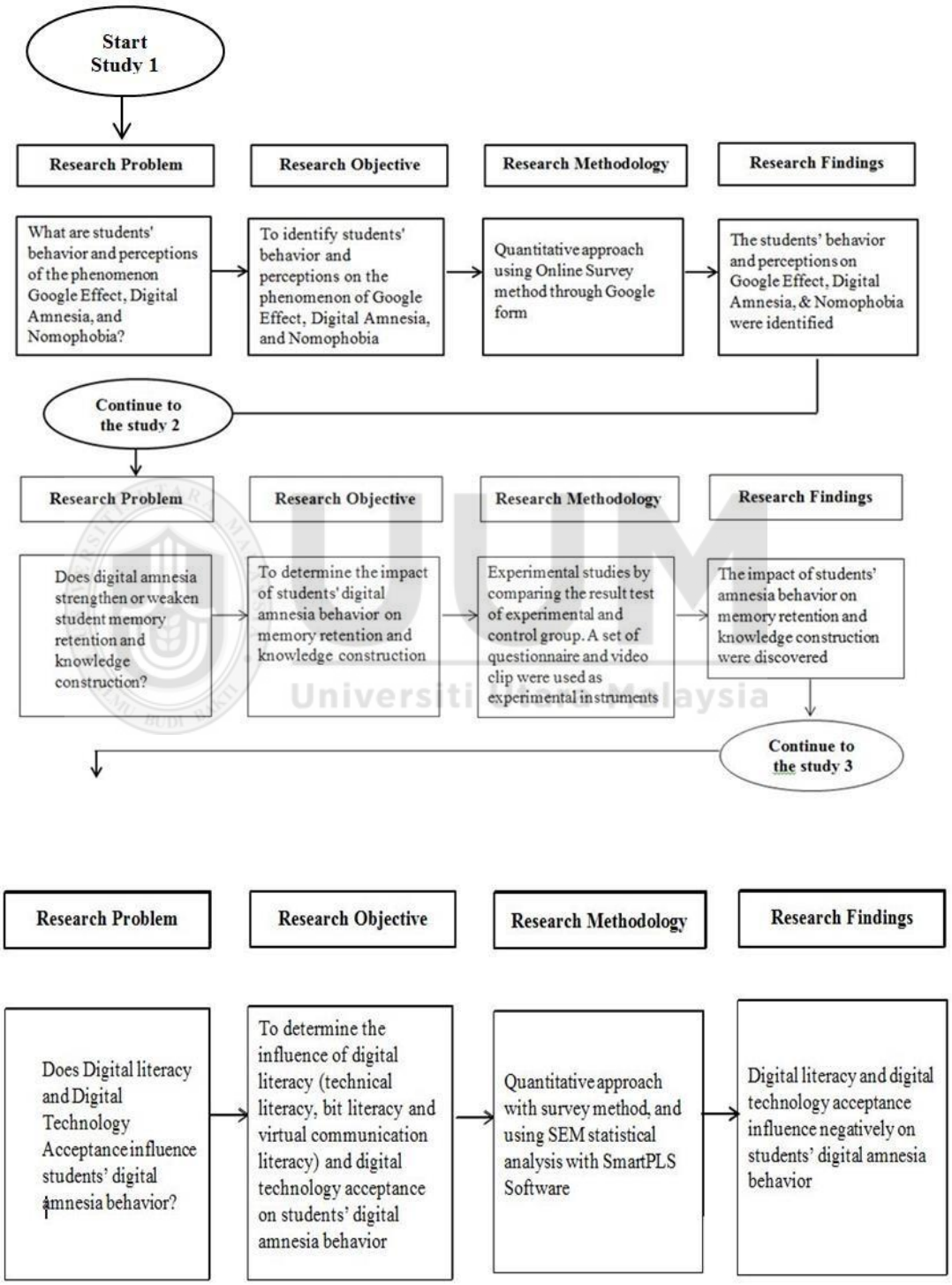

Figure 3. 1 The overall framework of research implementation

3.1.2 Study 1

The first study was conducted using a quantitative approach through an online survey via Google Form. The samples in this study were 110 new students who enrolled in Library Science Department at Universitas Islam Negeri Ar-Raniry Banda Aceh in the 2018/2019 academic year. This study intended to identify digital amnesia behaviour among students at the Universitas Islam Negeri Ar-Raniry Banda Aceh.

3.1.3 Study 2a and 2b

The second study was also carried out with a quantitative approach but with an experimental method. The experimental approach is one of the approaches to quantitative study methods. According to Creswell (2012), the experimental method is suitable for studying the relationship between the independent and dependent variables. In other words, experimental study is a study that aims to see the impact of certain treatments on something (Sugiyono, 2010).

A recent review conducted by Mills (2016) focused on several studies examining the possible effects of Internet use on cognitive processes, concluding several points, including that not many experimental studies have analysed the impact of Internet use on cognitive development (George & Odgers, 2015; Mills, 2016) (George & Odgers, 2015; Mills, 2014). The purpose of study 2a and 2b is to determine the effect of digital amnesia behaviour on university students' memory retention and knowledge construction.

3.1.3.1 Sample of Study 2a and 2b (Experimental)

According to Sugiyono (2017), the sample is a subset of the population's size and features. As a result, the population samples taken must be properly representative.. A representative sample is a sample that can truly represent the entire population. Samples can be drawn from any population if there is homogeneity in the population; however, to ensure that the study's results are relevant for each individual in the population, the sample must represent every heterogeneous component of the population.

Furthermore, Arikunto (2006) explains that experimental study requires a population that has relatively homogeneous variations. This is intended to make it easier to take samples and determine the treatment to be given. According to him, we can conduct sample study if the subjects in the population are completely homogeneous. If the subject population is not homogeneous, then the conclusion should not be applied to the population.

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To obtain a homogeneous sample as described above, the sampling of this study was carried out in stages through the following process.

1) In the first process, 110 people were taken randomly from the total population, 630 students enrolled in the Library Science Department at the Ar-Raniry State Islamic University (UIN) Banda Aceh. The 110 participants are students who took part in study 1 (study to identify students' perceptions of Internet dependence). In the second stage of the process, researchers took

40 participants randomly from 110 participants who were identified as having a high dependence on the Internet for the experiment.

2) The 40 selected participants were then divided into two groups, namely the control group and the experimental group. This grouping process was carried out by taking lottery numbers. Participants who received odd lottery numbers were used as the control group, and participants with even lottery numbers as the experimental group.

Moreover, it is necessary to explain why students majoring in Library Science are sampled in the first and second studies. First of all, they are digital natives by age; secondly, they offer a strong scientific perspective on this research.Thirdly, they are the researcher's students, making it easier for the data collection process.

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3.1.3.2 Research Design

This study uses a true-experimental with a post-test-only control group design. This called true experimental design in this way, the researcher can control every external variable that influences the experiment's outcome. Thus, the internal validity is high. The purpose of true experimental according to Krass (2016) and (Suryabrata, 2011) is to investigate the possibility of a causal relationship by applying the treatment and comparing the results with the control group that was not treated. True experiments have the main characteristic that the samples used for experiments and as a control group are taken randomly from a certain population.

In this design, there are two groups, each of which is selected randomly (R). The first group was given treatment (X) and the other group was not. The effect of the treatment is (O1:O2). This study chart is as follows.

R	X	O1
R		O2

In this study, the effect of the treatment was analysed by different tests using t-test statistics, treatment is significantly different from the control group if there is a significant difference between them (Anwar Hidayat, 2012). The result measurement technique was carried out with a group comparison system between groups (Creswell, 2012).

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3.1.3.2.1. Study 2a: Memory Retention Experiment

The memory retention test in this study has two main objectives. First, to test student's memory retention to recall previously known facts and information with their own mind or memory. The facts and information tested in this study were 20 easy and basic questions about knowledge of Islam and general knowledge. The second objective was to measure the tendency of students to use the Internet to answer these questions when allowed.

3.1.3.2.2. Study 2b: Knowledge Construction Experiment

The construct used to test the construction of knowledge in this study is a combination construct of two construction models, namely; from The 21st Century Knowledge Construction by The Washoe County School District and Knowledge Hierarchy by Bender and Fish (Bender and Fish, 2000). The Washoe County School District has the following four aspects of knowledge construction testing:

Description:

Interpretation : Drawing conclusions beyond the literal meaning

Analysis : Identifying the relationship among the part of whole

Synthesis : Identifying the relationship between two or more ideas

Evaluation : Assessing the quality, credibility, or importance of data, ideas, or events

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Treatment and Condition of Experiment Process

Table 3.1 shows the treatment and condition of knowledge construction experiment's process.

Table 3. 1

Treatment and Condition of Experiment Process

GROUP	TREATMENT	CONDITION
CONTROL	Each students was asked to answer 4 questions based on the video clips that have been watched as stimuli	Students are not allowed to use electronic devices in any form either smartphones, tablets, laptops or others. The maximum time given to answer the questions was 20 minutes

EXPERIMENT	Each student was asked to answer 4 questions, using the video clips that have been watched as stimuli.	If necessary, students are allowed to use electronic devices in any form either smartphones, tablets or laptops, the Internet and also PCs available in the experimental room. The maximum time allotted to answer the questions was 20 minutes

3.1.3.3 Experimental Stages

1) The researcher prepared a 5-minute video clip about world-famous brands consisting of four categories, namely; automotive, apparel, sports and technology applications.
2) The researcher prepared two rooms which were facilitated with a projector and a monitor screen to watch the video.
3) Researcher divided participants into two groups randomly by asking participants to take one of the colour cards that have been prepared.
4) The researcher asked participants with the same colour to enter the designated room
5) The researcher briefly explained to the experimental participants that they would watch a 5-minute video clip.
6) After watching the video, the researcher distributed the question sheets and asked the participants to answer the four questions that had been prepared.
7) After the time is up, both groups were asked to submit their answers to the researcher
8) The researcher evaluated the assignment through the standard rubric that has been prepared in the 21st Century Competencies A Guide to Planning

Instruction for 21st Century Learners issued by The Washoe County School District (See Appendix 14).

3.1.3.4 Evaluation Rubrics

A rubric is a standard measurement tool and among the popular definition is proposed by that has been popularly used among Andrade which is "a document that articulates expectations for a task by listing criteria, or what counts, and describing levels of quality from very good to weak" (Andrade, 2021). For the objectivity of the assessment in this study, the researcher also created rubrics with the measurement objectives for each experimental test using RubiStar, which is a free online tool to help educators create quality rubrics (Andrade, 2021).

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The RubiStar model rubric construction was chosen because of several advantages, including; easy to construct because tables and examples are provided It also provides a variety of themes that can be modified according to the researcher's needs.As mentioned above, the assessment indicators used in the rubric for the experimental test of knowledge construction testing are adopted from the Knowledge Hierarchy by Bender and Fish Model (Bender and Fish, 2000) with 4 value categories, namely 1 (weak) to 4 (Very Good).

Table 3. 2

Rubric for Evaluation Knowledge Construction Test (Control)

CATEGORY	Very Good 4	Good 3	Fair 2	Weak 1
ANALYSIS Identifying relationships between video clips	Students were able to list all the main points that appeared in the video clip.	Students were able to list some of the main points that appeared in the video clip	Students were able to list some points that appeared in the video clip but were not important.	Students were unable to accurately list the important points or information that appears in the video clip.
INTERPRETATION Drawing conclusions beyond the literal meaning of the video clips	They only use 1-3 sentences to explain clearly about the video clip.	They used a few sentences to accurately describe what the video clip was about	Students summarized most of the video clips accurately, but have a few misunderstanding s	Students had great difficulty in summarizing the video clips.
SYNTHESIS Identify relationships among the many ideas in a video clip	Students could remember some details for each main point of the video clip in sequence	Students could remember some details for each main point of the video clip, but not sequentially	Students could remember some details for each main point of the video clip, but not with accuracy.	Students could not remember some details for each main point of the video clip
EVALUATION Assess the quality and credibility of the information sources used (Emotional response to the video clips	Students include 4 or more high-quality sources used	Students included 2-3 high-quality sources.	Students included 2-3 sources but some of them were of questionable quality.	Students entered less than 2 sources

Note: *Not allowed to use the Internet for additional information*

In principle, the rubric for testing knowledge construction and the experimental group is the same, only the treatment is different; where in the experimental group, the rubric also evaluates the use of the Internet, if it is used as additional information in the knowledge construction process.

Table 3. 3

Rubric for Knowledge Construction (Experiment Group)

CATEGORY	Very Good 4	Good 3	Fair 2	Weak 1
ANALYSIS Identifying relationships between video clips	Students were able to list all the main points that appeared in the video clip.	Students were able to list some of the main points that appeared in the video clip	Students were able to list some points that appeared in the video clip but were not important.	Students were was unable to accurately list the important points or information that appears in the video clip.
INTERPRETATION Drawing conclusions beyond the literal meaning of the video clips	Student only used 1-3 sentences to explain clearly about the video clip.	Student used a few sentences to accurately describe what the video clip was about	Students summarize most of the video clips accurately, but have a few misunderstandings	Students have great difficulty in summarizing the video clips.
SYNTHESIS Identify relationships among the many ideas in a video clip	Students remembered some details for each main point of the video clip in sequence	Students remembered some details for each main point of the video clip, but not sequentially	Students could remember some details for each main point of the video clip, but not with accuracy.	Students could not remember some details for each main point of the video clip
EVALUATION Assess the quality and credibility of the information sources used (Emotional response to the video clips	Students include 4 or more high-quality sources used from Internet	Students include 2-3 high-quality sources from Internet	Students included 2-3 sources but some of them were of questionable quality	Students enter less than 2 sources

Note: *Allowed to use the Internet for additional information*

3.1.4 Study 3 Influence of DL and DTA on DAB

A major study of this study is study 3, but it is also interrelated with study 1 and Study 2. Study 3 seeks to investigate the relationship between digital literacy (DL)

self-efficacy, and digital technology acceptance (DTA) on respondents' Digital amnesia behaviours.

3.1.4.1 Sampling Techniques

Sample sizes for categorical data can be calculated using various sampling methods and formulas. The more complex the model, the more the sample size is required Kline (2011). Table 3.4 shows the minimum sample size recommended by Cohen (1992). According to this formula, the sample size is determined by the number of arrows. Referring to this formula, the minimum recommended sample size with four arrows pointing at the construct that this study has is 65 (Faul et al., 2007, 2009).

Table 3. 4

Sample Size Recommendation in PLS-SEM for a Statistical Power of 80 %

Maximum Number of Arrows Pointing at a Construct	Significance Level											
	1%				5%				10%			
	Minimum R^2				Minimum R^2				Minimum R^2			
	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75
2	158	75	47	38	110	52	33	26	88	41	26	21
3	176	84	53	42	124	59	38	30	100	48	30	25
4	191	91	58	46	137	65	42	33	111	53	34	27
5	205	98	62	50	147	70	45	36	120	58	37	30
6	217	103	66	53	157	75	48	39	128	62	40	32
7	228	109	69	56	166	80	51	41	136	66	42	35
8	238	114	73	59	174	84	54	44	143	69	45	37
9	247	119	76	62	181	88	57	46	150	73	47	39
10	256	123	79	64	189	91	59	48	156	76	49	41

However, this study prefers a larger sample size, 375 students with some considerations which are also supported by the literature. A hypothetically larger sample size leads to more accurate or representative results (Kim, 2013). A higher

sample size allows the researcher to increase the level of significance of the findings, and increasing the sample size tends to reduce survey bias so that it is expected to reflect the behaviour of the whole group (Hamdollah & Baghaei, 2016).

3.1.4.2 Survey Research Design

This study design uses a survey approach. This is based on several considerations. Survey research design is the most popular procedure in quantitative study used in the field of education (Creswell, 2012). The survey design also offers a more practical and economical way to collect data from large populations. By enabling surveys to samples or to large populations, researchers can describe attitudes, perceptions, behaviours, or characteristics of the population more accurately (Creswell, 2012).

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In this study, the survey was conducted to describe trends in student behaviour and perceptions. The researcher sent a questionnaire to them, analysed the results, and drew conclusions about the phenomenon of Internet dependence among students and their perception of the phenomenon. This study designed a set of survey questionnaires consisting of five parts, and each part consisting of six questions. Part A contains questions about Digital Technology Acceptance (DTA) such as personal experience, motivation and the positive attitude toward using technology. Part B details questions about Technical Literacy (TL), related to self-efficacy in operating digital devices and using computer software as well as solving technical problems of digital devices. Section C contains questions about Bit Literacy (BL) which assesses students' confidence in finding, selecting, extracting and reproducing and presenting information to the public. Meanwhile, section D contains questions related to Virtual

Community Literacy (VCL), namely students' confidence in online communication such as e-mail, the ability to participate, manage online meetings, and maintain security and the ability to build networks to create a cyber-culture. Finally, in part E, the focus is on questions related to digital amnesia behaviour to measure the level of dependence of students on digital devices, especially their tendency to use digital devices as external memories.

3.1.4.3 Data Collection

A total of 414 printed questionnaires were distributed to the students through the assistance of lecturers as my colleagues. Before the process of distributing the questionnaires, the researcher contacted colleagues who taught new students to ask for their cooperation in distributing the questionnaires. The data collection period for this study was 30 days. Of the 414 questionnaires, 39 questionnaires could not be accepted because they were not filled out completely. Therefore, the total sample size of this study was 375. This meant that the response from respondents is very high, which is around 90.5 %. This is because the questionnaire was submitted directly by the lecturer before the class started. Thus, the researchers did not find any significant obstacles in the data collection process. The data obtained were then coded into the SmartPLS software version 3.3.3 for analysis purposes.

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3.1.4.4 Measurement Development

The following section explains the measurement development. The establishment of digital literacy assessment criteria, acceptance of digital technology and digital amnesia behaviour involves a systematic assessment of content to test measurement tools to ensure that the measuring tool actually measures the behaviour domain of the study sample (Hadar et al., 2017). In this study, the content validity of digital literacy assessments, digital technology acceptance, and digital amnesia behaviour was achieved through literature reviews. Literature review related to digital literacy, digital technology acceptance, and digital amnesia behaviour became the basis for obtaining definitions and concepts related to the focus of this research.

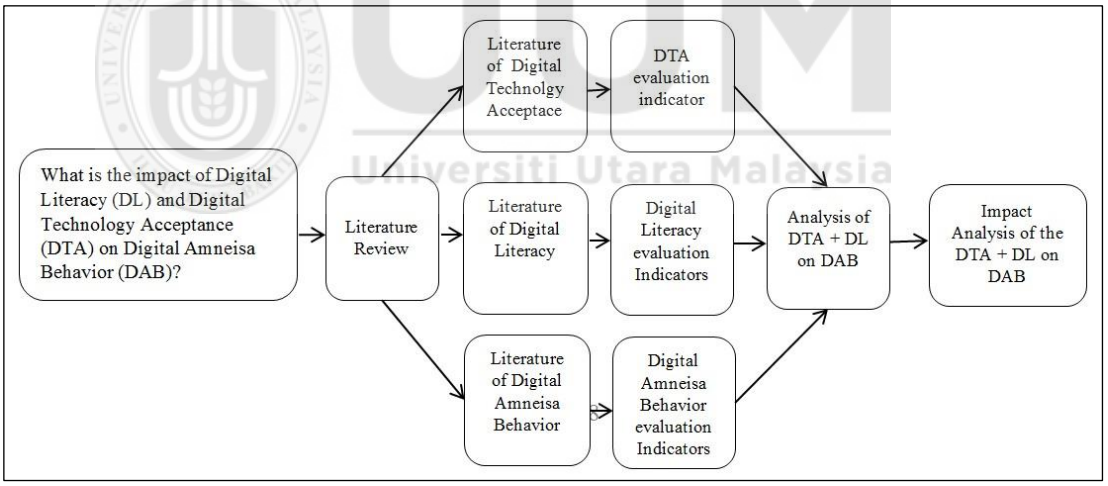

Figure 3.2 Path of Literature Review

3.1.4.5 Research Variables and Indicators

The study of the influence of Digital Literacy (DL) and Digital Technology Acceptance (DTA) on Digital amnesia behaviour (DAB) consists of two independent variables and one dependent variable. Independent variables that affect this study are

Digital Literacy (DL) and Digital Technology Acceptance (DTA). However, the digital literacy variables are tested by using three sub-constructs namely Technical Literacy (TL), Bit Literacy, and Virtual Community Literacy (VCL). The independent variable in this study is Digital amnesia behaviour.

Table 3. 5

Research Variables and Indicators

CATEGORIES	SUB-CATEGORIES	FACTORS
Digital Literacy (DL) Self-Efficacy	Technical literacy (TL)	Ability to operate hardware and tools Ability to use Windows Ability to edit documents and use tools Ability to use web browsers Ability to communicate
	Bit literacy (BL)	Ability to search for information Ability to judge appropriate information Ability to edit information Ability to process information Ability to use information
	Virtual community Literacy (VCL)	Ability to participate in community Ability to form self-identity Ability to have relationships Ability to problem solve collectively Ability to create cyber culture
Digital Technology	(Adobted TAM's	Using digital technology in education is essential Using digital technologi at campus would improve my academic achievement Using digital technology in education would enhance my effectiveness in study

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Acceptance (DTA)	Basic Questionnaire)	Having personal experience helps me to make the best use of technology
		Learning to operate digital technology would be easy for me
		It would be easy for me to become skilful in the use of the digital technology
Digital amnesia		Making the Internet a brain extension
		Proficient in remembering the location of

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behaviour (DAB)	information but difficult to remember facts Make digital devices a personal library Make digital devices an information search tool Making digital devices an information retrieval tool .It is difficult to recall important information without digital devices

3.1.4.6 Data Collection Method

Data collection was done using a set of structured questionnaires adopted from several sources. Questionnaires for Digital Technology Acceptance constructs were adopted from Rajabion (2019). Questionnaires for Digital Literacy constructs were adopted from Hanyang University (Noh, 2016), and Digital amnesia behaviour questionnaires were adapted from Kaspersky (2015).

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3.1.4.7 Measurement Scale

The perceptual scale was used to develop the measurements. Technical literacy, bit literacy, virtual community literacy, digital technology acceptance, and digital amnesia behaviour were all assessed using a five-point Likert scale. According to Munir (2018), the five, six, and seven-point likert scales are more valid and reliable than shorter and longer scales. This study applied five-point interval Likert scale starting from 1 (strongly disagree) to 5 (strongly agree).

3.1.4.8 Types of Data Analysis

Types of data analysis that are often used in thesis writing are descriptive analysis and inferential analysis. There are two stages to the inferential analysis in this dissertation. The first stage examines the measurement model, and the second stage uses the inferential analysis to draw conclusions. Furthermore, the type of evaluation at the two stages discussed below is for study models that use reflective indicators only (Hair et al., 2017).

3.1.4.9 Research Stages

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3.1.4.9.1. Pre-Test: Questionnaires Validity

The pre-test is one of the important steps that must be taken before carrying out the actual test. The pre-test aims to ascertain whether all the questionnaires are well understood by the respondent or not before the questioner is used as a data collection instrument. Participants will be able to identify questions that may be confusing or that might lead to biased responses in this initial test.

Once a questionnaire had been developed, throughout the development process, each item as well as the questionnaire was validated and evaluated (Knebel et al., 2021). In order to fine-tune the size prior to confirmation testing, this validation is very important. In other words, even though the validity and reliability of the statistical constructs are sufficient, the results of the study will indicate if the content of the construct questionnaire is incorrect and inappropriate (Hair et al., 2017).

Academicians and practitioners with specializations in digital literacy and information communication and technology pre-tested and reviewed the instrument in order to ensure and further enhance its accuracy and readability. To ensure the content validity, there is no statistical analysis that can be used. Usually; qualitative judgments were made by experts (Flynn et al., 1990). Pre-testing was conducted by five academics and four practitioners in order to detect any potential problems resulting from the questionnaire design. Interviews with respondents were conducted during this pre-test. There are three items to consider: (1) whether questions need to be added or removed; (2) whether the questionnaire content is sufficient; and (3) whether the right questions are being asked.

The pre-test provided a very useful mechanism for developing a better instrument, as well as clarifying the wording and suggesting some measurement items to add, delete, or modify. A revised instrument resulting from this pre-test was used for the actual survey. This pre-test became more important for two main reasons: (1) The questionnaire used in this study was adopted from the English language questionnaire so that there was a concern that there was a problem in language switching, and (2) the construct of this study was applied in the context of developing countries so that there was a concern that there would be context bias.

The number of participants in this pre-test was 15 new students of UIN Ar-Raniry Banda Aceh who were registered in the 2018/.2019 academic year who represented the object of this research. The pre-test was carried out face-to-face in a computer laboratory and the questionnaire was given online via the Google form. The results

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of this initial test indicate the validity of the questionnaire is good. All questionnaires were well understood and were not contextually biased as might be feared.

3.1.4.9.2. Pilot Study

Before conducting a real study, this study also conducts a pilot study. This pilot study aims to ensure the validity of the construct in terms of item dimensions and the reliability of the questionnaire items before carrying out the real study. In other words, this pilot study aims to evaluate and improve the validity of the questionnaire for all the constructs of this research, namely the digital literacy construct which includes 3 sub-constructs, namely technical literacy, bit literacy and virtual community literacy and the constructs of digital technology acceptance, and digital amnesia behaviour.

The number of respondents used in this pilot study were 40 new undergraduate students from Universitas Islam Negeri Ar-Raniry Banda Aceh who were selected with probability sampling; namely a sampling technique where all elements have the opportunity to be selected as a sample. The respondents consisted of 15 male students (37.5%) and 25 female students (62.5%). The pilot study was conducted online using Google form but the students took part in a computer laboratory. This is so that pilot test participants can ask questions directly if there are questions confusing or biased. The results of the pilot study show that the five constructs have good internal consistency, with an average value Cronbach's Alpha mean 0.785.

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Table 3. 6

Cronbach's Alpha of the Pilot Study

Construct	Item	Outer Loading (>0.708)	Cronbach's Alpha (>0.7)
Technical Literacy	I am confident in my ability to operate digital devices	0.777	0.745
	I am confident in my ability to use a web browser	0.748	
	I am confident in my ability to communicate online	0.736	
	I am confident in my ability to solve technical problems with my digital device	0.763	
Bit Literacy	I am confident in my ability to find information online	0.801	0.886
	I am confident in my ability to judge the right information	0.842	
	I am confident in my ability to edit information	0.813	
	I am confident in my ability to process information	0.840	
	I am confident in my ability to use information	0.805	
	I am confident in my ability to create information	0.816	
Virtual Community Literacy	I am confident in my ability to participate in virtual communities	0.754	0.733
	I am confident in my ability to keep my identity safe in the virtual world	0.771	
	I am confident in my ability to solve digital problems collectively	0.716	
	I am confident in my ability to manage virtual meetings such as webinars	0.739	
Digital Tech. Acceptance	The use of digital technology in education is a must	0.823	0.850
	I have a positive attitude towards using technology	0.809	
	The use of digital technology adds to my experience	0.806	
	Having personal experience helps me to make the best use of technology	0.829	
Digital amnesia	I use the Internet as an extension	0.807	0.886

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behaviour	of my online brain	
	I don't have to remember facts I found online - but I do have to remember where I saved them	0.823
	My digital device is my memory, almost everything I need to know is stored in it	0.827
	Most people now have so many numbers, email addresses, etc, that it is impossible to memorize them all	0.861
	I usually need answers quickly and don't have time for the library or books	0.823
	Without a digital device at hand, I tend to forget important data and information	0.850

3.1.4.9.3. Actual Study

After getting the results from the pilot study which showed that the construct validity in terms of item dimensions and the reliability of the questionnaire items met the requirements, the next step was to conduct an actual study (real study). The real study population was 4850 new students of Universitas Islam Negeri Ar-Raniry Banda Aceh were registered in the 2018/2019 academic year (ICT Center UIN Ar-Raniry Banda Aceh, 2019). However, the sample of this study was 375 students who were taken randomly or happened to be in the class being surveyed. Data collection activities for real studies this lasted for one month, October 2019.

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3.1.4.9.4. Data Entry

Data Entry is the process of transferring data from physical ones on sheets of paper or other notes to digital data that can be processed by applications. At this stage the researchers transferred data from the questionnaire sheets to a computer in Microsoft Excel format. After data has been completely imported into excel format, the file is saved in.csv format according to the provisions of the SmartPLS application version 3.3.3.

3.1.4.9.5. Data Screening

Data screening is the data filtering stage that is carried out when including the removal of outliers, as well as construct validity when measuring content validity (Hair et al., 2017).

3.1.4.9.6. Data Analysis

Data analysis is a process of inspection, cleaning, transformation and data modelling with the aim of finding useful information, suggesting conclusions, and supporting decision making (Hair et al., 2017). The data analysis technique used in this dissertation is structural equation modelling (PLS-SEM).

The researcher applied the SEM process in two stages (Hair et al., 2017). In the first phase, they test the fit of the measurement model and construct validity. Once the measurement model is satisfactory, the structural model is evaluated to determine how good the model is. A structural model was then evaluated after the measurement model had been verified as satisfactory. The validity of a structural test cannot be assessed with flawed measures according to Hair et al. (2017), even though fit and

construct validity could be assessed without the need for separate measurement and structural model. Study should be done to refine the measurement model or collect new data if the measurement model cannot be validated. It is important to refine the measurement model when it cannot be validated. The goal of SEM is to eliminate bias by assessing the validity of the model. Consequently, both measurement and structural models should be evaluated for model validity.

3.1.4.10 Measurement Model Validity

This study uses a reflective measurement model analysis based on the internal consistency, composite reliability, convergent validity, and discriminant validity.

3.1.4.10.1. Internal consistency

To measure internal consistency, this thesis uses a conventional method based on Cronbach's alpha value. In the PLS-SEM analysis, to determine the internal consistency of the construct, it should be based on the composite reliability value.

According to Hair, et al., (2017) internal consistency can be accepted based on the value of composite reliability between 0.60 to 0.70, and internal consistency is considered satisfactory if the composite reliability value is between 0.70 and 0.90.

3.1.4.10.2. Reliability of Each Indicator

The reliability of each indicator is measured based on the loading factor value. The accepted loading factor value is > 0.40 while the best value is > 0.70 (Hair et al., 2017). If the value of the loading factor is between 0.40 and 0.70, it is necessary to consider eliminating or maintaining the indicator. If removing the indicator will increase the Average Variance Extracted (AVE) value, then the indicator needs to be

removed. Vice versa, if the deletion of the indicator does not increase the AVE value, then the indicator is maintained.

High outer loadings of measurement items indicate that the items converge together on a common construct. It is important that all indicators have statistically significant outer loadings. The standardized outer loadings should be at least 0.708 because a significant outer loading could still be fairly weak. An outer loading of 0.708 or higher is recommended because an outer loading of even quite significant could be still quite weak. The rationale behind this rule is that square of the outer loading (R-square) should be higher than 0.50. Figure 3.7 shows outer loading relevance testing.

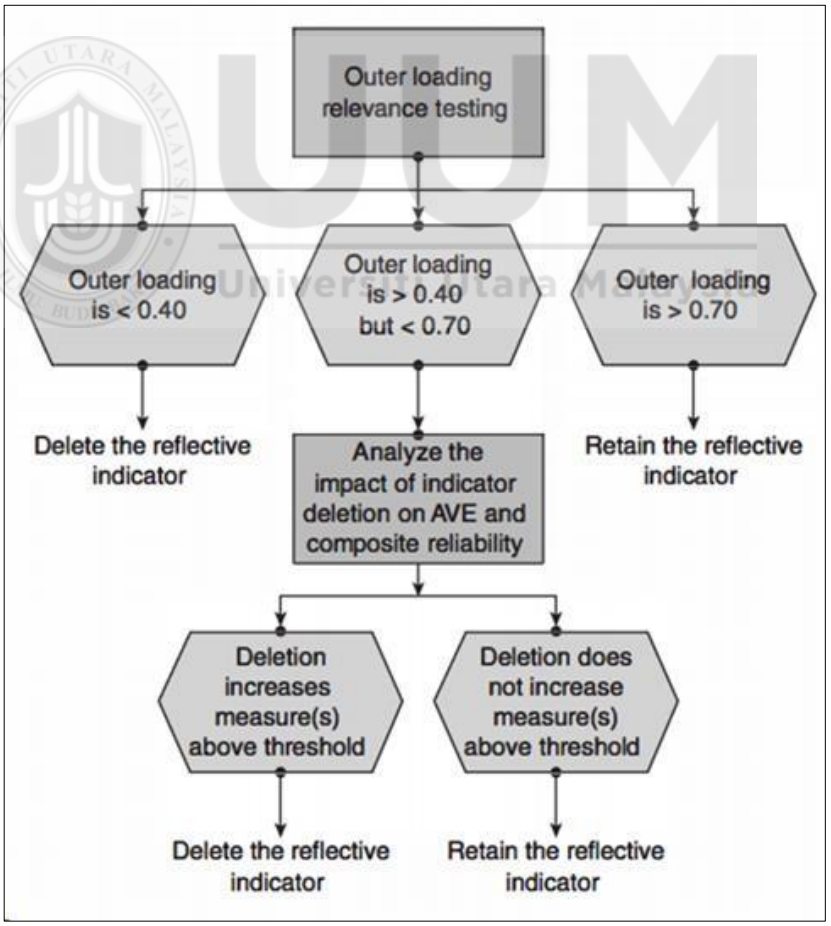

Table 3. 7

Outer Loading Relevance Testing (Hair et al., 2017).

3.1.4.10.3. Convergent Validity

The convergent validity of a particular construct is the measure that involves a high proportion of variance in common across multiple measures (Hair et al., 2017).In other words, the measurement of convergent validity is carried out to measure the average variance extracted which can indicate the extent to which an item is really different from other items. Convergence validity is measured by the Average Variance Extracted (AVE) value. According to Fornel and Larcker (1981) and Hair et al., (2017), the accepted AVE value is 0.50.

3.1.4.10.4. Discriminant validity

Discriminant validity aims to measure the difference between a construct and other constructs (Hair et al., 2017). To measure discriminant validity, three methods were used, namely cross loading, Fornell-Larcker criteria and Heterotrait-Monatrait Ratio (HTMT). Cross loading is referred to the value of the factor indicator (outer loading) of a tested construct that must exceed the value of the outer loading indicator that enters another construct. The Fornell-Larcker criterion is measured based on the square root value of the AVE for each construct if it exceeds the correlation value with other constructs. The Heterotrait-Monatrait Ratio was determined based on the construct correlation value < 0.85 or < 0.90.

3.1.4.11 Structural Model Analysis

Testing the validity of the structural model is the last stage of SEM. To achieve this, a comparison of a structural model's overall fit with a measurement model was

conducted. Structural model testing involves testing the study hypothesis model which contains the independent variables, namely digital literacy self-efficacy and digital technology acceptance, and the dependent variable, namely digital amnesia behaviour. Structural model testing was carried out according to the bootstrap analysis procedure and examined the t-value, p-value and confidence interval value for bootstrap at a 5% confidence level.

3.1.4.11.1. Hypotheses Testing

Hypothesis testing is an important step before drawing conclusions. Hypothesis testing is done by running Bootstrapping. Bootstrapping is "a nonparametric procedure that allows testing the statistical significance of various PLS-SEM results such as path coefficients, Cronbach's alpha, HTMT, and R^2 values (Hair et al., 2017). In bootstrapping, a subsample is created with observations drawn at random from the original dataset. To ensure stability of results, the sample size has to be large. For the initial assessment one can use a smaller number of bootstrap subsamples (e.g., 500). However, for the preparation of the final result, one must use a large number of bootstrap subsamples (e.g., 5,000). If the t-value is greater than or equal to 1.645 then the relationship is significant at alpha <0.05 (Navimipour et al., 2018). In other words, if the t-value is greater than the critical value (1.645) and the p-value is less than 0.05, the statistical significance of the hypothesis is accepted. For this study, researchers used a sub-sample of 5000 data with 1 tailed with a significance level of 5 % (Ringle et al., 2015).

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3.2 Chapter Summary

This chapter has discussed comprehensively about the overall research implementation framework, including design, population, sample, instrument, collection, measurement, steps of analysis of research variables and hypothesis testing.

In the beginning, it was described in depth through visuals that three studies were conducted and the methods used in each of these studies were explained in detail, and then it went into the stages of each study. Furthermore, this chapter provides an overview of the validation, reliability, analysis, and hypothesis testing processes.

It is hoped that by explaining the process of implementing the study as well as the rationale for each component of the study comprehensively, this study can be properly understood. In other words, with an explanation of how the study was implemented and the justifications provided for each component, it will hopefully be easier to comprehend.

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CHAPTER FOUR

FINDINGS

4.1 Introduction

This chapter describes the results of the data analysis. It begins with a description of the analysis associated with the study site profile and the respondents as the source of data for this study. Then, the results of data quality tests are presented, such as the outlier test and the data normality test, and an analysis of their significance is given. Moreover, this chapter provides the results of the test of the proposed study model and how the study model fits with the data. Lastly, the chapter discusses the test results of the hypothesis model namely the influence of digital literacy and the acceptance of digital technology on the digital amnesia behaviour.

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Three quantitative studies were conducted using survey and experimental methods in this study with specific aims, as previously mentioned. The first study aims to identify nomophobia, the Google effect, and digital amnesia behaviour among students at the Universitas Islam Negeri (UIN) Ar-Raniry Banda Aceh and understand students' perceptions of these phenomena. In the second study, an experimental study was conducted to investigate nomophobia, Google effect, and digital amnesia behaviour on memory retention and knowledge construction. Another quantitative study was conducted in the third study to investigate digital literacy self-efficacy and digital technology acceptance on digital amnesia behaviour. The main objectives of this study is to assess the influence of digital literacy and digital technology acceptance on digital amnesia behaviour that best describes educational sector intention to promote the use of digital technology positively and productively.

4.1.1 Profile of Research Location

This study was conducted at Universitas Islam Negeri (UIN) Ar-Raniry Banda Aceh, Indonesia. UIN Ar-Raniry was officially authorized based on Presidential Regulation Number 64 of 2013 and Regulation of the Minister of Religion of the Republic of Indonesia Number 12, 2014 concerning Organization and Work Procedure. Previously this higher education institution was called the Institut Agama Islam Negeri (IAIN) Ar-Raniry which was inaugurated on October 5, 1963, as the third IAIN in Indonesia.

UIN in Arabic term "Al-Jami'ah Al-Islamiyah Al-Hukumiyah", is a higher education institution that manages various disciplines of basic studies, namely the field of Islamic studies with a number of branches and other general scientific sub-branches. In terms of administration, UIN Ar-Raniry is under the ranks of the Ministry of Religion of the Republic of Indonesia, whose supervision and implementation are left to the Directorate General of Islamic Religious Institutions through the Directorate of Islamic Higher Education.

The name of Ar-Raniry is attributed to the last name of a great scholar and mufti of the Kingdom of Aceh Darussalam who was very influential during the time of Sultan Iskandar Tsani (1637-1641), namely Syeikh Nuruddin Ar-Raniry, who came from Raniry (now Render) in India. This scholar has contributed great thought to the development of Islam in the archipelago in general and Aceh in particular.

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Since its establishment as an Islamic higher education institution, UIN Ar-Raniry has shown a strategic role in community development. In its expansion, UIN Ar-Raniry has opened a number of undergraduate and postgraduate master and doctoral programs. At this time UIN Ar-Raniry Banda Aceh has ten faculties with forty-three study programs both religious studies and general study programs. With these existing study programs, this institution is expected to produce educators, thinkers, and experts who are professionals in their fields in accordance with the developments and changing times.

4.1.2 Profile of Respondents

The populations of this study were new students of the Ar-Raniry State Islamic University Banda Aceh registered in the 2018/2019 academic year. The total population is 4850 based on the data given bay Information and Communication Technology Center of UIN Ar-Raniry Banda Aceh, 2019). However, 414 people were part of the study sample or filled out the questionnaires. Furthermore, 39 questionnaires were removed from further analysis because of incomplete answers. Thus the total respondents of this study were 375 people. Hence, the response rate is around 90.5%.

4.1.3 Result of Study 1

The following are the summary of the survey conducted in 2019 intended to identify nomophobia, Google Effect and digital amnesia behaviour and Perception among students at Universitas Islam Negeri Ar-Raniry Banda Aceh. The data was collected

through an online survey using Google form application which was sent through the student's WhatsApp group. The sampling technique was carried out randomly. The sampling period lasted for 5 days.

Table 4.1 below shows the result of the survey based on the phenomena namely Nomophobia, Google effect and digital amnesia behavior as well as perceptions of of digital natives on these three phenomena.

4.1.3.1. Nomophobia among digital natives

Table 4.1 below shows the result of the survey based on the phenomena, namely Nomophobia, Google effect and digital behavior amnesia as well as perceptions of these three phenomena. 87.55 % of respondents feel more dependent on smartphones now than ever before.89.18 % always use smartphone to search for information. Even 78.18 have used it while studying and have found it very helpful for them.

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4.1.3.2 Google effect among digital natives

Similar to the phenomenon of nomophobia, the phenomenon of the Google effect among digital natives is also high. 79.09 % respondents said that the first thing they do when needed for general information was search the Internet, and 73.64 % of them did the same step when they looking for academic topic or did a college assignments. Interestingly, 44.55 % said they rarely save the information obtained because they believe that the information is always available on the Internet when needed.

4.1.3.3 Digital Amnesia Behavior among digital natives

Like the phenomenon of nomophobia and the Google effect, digital natives also experienced digital amnesia behavior. 84.55 % said that they have entrusted their digital device to remember something they would not have been able to remember on their own. In addition 70.91 % tended to store information in their digital devices. It was believed that by doing that it will able to lighten the burden of remembering so that they can concentrate on remembering others.Interestingly, 59.09 % have mentioned that digital devices, especially smartphones can increase their motivation to answer a question or discuss a new topic.

4.1.3.4 Perception on Nomophobia, Google Effect and Digital Amnesia Behavior

In general, the perception of digital natives towards the phenomenon of internet dependence, especially Nomophobia, Google Effect and Digital Amnesia Behavior is very high; sequentially the percentages are as follows 59.09%, 69.09 and 88.18% According to them this phenomenon is something normal as a consequence of living in the digital world.

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Table 4. 1

Result of study 1(Nomophobia, Google Effect, Digital Amnesia and Digital natives's Perceptions)

ITEM	QUESTION	RESPONSE YES (N)	%	NO (N)	%	TOTAL
	NOMOPHOBIA					
1	Do you feel more dependent on your smartphone now than ever?	93	87.55%	14	12.45%	110
2	Do you always use your smartphone to search for information?	98	89.18%	12	10.82%	110
3	When studying, I find it really helpful to use my smartphone	86	78.18%	24	21.82%	110
	GOOGLE EFFECT					
1	The first thing I do when I want to answer a question is search the Internet	87	79.09%	23	20.91%	110
2	I rarely save the information I find online because I believe it will always be there when I need it	49	44.55%	61	55.45%	110
3	The first thing I do when I want to find information to do a college assignment is to look for the topic on the Internet	81	73.64%	29	26.63%	110
	DIGITAL AMNESIA					
1	I trust my smartphone to remember things I can't do	93	84.55%	17	15.45%	110
2	By saving my memory to a smartphone or tablet, it can increase my concentration on something else	78	70.91%	32	29.09%	110
3	With a Smartphone in hand, I am more motivated to answer questions and discuss a new topic	65	59.09%	45	40.91%	110

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1	It is common for people to experience Nomophobia (high worry about not possessing a smartphone).	65	59.09%	45	40.91%	110
2	Google effect (the tendency not to store information since it is always accessible on Google whenever needed) is a normal phenomenon	76	69.09%	34	30.91%	110
3	Digital amnesia behavior (the tendency to store information on digital devices rather than remember it) is a common phenomenon in today's world.	97	88.18%	13	11.82%	110

4.1.4 Results of Study 2

The following is the result of two experimental studies assessing the impact of Digital amnesia behaviour on Memory Retention and Knowledge Construction.

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4.1.4.1 Digital Amnesia Behaviour and Memory Retention

As mentioned in chapter three, this experimental test has two main objectives. First, to test student's memory retention by answering 20 trivia questions related to knowledge of Islam and general knowledge. The second objective was to measure the tendency of students to use the Internet to answer these questions when allowed.

Table 4.2 below briefly shows the result of the experiment where there were only 2 of 20 students from the experimental group (who allowed to consult the Internet, if necessary) could answer question number 1 without consulting the Internet, whereas

the remaining 18 students directly searched the Internet. Meanwhile 9 of 20 students from the control group (who not allowed consulting the Internet) could answer question number 1 correctly.

Table 4. 2

Result of Memory Retention Test

NO	QUESTIONS	Experiment (N=20)		Control (N=20)
		O1a	O1b	O2
1	Subhanallah often called?	2	18	9
2	Al-Ghafur is one of Asmaul Husna which means?	3	17	8
3	The circumcision prayer that accompanies the obligatory Prayer is called prayer?	3	17	7
4	The third pillar of Islam is?	3	17	11
5	The fifth pillar of faith is faith in?	5	15	12
6	What is the person who pays zakat called?	7	13	9
7	What is the name of a congregation who is late one raka'at or more with the imam during congregational prayers?	5	15	9
8	What is the name of the angel in charge of providing sustenance?	7	13	12
9	Lakum diinukum waliyadiin is part of the surah?	8	12	12
10	Silence or stop not to walk when in Arafah called?	2	18	9
11	How long was Indonesia colonized by Japan?	4	16	8
12	What is the name of the oldest Islamic kingdom in Indonesia?	9	11	8
13	What city is the United Nations (UN) office located in?	8	12	14
14	The United Nations agency in charge of education and culture is?	7	13	13
15	KPU stands for?	6	14	7
16	What is the name of the third President of the Republic of Indonesia?	5	15	11
17	What is the name of the current Prime Minister of Malaysia?	9	11	12
18	What is the largest ocean in the world?	8	12	12
19	KPK is an abbreviation of?	3	17	11
20	BNN stands for?	5	15	12

Note
O1a = Own Memory (Experimental Group)
O1b = Internet Memory
O2 = Own Memory (Control Group)

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Almost the same behaviour occurs in the rest of the questions as listed in table 4.1, where students tend to immediately switch to Internet memory instead of using their own memory, even to answer trivia questions.

4.1.4.2 Knowledge Construction Experiment

This experimental study aimed to assess the impact of digital amnesia behaviour on knowledge construction among university students. The students were divided into two groups; control and experimental. Each student was given 20 minutes to answer 4 questions based on the video clips that have been watched as source of data. There were four evaluation criteria; interpretation, analysis, synthesis, and evaluation. Table 4.2 below shows the results of the control group test and table 4.3 for the experiment group.

Table 4.3

Result of Knowledge Construction of Control Group

STUDENT	GROUP	CATEGORIES KNOWLEDGE CONTRUCTION				TOTAL SCORE
		ANALYSIS Max.Score 5	INTEPRET. Max.Score 5	SYNTHESIS Max.Score 5	EVALUATION Max.Score 5	
1	Control	4	4	3	4	15
2	Control	3	3	2	4	12
3	Control	2	4	4	4	14
4	Control	5	4	3	3	15
5	Control	4	3	3	3	13
6	Control	5	4	3	4	16
7	Control	4	3	4	4	15
8	Control	3	4	4	4	15
9	Control	4	4	3	3	14
10	Control	3	3	4	4	14
11	Control	4	5	5	3	17
12	Control	2	4	4	2	12
13	Control	4	4	3	4	15
14	Control	4	4	3	3	14
15	Control	5	3	4	4	16
16	Control	4	4	4	4	16
17	Control	4	4	5	3	16
18	Control	3	4	3	3	13
19	Control	3	3	3	4	13
20	Control	5	3	4	4	16
Average Scores		**3.75**	**3.7**	**3.55**	**3.55**	**14.55**

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Table 4. 4

Result of Knowledge Construction of Experiment Group

STUDENT	GROUP	CATEGORY				TOTAL SCORE
		ANALYSIS Max.Score 5	INTEPRET. Max.Score 5	SYNTHESIS Max.Score 5	EVALUATION Max.Score 5	
1	Experiment	3	2	5	2	12
2	Experiment	2	3	4	2	11
3	Experiment	2	2	3	2	9
4	Experiment	3	4	3	2	12
5	Experiment	3	2	5	2	12
6	Experiment	3	2	4	3	12
7	Experiment	2	4	2	3	11
8	Experiment	3	3	4	2	12
9	Experiment	2	2	4	3	11
10	Experiment	3	3	4	2	12
11	Experiment	2	4	5	3	14
12	Experiment	2	3	4	2	11
13	Experiment	3	3	4	3	13
14	Experiment	3	4	4	2	13
15	Experiment	4	2	4	4	14
16	Experiment	3	4	4	2	13
17	Experiment	2	4	5	3	14
18	Experiment	4	4	4	2	14
19	Experiment	3	5	4	3	15
20	Experiment	3	4	4	4	15
Average Scores		**2.75**	**3.2**	**4**	**2.55**	**12.5**

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Table 4.5 shows the results of the comparison of the average score between the control group and the experimental group. The average score comparison is 12.50 (experiment group): 14.55 (control group), which is a difference of 2.05. This result has indicated that dependence on the Internet (Nomophobia, Google Effect, and Digital amnesia behaviour) has weakened knowledge construction among the students of Universitas Islam Negeri Ar-Raniry Banda Aceh.

Table 4. 5

Knowledge Construction Comparison Score

STUDENT (N=40)	TOTAL SCORE GROUP COMPARISON	
	EXPERIMENT Max.score =20)	CONTROL Max.score =20)
1	12	15
2	11	12
3	9	14
4	12	15
5	12	13
6	12	16
7	11	15
8	12	15
9	11	14
10	12	14
11	14	17
12	11	12
13	13	15
14	13	14
15	14	16
16	13	16
17	14	16
18	14	13
19	15	13
20	15	16
Average score comparison	12.50	14.55

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4.1.5 Result of Study 3

The third study is a survey to investigate the influence of digital literacy and digital technology acceptance on digital amnesia behaviour. The following is the stages of the study.

4.1.5.1 Measurement Model Validity

Measurement model validity is part of the model that represents the relationship between latent variables and their indicators. In PLS-SEM this model is generally called the outer model. In short, the assessment of the measurement model aims to ensure the validity and reliability of the constructs that are prerequisites for assessing the structural model (Akalili & Haryono, 2014).To assess the normality of data distribution; the standard used is to look at the slope and kurtosis threshold values. Although there is no single agreement about the absolute value, Orcan (2020) stated that the skewness value should not be more than 2.0 and the kurtosis value should not be more than 5.0, at absolute values. Furthermore, West et al. (1995), and Curran et al. (1996) provide a proactive picture of whether the data distribution is normal or not. According to them the data is considered normal if the univariate slope and kurtosis are equal to 0, univariate slope 2.0 and kurtosis 7.0 are categorized as moderate abnormal data distribution, and very non-normal distribution with univariate slope 3.0 and kurtosis 2.0.

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Table 4.6

Descriptive Statistics and Normality Assessment of the study

Item	Min	Max	Mean	Standard Deviation	Excess Kurtosis	Skewness
DTA1	1	5	3.072	1.116	-1.037	0.065
DTA2	1	5	3.075	1.189	-1.055	0.104
DTA3	1	5	3.021	1.143	-1.002	0.087
DTA4	1	5	3.024	1.111	-0.901	0.187
DTA5	1	5	3.144	1.125	-1.108	0.030
DTA6	1	5	2.997	1.147	-0.939	0.133
VCL1	1	5	3.091	1.123	-1.023	0.036
VCL2	1	5	2.981	1.135	-0.883	0.092
VCL3	1	5	3.051	1.209	-1.070	0.030
VCL4	1	5	3.077	1.158	-0.974	-0.069
VCL5	1	5	2.989	1.124	-0.943	0.032
VCL6	1	5	3.176	1.164	-0.959	-0.133
TL1	1	5	3.045	1.093	-0.858	0.205
TL2	1	5	3.115	1.157	-1.040	0.013
TL3	1	5	3.208	1.025	-0.547	-0.202
TL4	1	5	3.024	1.104	-0.931	0.048
TL5	1	5	3.067	1.123	-1.002	0.016
TL6	1	5	3.104	1.142	-0.898	0.000
BL1	1	5	3.224	1.223	-1.200	0.004
BL2	1	5	3.229	1.203	-1.098	-0.015
BL3	1	5	3.315	1.106	-0.866	-0.101
BL4	1	5	3.059	1.118	-1.000	-0.013
BL5	1	5	3.037	1.131	-0.902	0.104
BL6	1	5	3.032	1.121	-0.927	0.142
DAB1	1	5	3.333	1.104	-1.260	0.123
DAB2	1	5	3.301	1.109	-1.104	0.090
DAB3	1	5	3.312	1.118	-1.114	0.167
DAB4	1	5	3.173	1.058	-0.907	0.422
DAB5	1	5	3.237	1.073	-1.051	0.296
DAB6	1	5	3.304	1.050	-0.868	0.256

In contrast to maximum likelihood (ML)–based CB-SEM, PLS-SEM does not require normal distributions of data. However, it is nevertheless worthwhile to consider the distribution when working with PLS-SEM. "It is important to verify that

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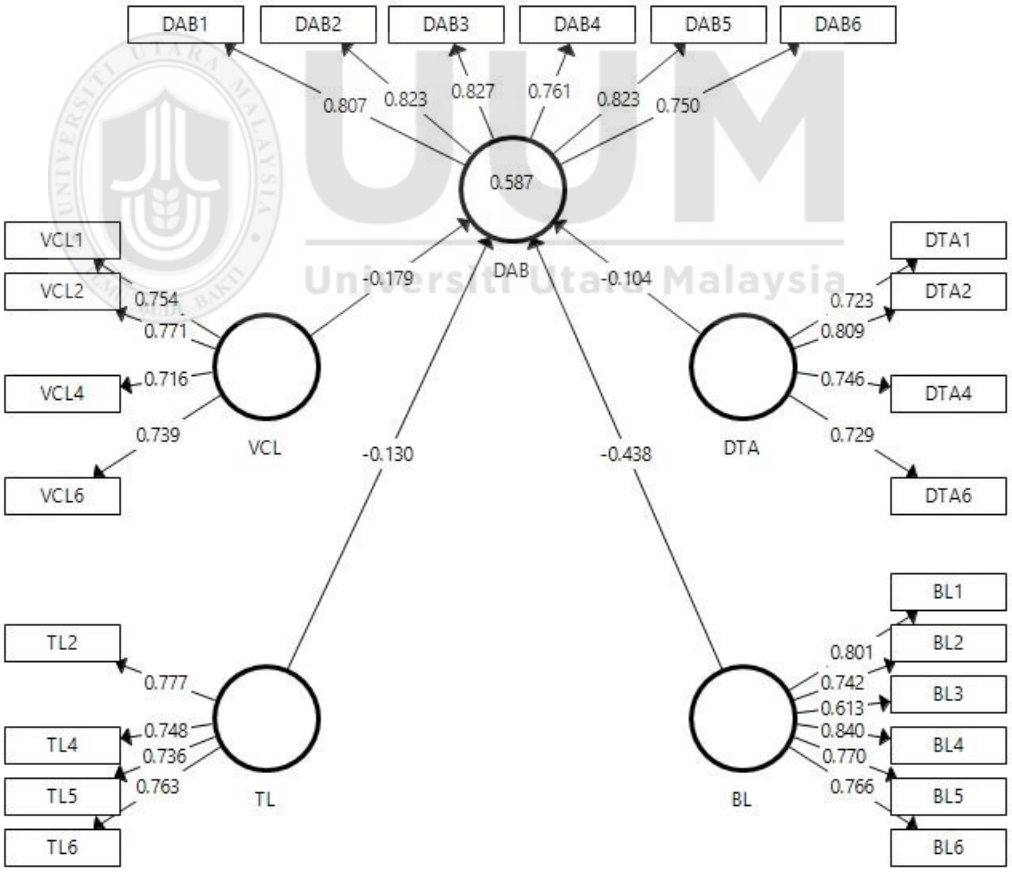
the data are not too far from normal as extremely non-normal data prove problematic in the assessment of the parameters' significance. Specifically, extremely non-normal data inflate standard errors obtained from bootstrapping and thus decrease the likelihood that some relationships will be assessed as significant" (Hair et al., 2017).

Figure 4.12 shows the modified PLS-path-model that indicates the results of the analysis of the study hypothesis model that meets the evaluation criteria of the measurement model based on the analysis procedure of Partial Least Squares Structural Equation Modelling.



Appendix 1 Modified PLS-Path Model

As previously explained in Chapter Three, this study model is evaluated based on four aspects. They are (1) internal consistency and composite reliability measured by Cronbach's alpha and (2) the reliability of each indicator based on the outer loading value, (3) convergent validity based on Average Variance Extracted value (AVE), and (4) discriminant validity based on cross loading value, Fornell-Larcker criteria and HTMT (Hair et al., 2017).

4.1.5.2 Evaluation of Internal Consistency Assessment

Table 4.7 shows that the five researches constructs achieved good internal consistency based on the value of composite reliability exceeding 0.7, which is between values 0.833 to 0.914.

4.1.5.3 Evaluation of the Reliability of Each Indicator

Figure 4.13 shows the initial PLS-path-model created with the support of SmartPLS 3.3 software was based on Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis.

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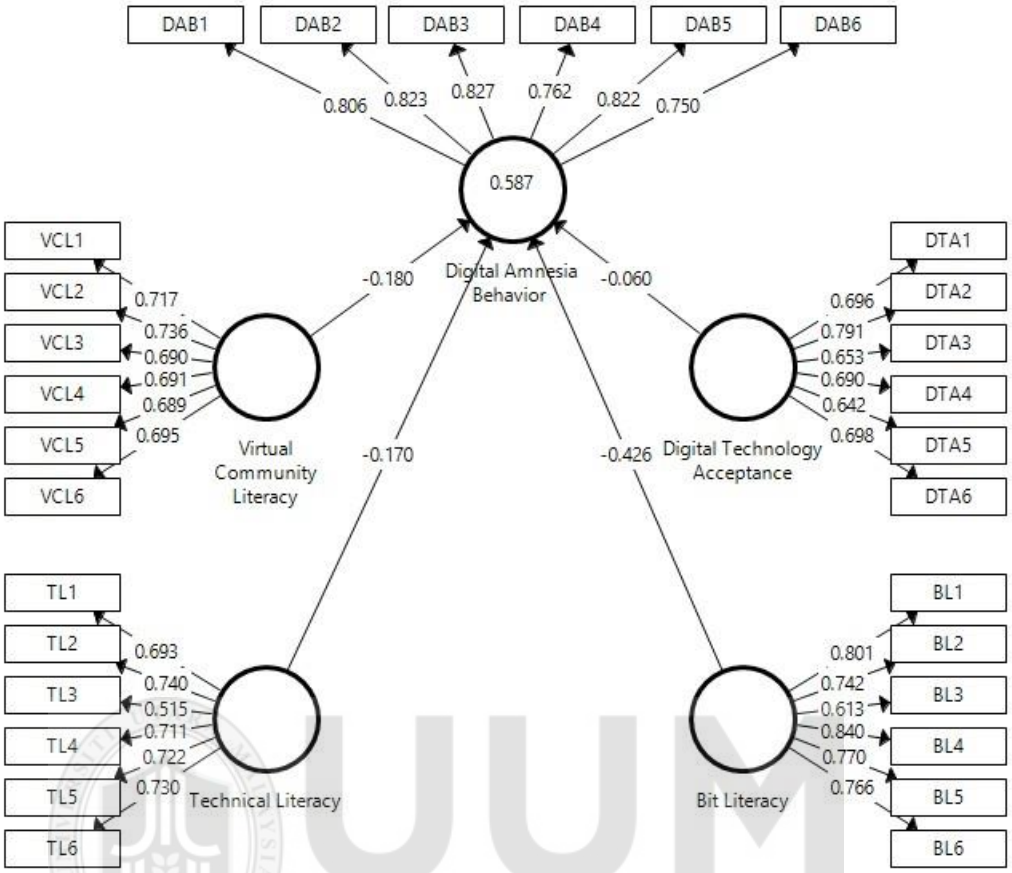

Appendix 2 Initial PLS-Path Model

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High outer loadings of measurement items indicate that the items converge together on a common construct. A statistically significant outer loading should exist for all indicators. An outer loading of 0.708 or higher is recommended because an outer loading of even quite significant could be still quite weak. The rationale behind this rule is that square of the outer loading (R-square) should be higher than 0.50.

In this study, the validity test was analysed by looking at the value of convergent validity. The value of convergent validity is the value of the factor loading on the latent variable with its indicators. The required factor loading value is > 0.70 (Hair et al., 2017).

Table 4. 7

The Result of Outer Loading Initial

Indicator	Bit Literacy	Digital amnesia behaviour	Digital Technology Acceptance	Technical Literacy	Virtual Community Literacy
BL1	0.801				
BL2	0.742				
BL3	0.613				
BL4	0.840				
BL5	0.770				
BL6	0.766				
DAB1		0.806			
DAB2		0.823			
DAB3		0.827			
DAB4		0.762			
DAB5		0.822			
DAB6		0.750			
DTA1			0.696		
DTA2			0.791		
DTA3			0.653		
DTA4			0.690		
DTA5			0.642		
DTA6			0.698		
TL1				0.693	
TL2				0.740	
TL3				0.515	
TL4				0.711	
TL5				0.722	
TL6				0.730	
VCL1					0.717
VCL2					0.736
VCL3					0.690
VCL4					0.691
VCL5					0.689
VCL6					0.695

The result shows that the construct of this study is not yet valid because there were still several loading factor values generated with a value <0.70. Because the loading factor value does not meet the requirements (0.658 <0.70), the indicators must be removed and a recount or modification will be carried out. The results of the

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recalculation after eliminating 6 out of 30 indicators that have a loading factor value <0.70 are as shown in Table 4.7.

Table 4. 8

The Result of Outer Loading Modified

Indicator	Bit Literacy	Digital amnesia behaviour	Digital Technology Acceptance	Technical Literacy	Virtual Community Literacy
BL1	0.801				
BL2	0.742				
BL3	0.713				
BL4	0.840				
BL5	0.770				
BL6	0.766				
DAB1		0.807			
DAB2		0.823			
DAB3		0.827			
DAB4		0.761			
DAB5		0.823			
DAB6		0.750			
DTA1			0.723		
DTA2			0.809		
DTA4			0.746		
DTA6			0.729		
TL2				0.777	
TL4				0.748	
TL5				0.736	
TL6				0.763	
VCL1					0.754
VCL2					0.771
VCL4					0.716
VCL6					0.739

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The results of this calculation indicate that 24 indicators are declared valid because they have a loading factor value>.0.70 so that they can be used in this research. In other words, the results of the output loading factor value of this study meet the expected requirements

4.1.5.4 Convergent Validity Assessment

The assessment of convergent validity found that the AVE values for this study construct were acceptable, namely Bit Literacy (AVE = 0.575), Technical Literacy (AVE = 0.571), Virtual Community Literacy (AVE = 0.555), Digital Technology Acceptance (AVE = 0.567), and Digital amnesia behaviour (AVE=638).This construct is also supported by the composite reliability and Cronbach's Alpha values which is above 0.7.

Table 4. 9
Summary of Convergent Validity

Construct	Item	Outer Loading (>0.708)	Cronbach's Alpha (>0.7)	CR (>0.7)	AVE (>0.5)
Bit Literacy	BL1	0.801	0.850	0.890	0.575
	BL2	0.742			
	BL3	0.613			
	BL4	0.840			
	BL5	0.770			
	BL6	0.766			
Technical Literacy	TL2	0.777	0.750	0.842	0.571
	TL4	0.748			
	TL5	0.736			
	TL6	0.763			
Virtual Community Literacy	VCL1	0.754	0.733	0.833	0.555
	VCL2	0.771			
	VCL4	0.716			
	VCL6	0.739			
Digital Tech. Acceptance	DTA1	0.723	0.745	0.839	0.567
	DTA2	0.809			
	DTA4	0.746			
	DTA6	0.729			
Digital amnesia behaviour	DAB1	0.807	0.886	0.914	0.638
	DAB2	0.823			
	DAB3	0.827			
	DAB4	0.761			
	DAB5	0.823			
	DAB6	0.750			

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4.1.5.5 Discriminant Validity

Discriminant validity is meant to work out whether or not a reflective indicator is an associate degree acceptable live of its construct supported by the principle that every indicator should be extremely related to its construct only. Measures of different constructs should not be highly correlated. In the SmartPLS application, the discriminant validity test uses cross loadings values, Fornell-Larcker Criterion, and Heterotrait-Monotrait (HTMT) (Hair et al., 2017). In other words, discriminant validity is a test to see the level of uniqueness of one construct from another. A latent variable should explain better the variance of its own indicators than the variance of other latent variables. If the discriminant validity is high, this proves that a construct is unique and different from other constructs (Hair et al., 2017).

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The degree of discriminant validity is discovered by determinative whether or not the root of AVE for every construct is more than the correlation between constructs and different constructs (Fornell & Larcker, 1981) where the AVE square root of the latent variable is required to be higher than the correlation between the latent variable and all other latent variables (Fornell & Larcker, 1981; Hair et al., 2017).

4.1.5.5.1.1 Cross-loading

Table 4.11 shows the factor values of each construct indicator and the cross-loading values with factor values with indicators in other constructs. The discriminant validity of this study is achieved when the value for each indicator of a construct has

a higher value than the value of the indicator of other constructs. The loadings of an item on its assigned latent variable should be higher than its loadings on all other latent variables. Table 4.11 shows the cross-loading value.

Table 4. 10

Cross-Loading

CONSTRUCT	BL	DAB	DTA	TL	VCL
BL1	0.801	-0.623	0.605	0.598	0.592
BL2	0.742	-0.496	0.528	0.566	0.520
BL3	0.613	-0.483	0.338	0.361	0.332
BL4	0.840	-0.605	0.605	0.598	0.581
BL5	0.770	-0.543	0.562	0.628	0.553
BL6	0.766	-0.571	0.576	0.632	0.557
DAB1	-0.596	0.807	-0.496	-0.549	-0.532
DAB2	-0.599	0.823	-0.560	-0.528	-0.537
DAB3	-0.639	0.827	-0.540	-0.546	-0.515
DAB4	-0.505	0.761	-0.429	-0.469	-0.444
DAB5	-0.633	0.823	-0.528	-0.574	-0.545
DAB6	-0.529	0.750	-0.475	-0.449	-0.507
DTA1	0.526	-0.431	0.723	0.528	0.517
DTA2	0.613	-0.547	0.809	0.597	0.557
DTA4	0.523	-0.493	0.746	0.500	0.528
DTA6	0.475	-0.424	0.729	0.520	0.508
TL2	0.595	-0.486	0.564	0.777	0.547
TL4	0.542	-0.465	0.527	0.748	0.514
TL5	0.555	-0.466	0.513	0.736	0.504
TL6	0.571	-0.547	0.549	0.763	0.481
VCL1	0.553	-0.475	0.551	0.514	0.754
VCL2	0.481	-0.519	0.546	0.496	0.771
VCL4	0.537	-0.460	0.483	0.516	0.716
VCL6	0.507	-0.463	0.506	0.488	0.739

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4.1.5.5.1.2 Fornell and Larcker Criterion Analysis

Table 4.10 shows the results of the Fornell-Larcker Criterion analysis where all AVE values exceed the squared correlation value indicated by the lower diagonal value of the table. Therefore, the discriminant validity of this study was also achieved based on the Fornell-Larcker criteria. The value of digital technology acceptance (0.753) is lower than the value of digital amnesia behaviour (0.799) and the virtual community literacy (0.745) which indicates that the two constructs are dimensions for the digital technology acceptance construct.

Table 4. 11

Discriminant Validity: Fornell and Larcker Criterion

Construct	Bit Literacy	Digital amnesia behaviour	Digital Technology Acceptance	Technical Literacy	Virtual Community Literacy
BL	**0.759**				
DAB	-0.734	**0.799**			
DTA	0.713	-0.634	**0.753**		
TL	0.749	-0.653	0.713	**0.756**	
VCL	0.695	-0.644	0.701	0.675	**0.745**

Note: *The diagonal values (bolded) are the square root of AVE. Off-diagonal values are correlation coefficients.*

4.1.5.5.1.3 Heterotrait-Monotrait Ratio (HTMT)

Heterotrait-monotrait correlation ratio (HTMT) was tested to assess discriminant validity (Hair, 2017). It is expected that the HTMT ratio should be < 0.85 to establish discriminant validity. Table 4.10 below shows that not all values meet the threshold of HTMT < 0.85. This indicated that the construction of this study lack of discriminant validity. However, this HTMT threshold problem has not prevented researchers from continuing the analysis because the bootstrap test results have

shown that the bootstrap confidence interval of 90% of HTMT does not include 1. This is as suggested by Henseler et al., (2016) that if HTMT is greater than 0.9, then use bootstrap to test whether HTMT differs significantly from 1 (HTMTinference); If so, the discriminant validity is not satisfactory. If not, the discriminant validity is satisfactory, and then the researcher can proceed with the analysis.

Table 4. 12

Heterotrait-Monotrait (HTMT) Ratio

	Bit Literacy	Digital amnesia behaviour	Digital Technology Acceptance	Technical Literacy	Virtual Community Literacy
Bit Literacy					
Digital amnesia behaviour	0.840				
Digital Tech. Acceptance	0.885	0.771			
Technical Literacy	0.933	0.794	0.951		
Virtual Community Literacy	0.878	0.796	0.947	0.913	

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4.1.5.6 Structural Model Validity

4.1.5.6.1. Results of Hypotheses

The significant level obtained from the hypothesis is confirmed at 99.9 per cent. Digital literacy plays a role in anticipating the behaviour of digital amnesia behaviour, where the three types of digital literacies (technical literacy, bit literacy and virtual community literacy) and digital technology acceptance have negative affect to digital amnesia behaviour.

4.1.5.6.2. Summary of Hypothesis

Table 4.13 summarizes the results of the hypotheses tests and the model:

Table 4.13

Summary of Hypothesis

						Confidence Interval Bias Corrected		
Hypts	Path	Std. Beta	Std. Error	T Value (>1.645)	Bias	5.00%	95.00%	Decision
H1	BLDAB	-0.438	0.065	6.710	0.002	-0.542	-0.329	Supported
H2	DTADAB	-0.104	0.060	1.733	-0.002	-0.199	-0.003	Supported
H3	TLDAB	-0.130	0.060	2.156	-0.002	-0.225	-0.029	Supported
H4	VCLDAB	-0.179	0.057	3.139	0.000	-0.273	-0.085	Supported

Based on Table 13, the results of the path coefficients and sample t-test bit literacy self-efficacy (BL) of students had a negative effect on students' digital amnesia behaviour (DAB) (b= -0.438, T-value = 6.710). This indicates that H1 is supported. Also, the impact of digital technology acceptance on students' digital amnesia behaviour (DAB) diversified to be negative and significant (b= -0.104, T-value = 1.733). Thus, H2 is supported accordingly. In addition, the impact of technical literacy self-efficacy (TL) has also been shown to have a negative effect on students' digital amnesia behaviour (DAB) behaviour (b= -0.130, T value = 2.156). Thus, H3 is supported correctly. In addition, for the H4 test, b = -0.179, T value = 3.139, thus supporting H4, which states that students' virtual community literacy self-efficacy (VCL) has a negative effect on students' digital amnesia behaviour (DAB).

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CHAPTER FIVE

DISCUSSION AND RECOMMENDATION

5.1 Introduction

This chapter contains discussions and recommendations based on the objectives and results of this study which have conducted at Universitas Islam Negeri Ar-Raniry, Banda Aceh. For convenience, the order of discussion issues is arranged based on the objectives of this research; starting from issues related to changes in student behaviour and perceptions of Nomophobia the Google Effect, and Digital amnesia behaviour phenomena, and their impact on memory retention and knowledge construction processes among students. The discussion then continued on the influence of digital literacy and digital technology acceptance on digital amnesia. At the end of the chapter contains several recommendations which are based on the findings of this study. It is hoped that the results of this discussion can enhance new insights and understandings on the Internet dependency among digital natives and its urgency to promote the digital literacy movement at various levels, both in the field of education and society in general.

5.2 Discussion

The following is a discussion of the research results. This discussion is intended to justify the findings with the theory and findings of previous studies. The discussion flow is carried out systematically based on the order of the variables studied in this study. The discussion begins with the perception of the phenomenon of nomophobia, Google effect, and digital amnesia behaviourphenomena. Then the discussion

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continues with the influence of technical literacy, bit literacy, virtual community literacy and digital technology acceptance on digital amnesia behaviour.

5.2.1. Nomophobia, Google effect, Digital Amnesia Behaviour

How do digital natives behave and perceive the phenomenon Internet dependency (Nomophobia, Google Effect and Digital Amnesia)?

5.2.1.1 Nomophobia among digital natives

Table 4.1 below shows the result of the survey based on the phenomena, namely Nomophobia, Google effect and digital behavior amnesia as well as perceptions of these three phenomena. 87.55 % of respondents feel more dependent on smartphones now than ever before.89.18 % always use smartphone to search for information. Even 78.18 have used it while studying and have found it very helpful for them.

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5.2.1.2 Google effect among digital natives

Similar to the phenomenon of nomophobia, the phenomenon of the Google effect among digital natives is also high. 79.09 % respondents said that the first thing they do when needed for general information was search the Internet, and 73.64 % of them did the same step when they looking for academic topic or did a college assignments. Interestingly, 44.55 % said they rarely save the information obtained because they believe that the information is always available on the Internet when needed.

5.2.1.3 Digital Amnesia Behavior among digital natives

Like the phenomenon of nomophobia and the Google effect, digital natives also experienced digital amnesia behavior.84.55 % said that they have entrusted their digital device to remember something they would not have been able to remember on their own. In addition 70.91 % tended to store information in their digital devices. It was believed that by doing that it will able to lighten the burden of remembering so that they can concentrate on remembering others.Interestingly, 59.09 % have mentioned that digital devices, especially smartphones can increase their motivation to answer a question or discuss a new topic.

5.2.1.4 Perception on Nomophobia, Google Effect and Digital Amnesia Behavior

In general, the perception of digital natives towards the phenomenon of internet dependence, especially Nomophobia, Google Effect and Digital Amnesia Behavior is very high; sequentially the percentages are as follows 59.09%, 69.09 and 88.18% According to them this phenomenon is something normal as a consequence of living in the digital world.

This study revealed that the digital natives generally experience nomophobia, Google effect, and digital amnesia behaviour phenomena and consider the phenomena normal in the digital era. This phenomenon is widely debated because it is feared that it will have a negative impact on the process of constructing human knowledge, especially digital natives. This concern seems reasonable because several study

results have shown early indications in that direction resulting in high human dependence on digital technology and new media, especially smartphones.

Furthermore study 2 has revealed that nomophobia, Google effect, and digital amnesia behaviour weakened memory retention and knowledge construction. Experimental results have shown that the effectiveness and efficiency offered by technology has increased people's addiction and trust in media technology, especially smartphones. This is evident from several experiments conducted by a group of researchers at the Columbia University and the University of Wisconsin–Madison below. The first experiment conducted by Betsy Sparrow of Columbia University and Jenny Liu, of the University of Wisconsin-Madison with the aim of examining the impact of people's trust in technology. This is in line with the finding of this study that digital amnesia behaviour weakens both memory retention and knowledge construction of digital natives.

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The conclusions that can be drawn from the result of experimental test of this study are (1) digital natives would try to think for themselves if they are not given the opportunity to use tools (the Internet), and interestingly, many of their answers are correct. (2) digital natives in the experimental group (who were allowed to check the Internet if needed) tended not to use their own memory to remember, but directly consulted the Internet

Along with this radical technological change has made this issue a popular topic and is studied in various disciplines. In the education, the issue of changing the behaviour of the digital .generation as a result of the development of information technology

was first discussed scientifically by (Prensky, 2001b)), at the same time popularizing the term Digital Natives, namely the generation born above the 1980s. Prensky (2001) stated that one of the inherent characteristics of this digital generation is “fluent in the digital language of computers, video games and the Internet.” For this digital generation, technology is not only functioning as a tool for finding information and communication but also as a lifestyle. Therefore, this radical change in the behaviour of digital natives needs to be responded well by all parties, from parents, educators to the government to ensure that technological and information developments have a positive impact on education (Koh, 2011; Prensky, 2001a).

Responding to this issue Henderson (2017) and Selwin (2009) who have conducted a cross-disciplinary literature review (information science, education studies and media/communication studies) to look at this issue comprehensively in various perspectives on how the behaviour of digital natives or "Net Generation" in using technology and digital information. By understanding of the behaviour of digital natives, it is hoped that it can help professional information service providers (information professionals) in educating this digital generation in the use of information technology in a more directed manner so that they do not get lost in their own world. Although Selwyn (2016) agrees with Prensk (2001) that digital natives has high competence and confidence in technology, he still emphasizes that changes in the behaviour of this digital generation should not be ignored, but always need adult monitoring and guidance.

Educators have also paid attention to the issue of changing the information-seeking behaviour of digital natives. For example Yusny (2017) reveals that although digital

natives have the ability in using smart technology, they tend to be less focused and serious in the teaching and learning process. This happens because they have believed that they can learn independently after class through the Internet.

The issue of technological transformation from manual to digital has been seriously responded to by world library organizations, IFLA. At the beginning of the 2017 IFLA Trend Report, specifically discussed "How will we access, use and benefit from information in an increasingly hyper-connected world?" (Karl et al., 2017).This IFLA question is a response to IFLA's concerns as a world body in the field of libraries that has the responsibility to ensure that all people can access and utilize information in the midst of this hyper-connected world. This question is of course not only important for librarians but also needs to be considered by scholars and policy makers. This is because today's information technology has successfully passed the connection and access phase of information. The Internet has become a solution to social issues about technological divide which was often questioned by parties in the late 1990s. Nowadays, the Internet has been able to bridge people in various corners of the earth to access various forms and formats of information online.

In other words, today's technology has succeeded in realizing an informed society. However, if we look at the big changes in the behaviour of the current digital generation, many people worried that technology will only succeed in creating the informed generation but not the knowledgeable generation. This concern certainly has reasons, especially when viewed from several study results regarding negative behaviour changes in digital natives, namely the high dependence digital devices

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(Byun et al., 2009; Soleymani et al., 2016), and less selective in seeking information that has a negative impact on academic achievement (Hakkarainen et al., 2015).

Negative indications of changes in information behaviour that occur among digital natives need to be studied to anticipate long-term negative impacts. This is because digital natives is required not only to be proficient in operating technological tools such as creating and editing information online but also to be wise in interacting with information critically, creatively, and ethically. These abilities are key to becoming a knowledgeable digital generation as well as responsible citizens in the context of a democratic society (American Association of School Librarians National Research Forum, 2014) Thus, it is hoped that technology must be a positive and productive solution to the development of digital generation knowledge.

In the following section, the results of study on the influence of digital literacy self-efficacy and digital acceptance of technology on students' digital amnesia behaviour will be discussed.

5.2.3 Technical literacy self-efficacy on Digital amnesia behaviour

The definition of technical literacy skills is the ability or competence of students to learn and work more independently or collaborate with others. In particular, digital natives can innovate digital technology in a professional, right-on-target, integrated, responsible, and productive manner to gain access, manage data, research, analyse, and obtain and share information or study objective data (Ezziane, 2007). The results of a survey related to technical literacy that conducted on the student population who are the subject of technology teaching objectives in all educational programs have

succeeded in guiding universities in designing technology innovation-based curricula.

Regarding the question of the level of technical literacy of students and their effect on the information patterns they do, Rakhmansyah's (2014) study discusses this issue where he proved that the effect of skills in using technology on the performance of the employees of the State Electricity Company in the Madiun Region. He added his study findings as follows: First, the simultaneous use of Internet wireless data and cellular information systems will substantially affect performance. Second, the use of wireless processing information partially has a significant performance impact.

Finally, any use of wireless information technology has a strong influence on efficiency. However, on digital competency skills with the level of information use in higher education, Emeahara's study (2016) shows a link between digital skills and information and equipment reception. Their study surveyed this relationship between graduate students at the University of Ibadan, Nigeria. Their findings suggest that the level of use of digital resources, particularly textual data, dramatically determines data retrieval skills and usage techniques. The results of the study concluded that the lack of adequate skills of students resulted in weak absorption of information expected by each subject from various information sources in the digital age. The implication, information and communication technology content should be part of the curriculum of every graduate program with an emphasis on e-information literacy.

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In line with that, Greenwood and Quinn (2017) said that digital amnesia behaviour among students is a problem of the complexity of digital technology tools and the future of the younger generation. According to him, the phenomenon of digital amnesia behaviouramong students is formed from the ignorance and over consciousness of technology users. They assessed the exponential growth of digital applications and consumer user relationships, including students. The implications for future generations of students in the printing success of sustainable development affect the imbalance of digital technology messages. The possibility of rearranging and conceptualizing learning is an important issue when preparing for future generations.

5.2.4 Bit literacy self-efficacy on digital amnesia behaviour

This sub-topic related to digital literacy bits discusses how the use of technology and information devices is affected by digital amnesia behaviourdue to the wrong or limited digital bit literacy rate. Several previous studies strongly support the relationship between digital bit literacy and student behaviour and the syndrome of using digital devices. For example, Noh (2016) who conducted a study to examine the pattern of use of technology and information devices by students and their effect on assignments at university. This study found that bit literacy competency has a very close impact on digital technology devices and information usage behaviour. Noh's substantial study proves that bit literacy affects the use of data in study results accompanied by interactive group literacy and technological literacy. Bit literacy is associated with data usage capacity, including information retrieval, data generation, information affirmation, information editing, information processing, and

information use, and these elements appear to influence information use (Noh, 2015, 2016).

5.2.5 Virtual community literacy self-efficacy and digital amnesia behaviour

The hypothesis supported that virtual community literacy influence negatively on digital amnesia behaviour. Justification of this result can be referred to Başaran İnce (2014). A growing digital culture is reflected in the use of smartphones for communication, according to him, makes friends through social media and using digital devices as a means of collective memory transfer. Modern and semi-modern societies will meet a new phase of temporality along with the development of digital technology. Speed, and mobility represent the fundamental characteristics of this phase. His essay tries to explore the possibilities or impossibilities of modern communication and understand its contribution to the development of collective memory "Digitality, interactivity, and hypertextuality", interactive content, and options provided. It is uncertain whether these modern times will contribute to the "memory explosion" or digital amnesia. Students who represent the younger generation in the digital era have undergone drastic changes as media users both as a means of communication and as absorbers of information. It should be understood that this development is a factor that influences the formation of communicative-cultural memory, which can be very advanced or backward in the field of cognitive memory (Oleshko and Oleshco, 2020). They add that digital amnesia behaviourcan occur as a factor that narrows the world of information and individual learning. Technology provides progress simply by increasing the number of mass

media multimedia products for different learning content. However, this did not cause this group of students to lose their memories; they need to be supported to enrich their understanding and knowledge through traditional learning and non-media literature sources.

5.2.6 Digital technology acceptance and digital amnesia behaviour

Looking at Taherdoos'(2018) analysis of the innovation adoption and implementation patterns and concepts, he said that an understanding of individual preferences and support, especially among youth, including students, is the starting point for every business to develop technology. For this reason, many academics are interested in knowing the variables that influence the adoption or rejection of innovation by young consumers. Various models and mechanisms for describing the implementation of emerging technologies by users have been developed. So far, business actors' studies will not examine the impacts and risks behind each technology acceptance and adoption, Though it is important to study how smartphone addiction among students has given a new look to students, both universities and schools. As reported by Alosaimi (2016) that the penetration of smartphone uses by students are quite high, namely 8 hours per day. 43% of smartphone users report reduced sleep hours and less energy the next day as a consequence of smartphone use. This is an example, among other aspects of how technology adoption models influence technology consumers rather than amnesia and cognitive disability.

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5.3 Implication of the Research

This research is expected to provide positive contributions or implications in three main aspects, namely theoretical implications, methodological implications, and practical implications.

5.3.1 Theoretical Implications

The TAM theory was successfully adopted by incorporating external elements to strengthen this theory. Digital Technology Acceptance (DTA) Self-efficacy of technical literacy (TL), BIT Literacy (BL) and Virtual Community Literacy (VCL) were found to contribute to reduce digital amnesia behaviour which is considered negative information behaviour which is feared that it will have a long-term impact on cognitive development and the constriction of human knowledge in the future.

Digital technology acceptance and digital literacy developed and used in this model show that students with a high level of digital literacy self-efficacy will continue to use digital technology devices in their daily academic life. They will be safe and able to use digital and mobile technologies for their needs, such as, to obtain, store, evaluate, and analyse and reproduce information positively and productively.

5.3.2 Methodological Implications

The methodological implications of this research include a successful application of mixed methods using the same approach-Quantitative in three different studies. As a result, the results are more detailed and comprehensive. Another implication is using structural equation modeling (SEM) for advanced statistical analysis. This has

provided new insight into measuring digital literacy self-efficacy among digital natives. It is because SEM emphasizes both content and internal construct validity, it also helps strengthen construct validity.

5.3.3 Practical Implications

The construct model of the influence of digital literacy and acceptance of digital technology on digital amnesia behaviour is adopted from several theories and developed in the context of information behaviour, especially in relation to the concept of universe of knowledge by Wilson (1981). Therefore, this construct can be used as a scale of measure or a guideline for the parties like librarian, educator and other information service providers who do not have a correct assessment of the role of digital literacy in relation to the radical changes in information behaviour in the digital era.

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5.4 Limitation

This study also has several limitations including; The sample coverage is relatively small involving only digital natives so the results cannot be generalized. Apart from building digital literacy constructs, there are no in-depth interviews with cross-sectoral experts who have a reputation in this field. The test of DL and DTA constructs only focused on students, not the general public. The study range was also short, so the results obtained were relatively less comprehensive.Therefore long-term (longitudinal) studies should be conducted to observe the most effective DL models and to identify DAB and other negative technology usage behaviours in this evolving digital development.

5.5 Recommendations for Future Studies

The findings of this study suggest several directions for further study. First, interviews with more reputable cross-sectoral experts should be done in order to gain a better understanding of the definition of digital literacy constructs to measure digital amnesia behaviour. In addition, testing the digital literacy constructs and digital technology acceptance with respect to various categories and academic levels of students is a feasible approach that does not only focus on students but also the general public. Furthermore, Studies can be conducted on a long-term (longitudinal) and continuous basis to observe the most effective digital literacy models and to identify digital amnesia behaviourand other negative technology use behaviours. Finally, in order to provide more reliable and comprehensive results, future studies should involve a range of groups and contexts.

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5.6 Conclusion

Human involvement in digital technology and new media is becoming increasingly intense, posing a severe humanitarian hazard. Because technology has a faster rate of collecting, storing, processing, finding, producing, and disseminating information than human capacities, humans have represented mental tasks on technical instruments. Digital literacy is an essential variable in educating and navigating the use of digital technologies, and anticipating their negative effects. In this regard, groups of students who have high self-efficacy towards digital literacy have good information literacy in seeking, selecting, discussing, processing, extracting, creating and communicating information new knowledge virtually. This is because people who have strong digital literacy competencies can not only use multimedia technology but also have a strong knowledge base to assess information content stored in multi-formats.

More specifically, students who have high self-efficacy in technical literacy are able to select, use and utilize appropriate technological devices according to their needs. The results of the hypothesis of this study also show that students who have high self-efficacy in bits literacy are able to select information which is based on the credibility of the source, the credibility of the information and the credibility of the media. These factors are very important to be considered in the era of Internet information. Likewise, students who have high self-efficacy in terms of virtual community literacy tend to have no effect on their digital amnesia behaviour.

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This study clearly reveals that the acceptance of technology and digital literacy self-efficacy with all its categories has a negative effect on digital amnesia behaviour. In other words, having self-efficacy on technical skills, bit ability and the ability to communicate virtually can reduce digital amnesia behaviour.

These findings actually open a wider space for all parties such as governments, educators, librarians across time, space and location. Digital amnesia behaviourand other negative use of technology are new phenomena which long-term effect is doubtful for the development of mass knowledge. In front of humans, it can be anticipated by promoting more digital literacy competence programs for all levels of society.

The behaviour of digital amnesia behaviouris also strongly supported by the presence of external factors (or antecedent factors), namely the acceptance of digital technology and the low self-efficacy of digital literacy, especially from the three basic literacy categories, namely technical literacy, bit literacy, and virtual community literacy. These factors are the principles that stimulate the formation of positive information behaviour from respondents who have high self-efficacy about digital literacy which ultimately encourages them to use information on the Internet positively and productively.

Digital literacy plays significant role in influencing the usage of positive information and technology on the Internet, but it is not the only factor. On the other hand, for respondents who have accepted and used digital technology based on the perception that digital technology is useful and digital technology is easy to use, it also becomes

an important prerequisite.In conclusion, perceived positive attitudes toward technology and high levels of self-efficacy in technical literacy, bit literacy, and virtual community literacy reduce digital amnesia behaviour among digital natives

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APPENDIXES

Appendix 3: Instrument for Study 2a (Memory Retention-Control Group)

INSTRUMEN PENELITIAN

Pusat Pengajian Teknologi Multimedia & Komunikasi
SCHOOL OF MULTIMEDIA TECHNOLOGY & COMMUNICATION
Universiti Utara Malaysia

Assalamu'alaikum Adik-Adik Mahasiswa

Perkenalkan Saya Nazaruddin Musa, dosen Universitas Islam Negeri (UIN) Banda Aceh yang saat ini sedang melakukan penelitian untuk menyelesaikan program doktor (Ph.D) di School of Multimedia Technology and Communication (SMMTC) Universiti Utara Malaysia. Untuk itu, saya sangat memerlukan bantuan Anda untuk menjawab 20 soal mudah berikut ini. Partisipasi Anda dalam kuis ini bersifat sukarela. Namun, saya sangat mengharapkan kesukarelaan Anda agar proses pendataan dapat dilakukan dengan baik dan cepat. Semua data pribadi dan jawaban Anda hanya digunakan untuk kepentingan penelitian ini dan saya jamin kerahasiaannya.

Jika Anda membutuhkan informasi lebih lanjut tentang eksperimen ini, jangan ragu untuk menghubungi saya melalui: Email : nazaruddin@ar-raniry.ac.id atau WhatsApp : +61811670101

Ketentuan:
Jawablah soal-soal berikut dengan tepat dan benar dalam waktu 20 menit
Anda tidak diperbolehkan menggunakan alat bantu apapun seperti smartphone, Internet, bertanya kepada kawan untuk menjawab soal-soal berikut ini.

NO	PERTANYAAN	JAWABAN
1	Subhanallah sering disebut bacaan?	
2	Al-Ghafur adalah salah satu asmaul husna yang artinya?	
3	Shalat sunat yang yang mengiringi shalat wajib disebut shalat?	
4	Rukun Islam yang ketiga adalah?	
5	Rukun Iman yang kelima adalah iman kepada?	
6	Orang yang membayar zakat disebut?	

7	Makmum yang terlambat satu raka'at atau lebih bersama imam disaat shalat berjama'ah disebut?	
8	Nama Malaikat yang bertugas memberi rezeki adalah?	
9	Lakum diinukum waliyadiin ialah bagian dari surat?	
10	Berdiam diri atau berhenti untuk tidak berjalan ketika di Arafah disebut ?	
11	Berapa lama Indoensia dijajah oleh Jepang?	
12	Nama kerajaan Islam tertua di Indonesia adalah?	
13	Kantor Perserikatan Bangsa-Bangsa (PBB) terletak di kota?	
14	Badan Perserikatan Bangsa-Bangsa (PBB) yang mengurusi bidang pendidikan dan kebudayaan adalah?	
15	KPU merupakan singkatan dari?	
16	Nama Presiden ketiga Republik Indonesia adalah?	
17	Nama Perdana Menteri Malaysia sekarang adalah?	
18	Samudera terluas di dunia adalah ?	
19	KPK merupakan singkatan dari ?	
20	BNN merupakan singkatan dari ?	

Appendix 4: Instrument for Study 2a (Memory Retention- Experimental Group)

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INSTRUMEN PENELITIAN

Pusat Pengajian Teknologi Multimedia & Komunikasi
SCHOOL OF MULTIMEDIA TECHNOLOGY & COMMUNICATION
Universiti Utara Malaysia

Assalamu'alaikum Adik-Adik Mahasiswa

Perkenalkan Saya Nazaruddin Musa, dosen Universitas Islam Negeri (UIN) Banda Aceh yang saat ini sedang melakukan penelitian untuk menyelesaikan program doktor (Ph.D) di School of Multimedia Technology and Communication (SMMTC) Universiti Utara Malaysia. Untuk itu, saya sangat memerlukan bantuan Anda untuk menjawab 20 soal mudah berikut ini. Partisipasi Anda dalam kuis ini bersifat sukarela. Namun, saya sangat mengharapkan kesukarelaan Anda agar proses pendataan dapat dilakukan dengan baik dan cepat. Semua data pribadi dan jawaban Anda hanya digunakan untuk kepentingan penelitian ini dan saya jamin kerahasiaannya.

Jika Anda membutuhkan informasi lebih lanjut tentang eksperimen ini, jangan ragu untuk menghubungi saya melalui: Email : nazaruddin@ar-raniry.ac.id atau WhatsApp : +61811670101

Ketentuan:

Jawablah soal-soal berikut dengan tepat dan benar dalam waktu 20 menit.

Jika diperlukan, **Anda boleh menggunakan Internet** untuk menjawab namun tolong berikan alasan Anda secara detil di kolom keterangan yang tersedia.

NO	PERTANYAAN	KETERANGAN
1	Subhanallah sering disebut bacaan?	
2	Al-Ghafur adalah salah satu asmaul husna yang artinya?	
3	Shalat sunat yang yang mengiringi shalat wajib disebut shalat ?	
4	Rukun Islam yang ketiga adalah?	
5	Rukun Iman yang kelima adalah iman kepada ?	
6	Orang yang membayar zakat disebut?	
7	Makmum yang terlambat satu raka'at atau lebih bersama imam disaat shalat berjama'ah disebut?	
8	Nama Malaikat yang bertugas memberi rezeki adalah?	
9	Lakum diinukum waliyadiin ialah bagian dari surat?	
10	Berdiam diri atau berhenti untuk tidak berjalan ketika di Arafah disebut ?	
11	Berapa lama Indoensia dijajah oleh Jepang?	
12	Nama kerajaan Islam tertua di Indonesia adalah?	
13	Kantor Perserikatan Bangsa-Bangsa (PBB) terletak di	

	kota?	
14	Badan Perserikatan Bangsa-Bangsa (PBB) yang mengurusi bidang pendidikan dan kebudayaan adalah?	
15	KPU merupakan singkatan dari?	
16	Nama Presiden ketiga Republik Indonesia adalah?	
17	Nama Perdana Menteri Malaysia sekarang adalah?	
18	Samudera terluas di dunia adalah ?	
19	KPK merupakan singkatan dari ?	
20	BNN merupakan singkatan dari ?	

Appendix 5: Instrument for Study 2b (Knowledge Construction-Control Group)

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INSTRUMEN PENELITIAN

Pusat Pengajian Teknologi Multimedia & Komunikasi
SCHOOL OF MULTIMEDIA TECHNOLOGY & COMMUNICATION
Universiti Utara Malaysia

Assalamu'alaikum Adik-Adik Mahasiswa

Perkenalkan Saya Nazaruddin Musa, dosen Universitas Islam Negeri (UIN) Banda Aceh yang saat ini sedang melakukan penelitian untuk menyelesaikan program doktor (Ph.D) di School of Multimedia Technology and Communication (SMMTC) Universiti Utara Malaysia. Untuk itu, saya sangat memerlukan bantuan Anda untuk menonton video eksperimen saya. Selanjutnya mohon kesdiaan adik-adik untuk menjawab 4 buah pertanyaan yang berhubungan dengan video tersebut.

Partisipasi Anda dalam kuis ini bersifat sukarela. Namun, saya sangat mengharapkan kesukarelaan Anda agar proses pendataan dapat dilakukan dengan baik dan cepat. Semua data pribadi dan jawaban Anda hanya digunakan untuk kepentingan penelitian ini dan saya jamin kerahasiaannya.

Jika Anda membutuhkan informasi lebih lanjut tentang eksperimen ini, jangan ragu untuk menghubungi saya melalui: Email : nazaruddin@ar-raniry.ac.id atau WhatsApp : +61811670101

UUM Universiti Utara Malaysia

Instrumen Eksperimen-Untuk Kelompok Kontrol

Ketentuan:

Nama :…….(Tidak wajib isi)

Waktu: 20 Menit

Anda **tidak dibolehkan** bertanya kawan atau menggunakan alat Internet

1. Menurut analisa Anda, apa kira-kira tema yang tepat terhadap video kilp yang telah anda tonton?
2. Menurut Anda, semua video klip yang muncul dalam tayangan dapat dikelempokkan ke dalam berapa kategori? Sebutkan nama-nama kategori yang Anda maksudkan.

Perhatian : Untuk pertanyaan di atas ini,silakan jawab pertanyaan tambahan berikut ini dengan cara memberi tanda di kotak yang tersedia

Saya sudah pernah mengetahui lebih dari 50% dari iklan-iklan/merek-merek diperlihat di video tersebut:

Ya ☐

Tidak ☐

3. Sebutkan merek-merek apa saja yang muncul dalam video klip yang anda ingat
4. Berikan interpretasi (kesimpulan) Anda tentang tema video klip yang telah Anda tonton, dan hubungkan dengan kondisi sosial di sekeliling Anda?

TERIMA KASIH

Appendix 6: Instrument for Study 2b (KC Test –Experimental Group)

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INSTUMENT PENELITIAN

Pusat Pengajian Teknologi Multimedia & Komunikasi
SCHOOL OF MULTIMEDIA TECHNOLOGY & COMMUNICATION
Universiti Utara Malaysia

Ketentuan:

Nama :…….(Tidak wajib isi)

Waktu: 20 Menit

Anda **dibolehkan** menggunakan alat elektronik dan Internet

1. Menurut analisa Anda, apa kira-kira tema yang tepat terhadap video kilp yang telah anda tonton?
2. Menurut Anda, semua video klip yang muncul dalam tayangan dapat dikelempokkan ke dalam berapa kategori? Sebutkan nama-nama kategori yang Anda maksudkan.

Perhatian : Untuk pertanyaan di atas ini,silakan jawab pertanyaan tambahan berikut ini dengan cara memberi tanda di kotak yang tersedia

Saya sudah pernah mengetahui lebih dari 50% dari iklan-iklan/merek-merek diperlihat di video tersebut:

Ya ☐

Tidak ☐

3. Sebutkan merek-merek apa saja yang muncul dalam video klip yang anda ingat
4. Berikan interpretasi (kesimpulan) Anda tentang tema video klip yang telah Anda tonton, dan hubungkan dengan kondisi sosial di sekeliling Anda?

TERIMA KASIH

Appendix 7: Experimental Action and Treatment

GROUP	TREATMENT	CONDITION
CONTROL	Each participant was asked to answer 4 questions, using the video clips that have been watched as source of data	Participants were not allowed to use electronic devices in any form such as smartphones, tablets, laptops and others. The maximum time given to answer the question is 20 minutes
EXPERIMENT	Each participant was asked to answer 4 questions, using the video clips that have been watched as data.	If necessary, participants were allowed to use electronic devices in any form such as smartphones, tablets and laptops, the Internet and also PCs available in the experimental room. The maximum time allotted to answer the question was 20 minutes

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Appendix 8: Rubric for Knowledge Construction Test (Control Group)

CATEGORY	Very Good (4)	Good (3)	Fair (2)	Weak (1)
Identifying relationships between video clips	able to list all the main points that appeared in the video clip.	Students were able to list some of the main points that appeared in the video clip	Students were able to list some points that appeared in the video clip but were not important.	Students were unable to accurately list the important points or information that appears in the video clip.
INTERPRETATION Drawing conclusions beyond the literal meaning of the video clips	They only use 1-3 sentences to explain clearly about the video clip.	They used a few sentences to accurately describe what the video clip was about	Students summarized most of the video clips accurately, but have a few misunderstandings	Students had great difficulty in summarizing the video clips.
SYNTHESIS Identify relationships among the many ideas in a video clip	Students could remember some details for each main point of the video clip in sequence	Students could remember some details for each main point of the video clip, but not sequentially	Students could remember some details for each main point of the video clip, but not with accuracy.	Students could not remember some details for each main point of the video clip
EVALUATION Assess the quality and credibility of the information sources used (Emotional response to the video clips	Students include 4 or more high-quality sources used	Students included 2-3 high-quality sources.	Students included 2-3 sources but some of them were of questionable quality.	Students entered less than 2 sources

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Appendix 9:Rubric for Knowledge Construction Test (Experiment Group)

CATEGORY	Very Good (4)	Good (3)	Fair (2)	Weak (1)
ANALYSIS Identifying relationships between video clips	Students were able to list all the main points that appeared in the video clip.	Students were able to list some of the main points that appeared in the video clip	Students were able to list some points that appeared in the video clip but were not important.	Students were was unable to accurately list the important points or information that appears in the video clip.
INTERPRETATION Drawing conclusions beyond the literal meaning of the video clips	Student only used 1-3 sentences to explain clearly about the video clip.	Student used a few sentences to accurately describe what the video clip was about	Students summarize most of the video clips accurately, but have a few misunderstandings	Students have great difficulty in summarizing the video clips.
SYNTHESIS Identify relationships among the many ideas in a video clip	Students remembered some details for each main point of the video clip in sequence	Students remembered some details for each main point of the video clip, but not sequentially	Students could remember some details for each main point of the video clip, but not with accuracy.	Students could not remember some details for each main point of the video clip
EVALUATION Assess the quality and credibility of the information sources used (Emotional response to the video clips	Students include 4 or more high-quality sources used from Internet	Students include 2-3 high-quality sources from Internet	Students included 2-3 sources but some of them were of questionable quality	Students enter less than 2 sources

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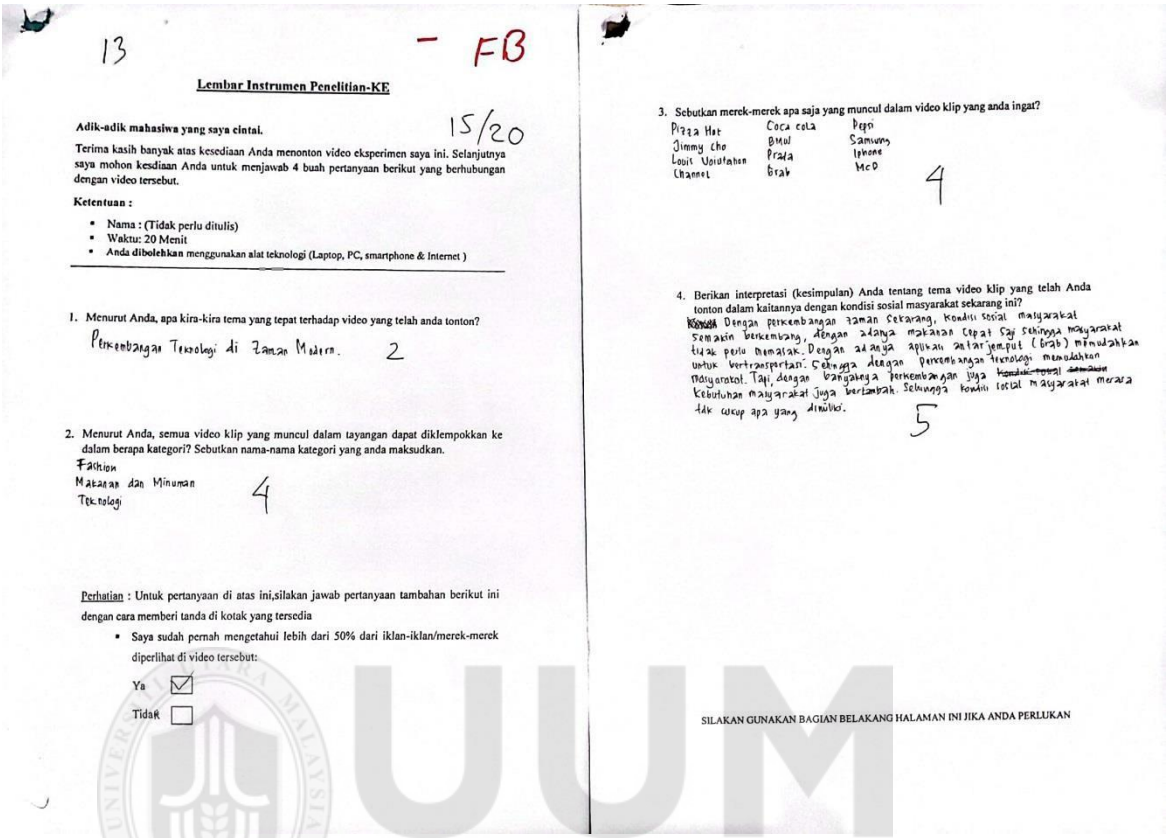
Appendix 10: Example of score based on rubric for knowledge construction Test



13 — FB

Lembar Instrumen Penelitian-KE

15/20

Adik-adik mahasiswa yang saya cintai.

Terima kasih banyak atas kesediaan Anda menonton video eksperimen saya ini. Selanjutnya saya mohon kesdiaan Anda untuk menjawab 4 buah pertanyaan berikut yang berhubungan dengan video tersebut.

Ketentuan :

- Nama : (Tidak perlu ditulis)
- Waktu: 20 Menit
- **Anda dibolehkan** menggunakan alat teknologi (Laptop, PC, smartphone & Internet)

1. Menurut Anda, apa kira-kira tema yang tepat terhadap video yang telah anda tonton?

   Perkembangan Teknologi di Zaman Modern. 2

2. Menurut Anda, semua video klip yang muncul dalam tayangan dapat diklempokkan ke dalam berapa kategori? Sebutkan nama-nama kategori yang anda maksudkan.

   Fashion
   Makanan dan Minuman
   Teknologi
   4

Perhatian : Untuk pertanyaan di atas ini,silakan jawab pertanyaan tambahan berikut ini dengan cara memberi tanda di kotak yang tersedia

- Saya sudah pernah mengetahui lebih dari 50% dari iklan-iklan/merek-merek diperlihat di video tersebut:

  Ya ☑
  Tidak ☐

3. Sebutkan merek-merek apa saja yang muncul dalam video klip yang anda ingat?

   Pizza Hut, Jimmy Choo, Louis Vuittonen Channel, Coca cola, BMW, Prada, Grab, Pepsi, Samsung, Iphone, McD
   4

4. Berikan interpretasi (kesimpulan) Anda tentang tema video klip yang telah Anda tonton dalam kaitannya dengan kondisi sosial masyarakat sekarang ini?

   Dengan perkembangan zaman sekarang, kondisi sosial masyarakat semakin berkembang, dengan adanya makanan cepat saji sehingga masyarakat tidak perlu memasak. Dengan adanya aplikasi antar jemput (Grab) memudahkan untuk bertransportasi. Sehingga dengan perkembangan teknologi memudahkan masyarakat. Tapi, dengan bangyaknya perkembangan juga kebutuhan masyarakat juga bertambah. Sehingga kondisi sosial masyarakat merasa tdk cukup apa yang dimiliki.
   5

SILAKAN GUNAKAN BAGIAN BELAKANG HALAMAN INI JIKA ANDA PERLUKAN

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Appendix 11: Instrument for study 3 (Influence of DL and DTA on DAB)

Assalamu'alaikum rekan-rekan mahasiswa

Saya Nazaruddin Musa, dosen Universitas Islam Negeri (UIN) Banda Aceh yang saat ini sedang melakukan penelitian untuk menyelesaikan program doktor (Ph.D.) di School of Multimedia Technology and Communication (SMMTC) Universiti Utara Malaysia. Untuk itu, saya sangat memerlukan bantuan Anda untuk mengisi pertanyaan survei berikut. Partisipasi Anda dalam eksperimen ini bersifat sukarela. Namun, saya sangat mengharapkan kesukarelaan Anda agar proses pendataan dapat dilakukan dengan baik dan cepat. Semua data pribadi dan jawaban Anda hanya digunakan untuk kepentingan penelitian ini dan saya jamin kerahasiaannya.

Jika Anda memerlukan informasi lebih lanjut tentang eksperimen ini, jangan ragu untuk menghubungi saya melalui: Email: nazaruddin@ar-raniry.ac.id atau WhatsApp: +61811670101

Atas partisipasi Anda dalam survei ini, saya ucapkan terima kasih dan doakan semoga menjadi amal kebaikan di sisi Allah SWT. Amin.

Keterangan :

STS = Sangat Tidak Setuju

TS = Tidak Setuju

KS = Kurang Setuju

S = Setuju

SS = Sangat Setuju

QUESTIONER		SKALA LIKERT				
A	Digital Technology Acceptance (DTA)	STS	TS	KS	S	SS
1	Penggunaan teknologi digital di bidang pendidikan adalah suatu keharusan	1	2	3	4	5
2	Saya memiliki sikap positif terhadap penggunaan teknologi	1	2	3	4	5
3	Saya percaya bahwa berbagi informasi dengan TIK memberi saya kepercayaan diri	1	2	3	4	5
4	Penggunaan teknologi digital menambah pengalaman saya	1	2	3	4	5

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5	Motivasi saya untuk menggunakan teknologi digital dan Internet cukup pribadi	1	2	3	4	5
6	Memiliki pengalaman pribadi membantu saya dalam memanfaatkan teknologi dengan sebaik-baiknya	1	2	3	4	5
B	Technical Literacy (TL)	STS	TS	KS	S	SS
7	Saya percaya diri dengan kemampuan saya untuk mengoperasikan perangkat digital	1	2	3	4	5
8	Saya percaya diri dengan kemampuan saya untuk menggunakan Microsoft Windows	1	2	3	4	5
9	Saya percaya diri dengan kemampuan saya untuk mengedit dokumen	1	2	3	4	5
10	Saya percaya diri dengan kemampuan saya untuk menggunakan browser web	1	2	3	4	5
11	Saya percaya diri dengan kemampuan saya untuk berkomunikasi secara online	1	2	3	4	5
12	Saya percaya diri dengan kemampuan saya mengatasi masalah teknis perangkat digital saya	1	2	3	4	5
C	Bit Literacy (BL)	STS	TS	KS	S	SS
13	Saya percaya diri dengan kemampuan saya mencari informasi secara online	1	2	3	4	5
14	Saya percaya diri dengan kemampuan saya untuk menilai informasi yang tepat	1	2	3	4	5
15	Saya percaya diri dengan kemampuan saya untuk mengedit informasi	1	2	3	4	5
16	Saya percaya diri dengan kemampuan saya untuk memproses informasi	1	2	3	4	5
17	Saya percaya diri dengan kemampuan saya untuk menggunakan informasi	1	2	3	4	5
18	Saya percaya diri dengan kemampuan saya untuk menciptakan informasi	1	2	3	4	5
D	Virtual Community Literacy (VCL)	STS	TS	KS	S	SS

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19	Saya percaya diri dengan kemampuan saya untuk berpartisipasi dalam komunitas vitual	1	2	3	4	5
20	Saya percaya diri dengan kemampuan saya untuk menjaga keamanan identitas diri di dunia virtual	1	2	3	4	5
21	Saya percaya diri dengan kemampuan saya untuk menjalin hubungan vitual	1	2	3	4	5
22	Saya percaya diri dengan kemampuan saya untuk memecahkan masalah digital secara kolektif	1	2	3	4	5
23	Saya percaya diri dengan kemampuan saya untuk menciptakan budaya cyber	1	2	3	4	5
24	Saya percaya diri dengan kemampuan saya untuk mengelola pertemuan virtual seperti webinar	1	2	3	4	5
E	Perilaku Digital Amnesia	STS	TS	KS	S	SS
25	Saya menggunakan Internet sebagai perpanjangan otak online saya	1	2	3	4	5
26	Saya tidak perlu mengingat fakta yang saya temukan online - tetapi saya harus mengingat di mana saya menyimpannya	1	2	3	4	5
27	Perangkat digital saya adalah memori saya, hampir semua yang perlu saya ketahui tersimpan di dalamnya	1	2	3	4	5
28	Kebanyakan orang sekarang memiliki begitu banyak angka, alamat email, dll, sehingga tidak mungkin untuk menghafal semuanya	1	2	3	4	5
29	Saya biasanya membutuhkan jawaban dengan cepat dan tidak punya waktu untuk perpustakaan atau buku	1	2	3	4	5
30	Tanpa perangkat digital di tangan, saya cenderung melupakan data maupun informasi yang penting	1	2	3	4	5

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Appendix 12: Instrument for study 3(Influence of DL and DTA on DAB) (English)

Assalamu'alaikum my fellow students

I am Nazaruddin Musa, a lecturer at Universitas Islam Negeri (UIN) Banda Aceh who is currently conducting research to complete a doctoral program (Ph.D) at the School of Multimedia Technology and Communication (SMMTC) Universiti Utara Malaysia. For this purpose, I really need your help to fill out the following survey questions. Your participation in this survey is voluntary. However, I really hope for your volunteerism so that the data collection process can be carried out properly and quickly. All personal data and your answers are only used for the purposes of this research and I guarantee confidentiality.
If you need further information about this survey, please do not hesitate to contact me via: Email : nazaruddin@ar-raniry.ac.id or WhatsApp : +61811670101
Finally, for your participation in this survey, I thank you and pray that it will be a good deed by Allah. Amen.

Description:
SD = Strongly Disagree
D = Disagree
AD = Nether Agree nor Disagree
A = Agree
SA = Strongly Agree

QUESTIONER LIST		LIKERT SCALE				
A	Digital Technology Acceptance (DTA)	SD	D	A/D	A	SA
1	The use of digital technology in education is a must	1	2	3	4	5
2	I have a positive attitude towards using technology	1	2	3	4	5
3	I believe that sharing information with ICT gives me confidence	1	2	3	4	5
4	Using digital technology enhances my experience	1	2	3	4	5
5	My motivation for using digital technology and the Internet is quite personal	1	2	3	4	5
6	Having personal experience helps me make the best use of technology	1	2	3	4	5
B	Technical Literacy (TL)	SD	D	A/D	A	SA
7	I am confident in my ability to operate digital devices.	1	2	3	4	5
8	I am confident in my ability to use Microsoft Windows	1	2	3	4	5
9	I am confident in my ability to edit documents	1	2	3	4	5
10	I am confident in my ability to use a web browser	1	2	3	4	5
11	I am confident in my ability to communicate online	1	2	3	4	5
12	I am confident in my ability to solve technical	1	2	3	4	5

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	problems with my digital device					
C	Bit Literacy (BL)	SD	D	A/D	A	SA
13	I am confident in my ability to find information online	1	2	3	4	5
14	I am confident in my ability to judge appropriate information	1	2	3	4	5
15	I am confident in my ability to edit information	1	2	3	4	5
16	I am confident in my ability to process information	1	2	3	4	5
17	I am confident in my ability to use information	1	2	3	4	5
18	I am confident in my ability to create information	1	2	3	4	5
D	Virtual Community Literacy (VCL)	SD	D	A/D	A	SA
19	I am confident in my ability to participate in virtual community	1	2	3	4	5
20	I am confident in my ability to keep my identity safe in the virtual world	1	2	3	4	5
21	I am confident in my ability to make virtual connections	1	2	3	4	5
22	I am confident in my ability to solve digital problems collectively	1	2	3	4	5
23	I am confident in my ability to create cyber culture	1	2	3	4	5
24	I am confident in my ability to manage virtual meetings such as webinars	1	2	3	4	5
E	Perilaku Digital Amnesia	SD	D	A/D	A	SA
25	I use the Internet as an extension of my online brain	1	2	3	4	5
26	I don't need to remember facts I find online - but I need to remember where I put them	1	2	3	4	5
27	My digital device is my memory, almost everything I need to know is stored on it	1	2	3	4	5
28	Most people today have so many numbers, email addresses, etc., that it is impossible to memorize them all	1	2	3	4	5
29	I usually need answers quickly and don't have time for the library or books	1	2	3	4	5
30	Without a digital device at hand, I tend to forget important data and information	1	2	3	4	5

Appendix 13:Pretest- Knowledge Construction

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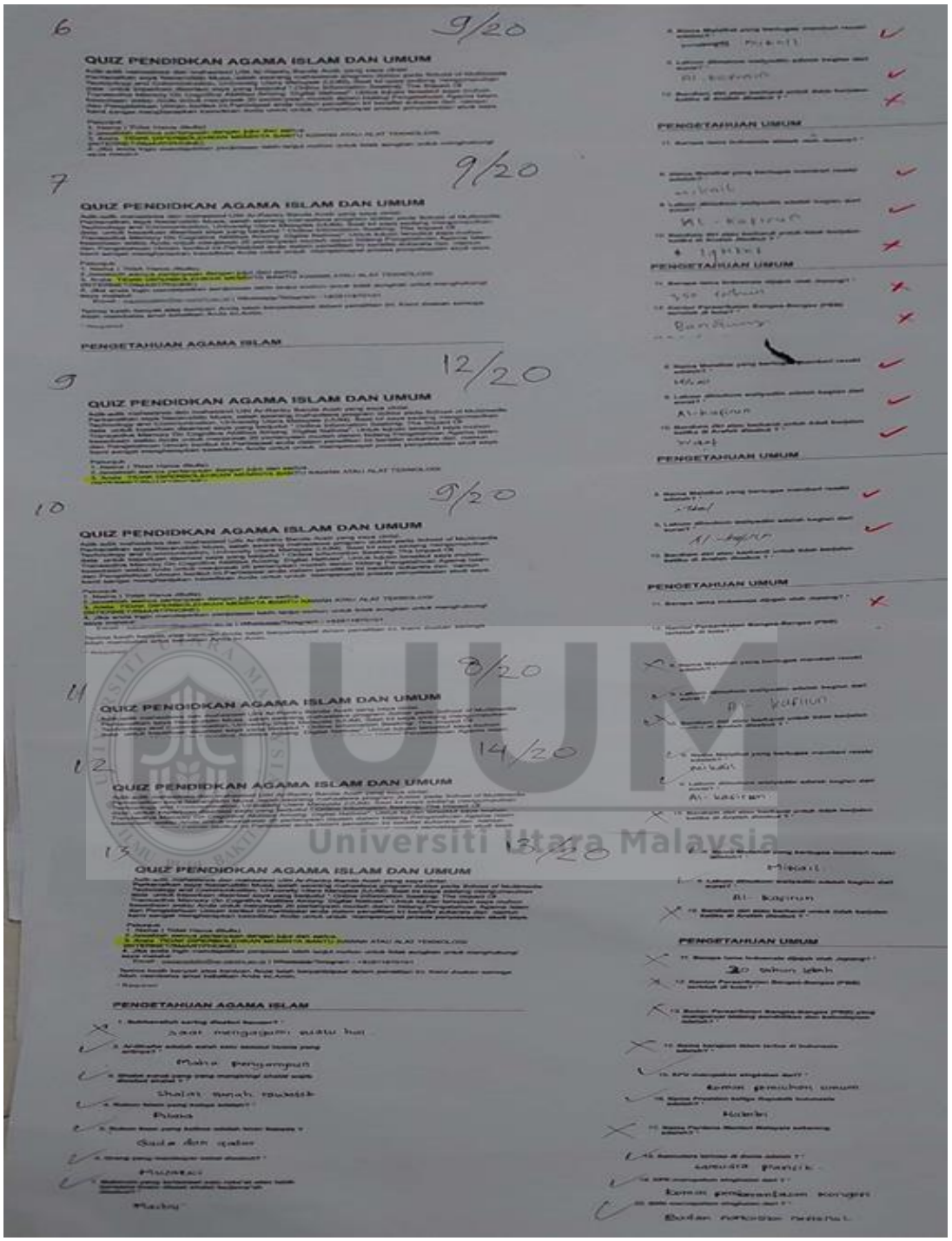
Appendix 14: Memory Retetion Test (Control Group)

Appendix 15: Example Resul tof Memory Retention Test (Control Group)



Appendix 16: Example of Control Group on “Internet Knowledge” (Lowe Score)

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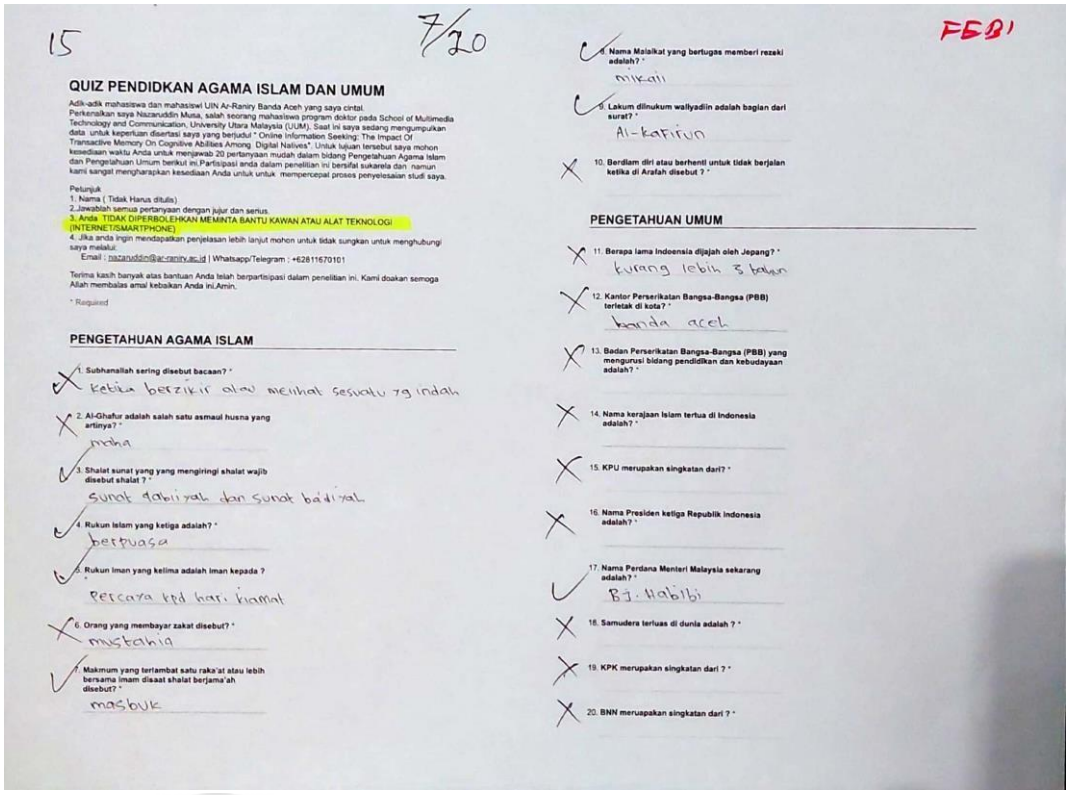

15 7/20 FE81

QUIZ PENDIDKAN AGAMA ISLAM DAN UMUM

Adik-adik mahasiswa dan mahasiswi UIN Ar-Raniry Banda Aceh yang saya cintai.
Perkenalkan saya Nazaruddin Muta, salah seorang mahasiswa program doktor pada School of Multimedia Technology and Communication, University Utara Malaysia (UUM). Saat ini saya sedang mengumpulkan data untuk keperluan disertasi saya yang berjudul " Online Information Seeking: The Impact Of Transactive Memory On Cognitive Abilities Among Digital Natives". Untuk tujuan tersebut saya mohon kesediaan waktu Anda untuk menjawab 20 pertanyaan mudah dalam bidang Pengetahuan Agama Islam dan Pengetahuan Umum berikut ini.Partisipasi anda dalam penelitian ini bersifat sukarela dan namun kami sangat mengharapkan kesediaan Anda untuk untuk mempercepat proses penyelesaian studi saya.

Petunjuk
1. Nama (Tidak Harus ditulis)
2. Jawablah semua pertanyaan dengan jujur dan serius.
3. Anda TIDAK DIPERBOLEHKAN MEMINTA BANTU KAWAN ATAU ALAT TEKNOLOGI (INTERNET/SMARTPHONE)
4. Jika anda ingin mendapatkan penjelasan lebih lanjut mohon untuk tidak sungkan untuk menghubungi saya melalui:
Email : nazaruddin@ar-raniry.ac.id | Whatsapp/Telegram : +62811670101

Terima kasih banyak atas bantuan Anda telah berpartisipasi dalam penelitian ini. Kami doakan semoga Allah membalas amal kebaikan Anda ini.Amin.

* Required

PENGETAHUAN AGAMA ISLAM

1. Subhanallah sering disebut bacaan? *
ketika berzikir atau melihat sesuatu yg indah
2. Al-Ghafur adalah salah satu asmaul husna yang artinya? *
maha
3. Shalat sunat yang yang mengiringi shalat wajib disebut shalat ? *
sunat qabliyah dan sunat badiyah
4. Rukun Islam yang ketiga adalah? *
berpuasa
5. Rukun Iman yang kelima adalah Iman kepada ? *
percaya kpd hari kiamat
6. Orang yang membayar zakat disebut? *
mustahia
7. Makmum yang terlambat satu raka'at atau lebih bersama imam diaaat shalat berjama'ah disebut? *
masbuk
8. Nama Malaikat yang bertugas memberi rezeki adalah? *
mikail
9. Lakum dilnukum wallyadiin adalah bagian dari surat? *
Al-kafirun
10. Berdiam diri atau berhenti untuk tidak berjalan ketika di Arafah disebut ? *

PENGETAHUAN UMUM

11. Berapa lama Indoensia dijajah oleh Jepang? *
kurang lebih 3 bulan
12. Kantor Perserikatan Bangsa-Bangsa (PBB) terletak di kota? *
banda aceh
13. Badan Perserikatan Bangsa-Bangsa (PBB) yang mengurusi bidang pendidikan dan kebudayaan adalah? *
14. Nama kerajaan Islam tertua di Indonesia adalah? *
15. KPU merupakan singkatan dari? *
16. Nama Presiden ketiga Republik Indonesia adalah? *
17. Nama Perdana Menteri Malaysia sekarang adalah? *
BJ. Habibi
18. Samudera terluas di dunia adalah ? *
19. KPK merupakan singkatan dari ? *
20. BNN merupakan singkatan dari ? *

Appendix 17: Memory Retention Test (Experiment Group)

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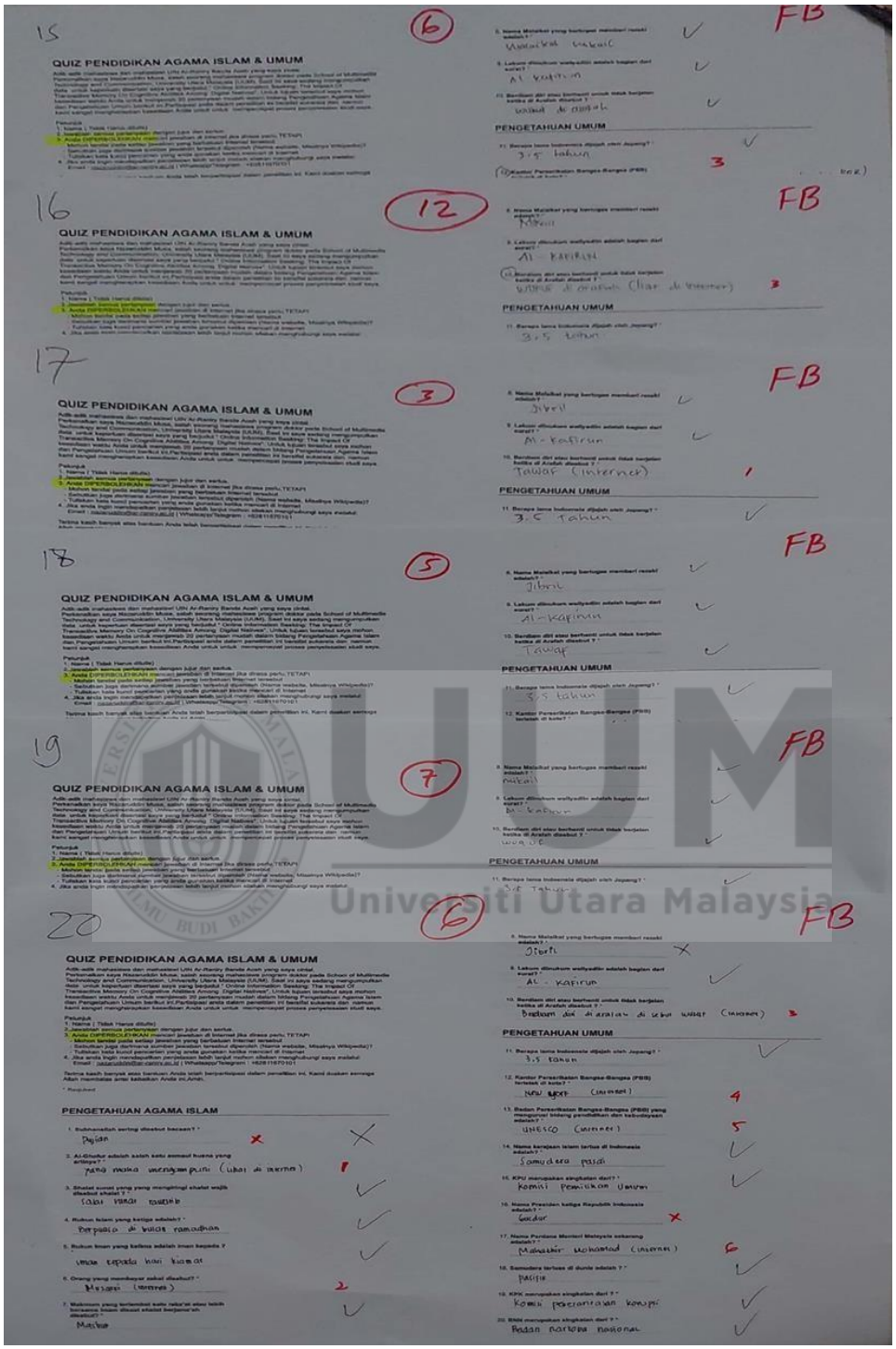
Appendix 18: Example Result of Memory Retention Test (Experimental Group)



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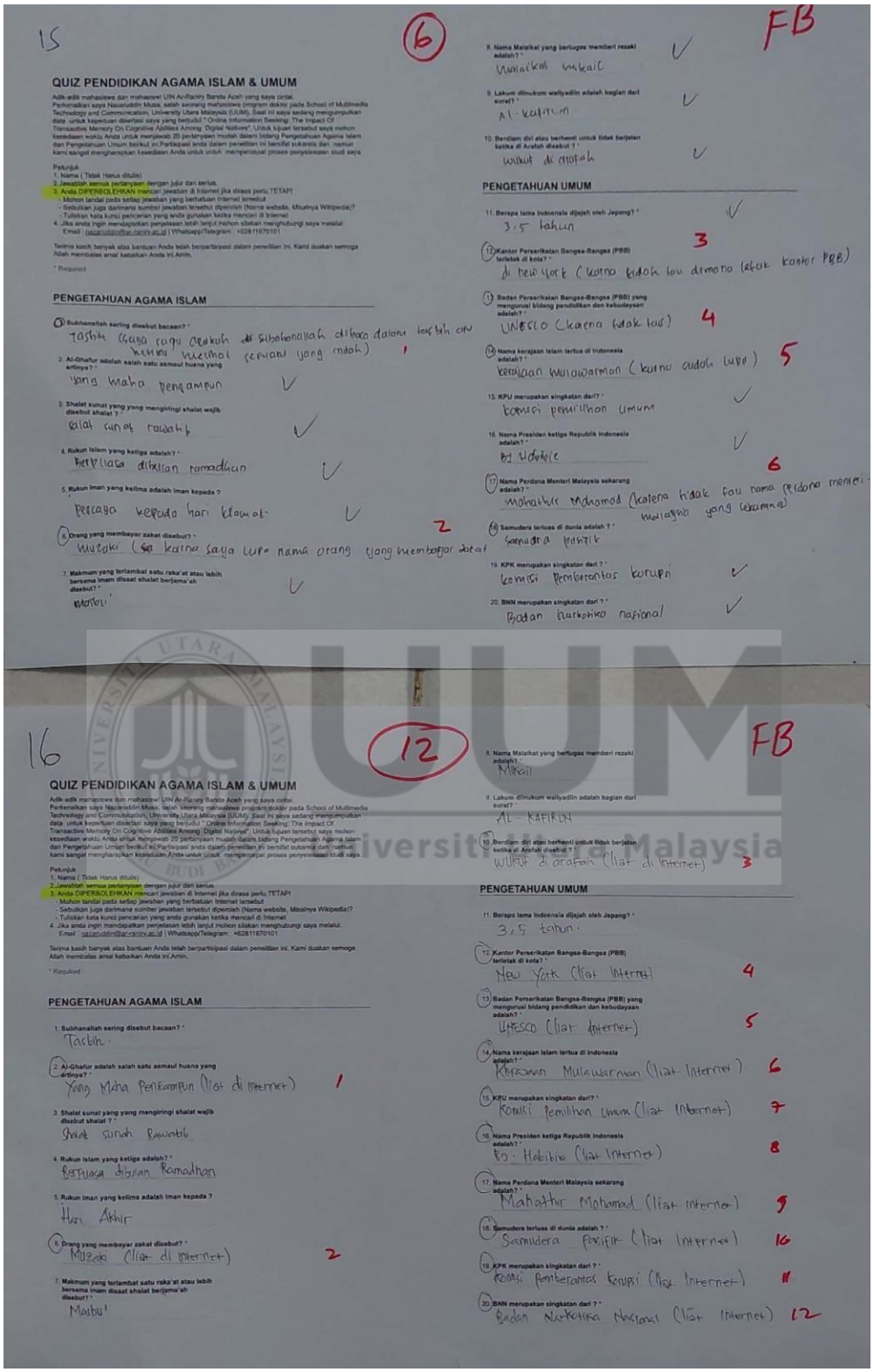
Appendix 19: Example of Answer Description (Experimental Group)



15

6

FB

QUIZ PENDIDIKAN AGAMA ISLAM & UMUM

Adik-adik mahasiswa dan mahasiswi UIN Ar-Raniry Banda Aceh yang saya cintai,
Perkenalkan saya Nazaruddin Musa, salah seorang mahasiswa program doktor pada School of Multimedia Technology and Communication, University Utara Malaysia (UUM). Saat ini saya sedang mengumpulkan data untuk kepentuan disertasi saya yang berjudul " Online Information Seeking: The Impact Of Transactive Memory On Cognitive Abilities Among Digital Natives". Untuk tujuan tersebut saya mohon kesediaan waktu Anda untuk menjawab 20 pertanyaan mudah dalam bidang Pengetahuan Agama Islam dan Pengetahuan Umum berikut ini.Partisipasi anda dalam penelitian ini bersifat sukarela dan namun kami sangat menghargaikan kesediaan Anda untuk untuk mempercepat proses penyelesaian studi saya.

Petunjuk
1. Nama (Tidak Harus ditulis)
2. Jawabah semua pertanyaan dengan jujur dan serius.
3. Anda DIPERBOLEHKAN mencari jawaban di Internet jika dirasa perlu.TETAPI
- Mohon tandai pada setiap jawaban yang berbatuan Internet tersebut
- Sebutkan juga dariman sumber jawaban tersebut dipenuhi (Nama website, Misalnya Wikipedia)?
- Tuliskan kata kunci pencarian yang anda gunakan ketika mencari di Internet.
4. Jika anda ingin mendapatkan penjelasan lebih lanjut mohon sitakan menghubungi saya melalui:
Email : nazaruddin@ar-raniry.ac.id | Whatsapp/Telegram : +628116701011

Terima kasih banyak atas bantuan Anda telah berpartisipasi dalam penelitian ini. Kami duakan semoga Allah membalas amal kebaikan Anda ini Amin.

* Required

PENGETAHUAN AGAMA ISLAM

1. Subhanallah sering disebut bacaan? *
Tasbih (saya ragu apakah di subhanallah ditbaca dalam tasbih atau kalau mereka semua sesuai yang maah) 1

2. Al-Ghafur adalah salah satu asmaul husna yang artinya? *
Yang maha pengampun ✓

3. Shalat sunat yang yang mengiringi shalat wajib disebut shalat ? *
Salat sunat rawatib ✓

4. Rukun Islam yang ketiga adalah? *
Berpuasa dibulan ramadhan ✓

5. Rukun Iman yang kelima adalah Iman kepada ?
Percaya kepada hari kiamat ✓

6. Orang yang membayar zakat disebut? *
Muzaki (saya karna saya lupa nama orang yang membayar zakat 2

7. Makmum yang terlambat satu raka'at atau lebih bersama imam disaat shalat berjama'ah disebut? *
Makmum ✓

8. Nama Malaikat yang bertugas memberi rezaki adalah? *
Malaikat mikail ✓

9. Lakum dinukum wallyadlin adalah bagian dari surat? *
Al-kafirun ✓

10. Berdiam diri atau berhenti untuk tidak berjalan ketika di Arafah disebut ? *
wukuf di arafah ✓

PENGETAHUAN UMUM

11. Berapa lama Indonesia dijajah oleh Jepang? *
3,5 tahun ✓

12. Kantor Perserikatan Bangsa-Bangsa (PBB) terletak di kota? *
di New York (karna tidak tau dimana letak kantor PBB) 3

13. Badan Perserikatan Bangsa-Bangsa (PBB) yang mengurusi bidang pendidikan dan kebudayaan adalah? *
UNESCO (karena tidak tau) 4

14. Nama kerajaan Islam tertua di Indonesia adalah? *
Kerajaan Mulawarman (karna sudah lupa) 5

15. KPU merupakan singkatan dari? *
komisi pemilihan umum ✓

16. Nama Presiden ketiga Republik Indonesia adalah? *
BJ Habibie ✓

17. Nama Perdana Menteri Malaysia sekarang adalah? *
Mahathir Mahamod (karena tidak tau nama perdana menteri malaysia yang sekarang) 6

18. Samudera terluas di dunia adalah ? *
Samudra pasifik

19. KPK merupakan singkatan dari ? *
komisi pemberantas korupsi ✓

20. BNN merupakan singkatan dari ? *
Badan narkotika nasional ✓

16

12

FB

QUIZ PENDIDIKAN AGAMA ISLAM & UMUM

Adik-adik mahasiswa dan mahasiswi UIN Ar-Raniry Banda Aceh yang saya cintai,
Perkenalkan saya Nazaruddin Musa, salah seorang mahasiswa program doktor pada School of Multimedia Technology and Communication, University Utara Malaysia (UUM). Saat ini saya sedang mengumpulkan data untuk kepentuan disertasi saya yang berjudul " Online Information Seeking: The Impact Of Transactive Memory On Cognitive Abilities Among Digital Natives". Untuk tujuan tersebut saya mohon kesediaan waktu Anda untuk menjawab 20 pertanyaan mudah dalam bidang Pengetahuan Agama Islam dan Pengetahuan Umum berikut ini.Partisipasi anda dalam penelitian ini bersifat sukarela dan namun kami sangat menghargaikan kesediaan Anda untuk untuk mempercepat proses penyelesaian studi saya.

Petunjuk
1. Nama (Tidak Harus ditulis)
2. Jawabah semua pertanyaan dengan jujur dan serius.
3. Anda DIPERBOLEHKAN mencari jawaban di Internet jika dirasa perlu.TETAPI
- Mohon tandai pada setiap jawaban yang berbatuan Internet tersebut
- Sebutkan juga dariman sumber jawaban tersebut dipenuhi (Nama website, Misalnya Wikipedia)?
- Tuliskan kata kunci pencarian yang anda gunakan ketika mencari di Internet.
4. Jika anda ingin mendapatkan penjelasan lebih lanjut mohon sitakan menghubungi saya melalui:
Email : nazaruddin@ar-raniry.ac.id | Whatsapp/Telegram : +628116701011

Terima kasih banyak atas bantuan Anda telah berpartisipasi dalam penelitian ini. Kami duakan semoga Allah membalas amal kebaikan Anda ini Amin.

* Required

PENGETAHUAN AGAMA ISLAM

1. Subhanallah sering disebut bacaan? *
Tasbih.

2. Al-Ghafur adalah salah satu asmaul husna yang artinya? *
Yang Maha Pengampun (liat di internet) 1

3. Shalat sunat yang yang mengiringi shalat wajib disebut shalat ? *
Shalat sunah Rawatib

4. Rukun Islam yang ketiga adalah? *
Berpuasa dibulan Ramadhan

5. Rukun Iman yang kelima adalah Iman kepada ?
Hari Akhir

6. Orang yang membayar zakat disebut? *
Muzaki (liat di internet) 2

7. Makmum yang terlambat satu raka'at atau lebih bersama imam disaat shalat berjama'ah disebut? *
Maibu'

8. Nama Malaikat yang bertugas memberi rezaki adalah? *
Mikail

9. Lakum dinukum wallyadlin adalah bagian dari surat? *
Al-KAFIRUN

10. Berdiam diri atau berhenti untuk tidak berjalan ketika di Arafah disebut ? *
WUKUF di arafah (liat di Internet) 3

PENGETAHUAN UMUM

11. Berapa lama Indonesia dijajah oleh Jepang? *
3,5 tahun.

12. Kantor Perserikatan Bangsa-Bangsa (PBB) terletak di kota? *
New York (liat Internet) 4

13. Badan Perserikatan Bangsa-Bangsa (PBB) yang mengurusi bidang pendidikan dan kebudayaan adalah? *
UNESCO (liat Internet) 5

14. Nama kerajaan Islam tertua di Indonesia adalah? *
Kerajaan Mulawarman (liat Internet) 6

15. KPU merupakan singkatan dari? *
Komisi pemilihan umum (liat Internet) 7

16. Nama Presiden ketiga Republik Indonesia adalah? *
BJ. Habibie (liat Internet) 8

17. Nama Perdana Menteri Malaysia sekarang adalah? *
Mahathir Mohamad (liat Internet) 9

18. Samudera terluas di dunia adalah ? *
Samudera Pasifik (liat Internet) 10

19. KPK merupakan singkatan dari ? *
Komisi Pemberantas Korupsi (liat Internet) 11

20. BNN merupakan singkatan dari ? *
Badan Narkotika Nasional (liat Internet) 12

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Appendix 20 : Knowledge Construction Test (Experiemntal Group)

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Appendix 21: Example Answer of Control Group

FTK

Lembar Instrumen Penelitian-Control Group

Adik-adik mahasiswa yang saya cintai.

Terima kasih banyak telah menonton video eksperimen saya. Selanjutnya mohon kesdiaan adik-adik untuk menjawab 4 buah pertanyaan yang berhubungan dengan video tersebut.

Ketentuan :

1. Nama : (Tidak wajib)
2. Waktu: 20 Menit
3. Anda **tidak dibolehkan** bertanya kawan atau menggunakan alat teknologi/Internet

---

1. Menurut analisa Anda, apa kira-kira tema yang tepat terhadap video kilp yang telah anda tonton? Merk terkenal yang ada di dunia

1) Menurut Anda, semua video klip yang muncul dalam tayangan dapat dikelempokkan ke dalam berapa kategori? Sebutkan nama-nama kategori yang Anda maksudkan.

- Minuman
- Makanan
- Sport
- elektronik

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Perhatian : Untuk pertanyaan di atas ini,silakan jawab pertanyaan tambahan berikut ini dengan cara memberi tanda di kotak yang tersedia

- Saya sudah pernah mengetahui lebih dari 50% dari iklan-iklan/merek-merek diperlihat di video tersebut:

Ya ☑

Tidak ☐

2. Sebutkan merek-merek apa saja yang muncul dalam video klip yang anda ingat

- Hermes
- Adidas
- Gucci

3. Berikan interpretasi (kesimpulan) Anda tentang tema video klip yang telah Anda tonton, dan hubungkan dengan kondisi sosial di sekeliling Anda?

Beberapa Iklan dari perusahaan terkenal yang ada didunia.
Banyak zaman sekarang banyak menggunakan barang-barang terkenal hanya untuk hobi bukan untuk keperluan hanya untuk memenuhi tuntutan gaya hidup.

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SILAKAN GUNAKAN BELAKANG HALAMAN INI JIKA DIPERLUKAN.

Appendix 22: Knowledge Construction Test (Experimental Group)

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Appendix 23: Example Answer of Control Group

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Lembar Instrumen Penelitian-Experiment Group

Adik-adik mahasiwa yang saya cintai.

Terima kasih banyak atas kesediaan Anda menonton video eksperimen saya ini. Selanjutnya saya mohon kesdiaan Anda untuk menjawab 4 buah pertanyaan berikut yang berhubungan dengan video tersebut.

Ketentuan :

- Nama : (Tidak perlu ditulis)
- Waktu: 20 Menit
- Anda **dibolehkan** menggunakan alat teknologi (Laptop, PC, smartphone & Internet)

---

1. Menurut Anda, apa kira-kira tema yang tepat terhadap video yang telah anda tonton?

   * Perkembangan teknologi

2. Menurut Anda, semua video klip yang muncul dalam tayangan dapat diklempokkan k dalam berapa kategori? Sebutkan nama-nama kategori yang anda maksudkan.

   - Mobil
   - fashion
   - makanan
   - minuman
   - Elektronik

Perhatian : Untuk pertanyaan di atas ini,silakan jawab pertanyaan tambahan berikut i dengan cara memberi tanda di kotak yang tersedia

- Saya sudah pernah mengetahui lebih dari 50% dari iklan-iklan/merek-mer diperlihat di video tersebut:

  Ya ☑

  Tida ☐

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DO

3. Sebutkan merek-merek apa saja yang muncul dalam video klip yang anda ingat, dan daftarkan di bawah kategori masing-masing yang telah Anda kelompokkan?

- Hermes Paris
- Gucci
- Chanel
- Rolex
- cartier
- Iphone
- Samsung
- Adidas
- Pepsi
- ~~esto~~ coca-cola
- Grab
- Pizza Hut
- Hummer
- Mc donald

4. Berikan interpretasi (kesimpulan) Anda tentang tema video klip yang telah Anda tonton dalam kaitannya dengan kondisi sosial masyarakat sekarang ini?

Kesimpulan => Jadi, seiring berjalannya waktu, trend terus bergulir mengikuti perkembangan Jaman, terutama dengan dunia fashion dan gaya hidup. Dengan bermacam merek terkenal serta makanan bahkan minuman.

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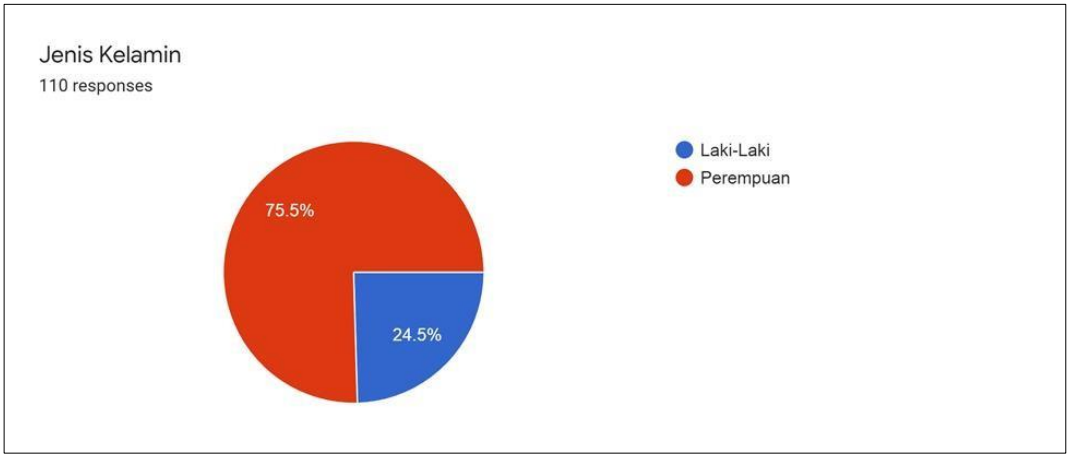
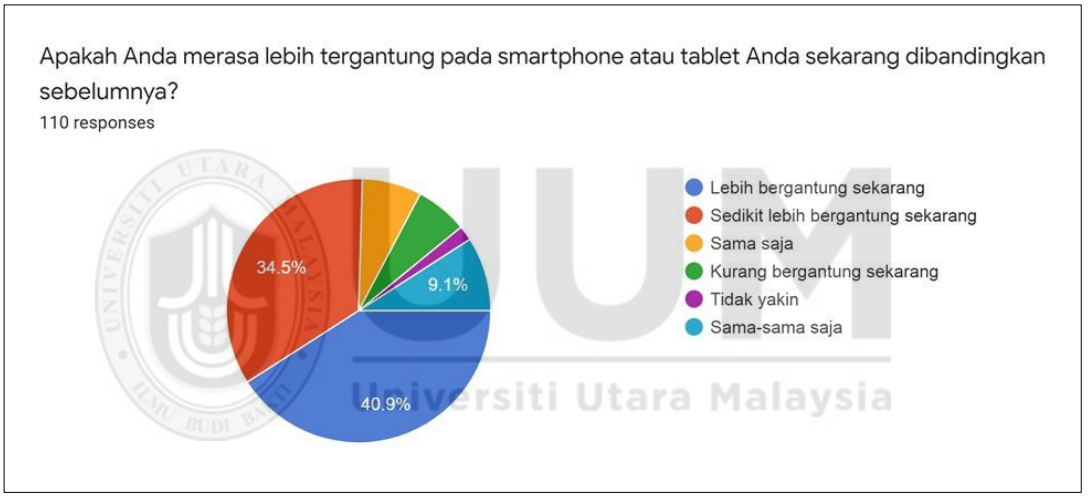
SILAKAN GUNAKAN BAGIAN BELAKANG HALAMAN INI JIKA ANDA PERLUKAN

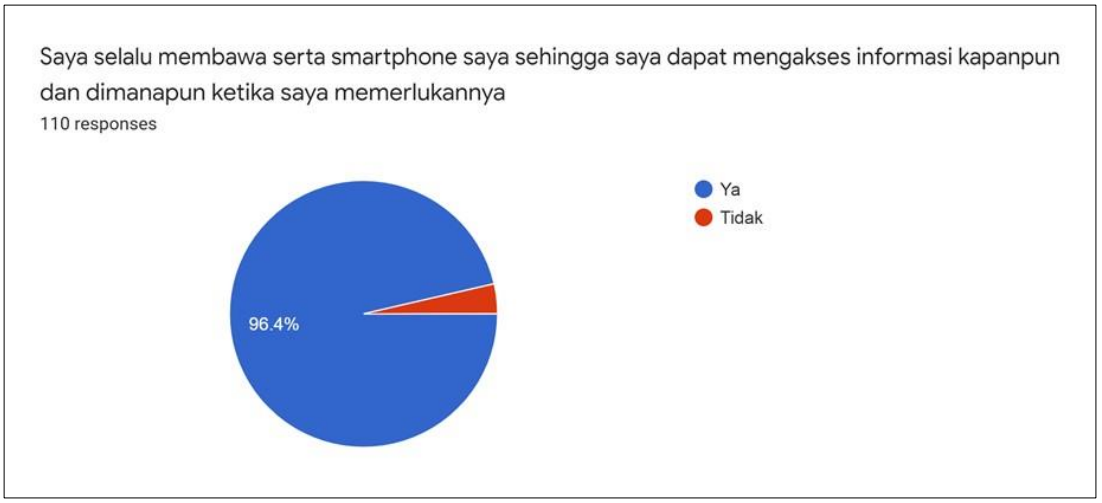
Appendix 24: Study 1 sample based on gender



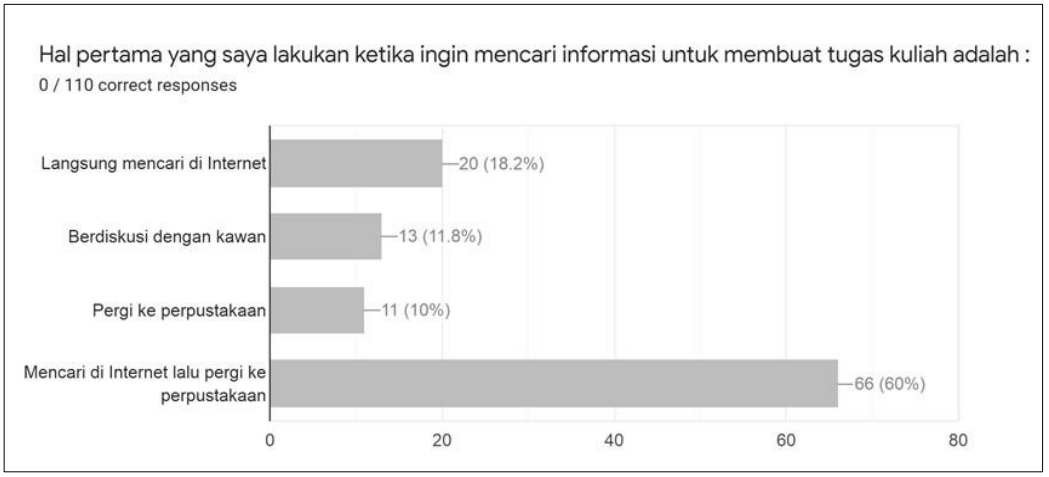
Appendix 25: The trend of dependency on digital devices gender



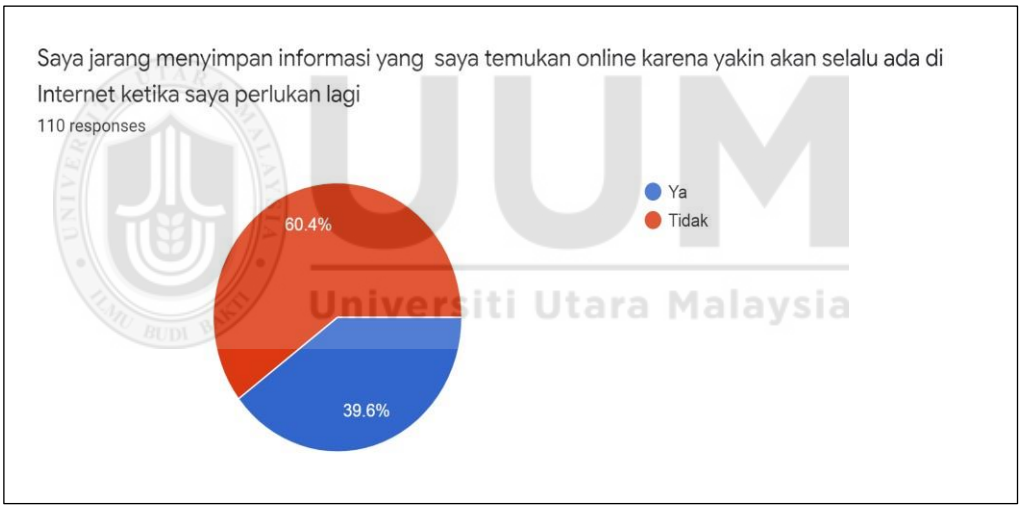
Appendix 26: Dependence on smartphones as information tools



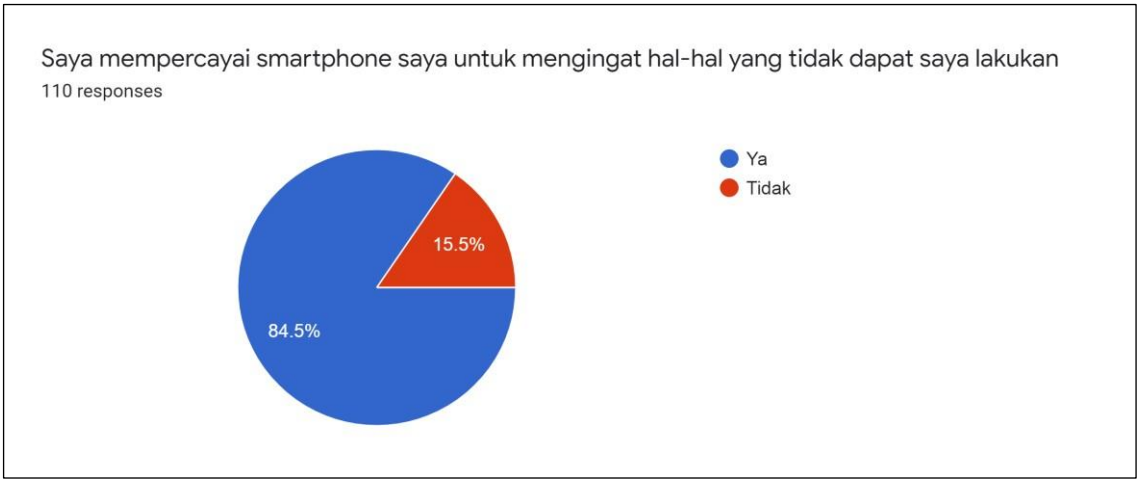
Appendix 27 : Source of information for academics



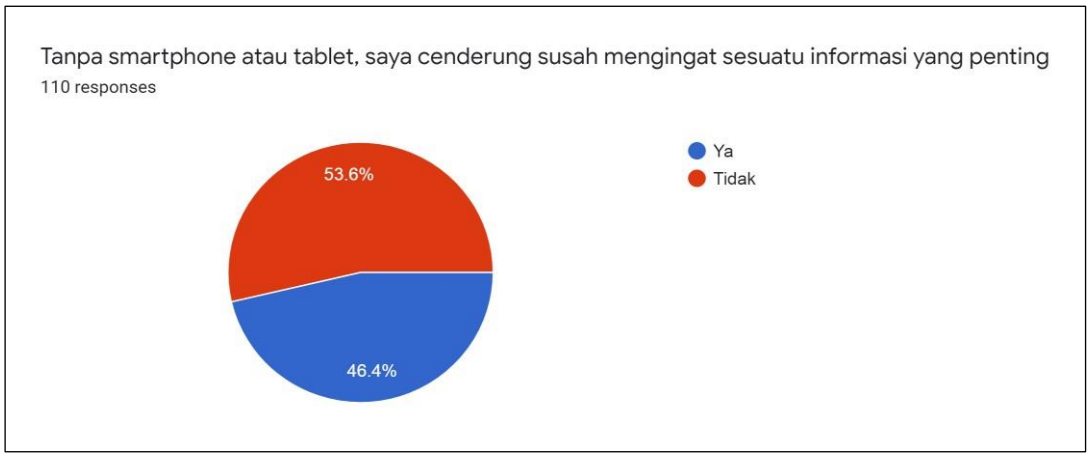
Appendix 28: Internet as external memory



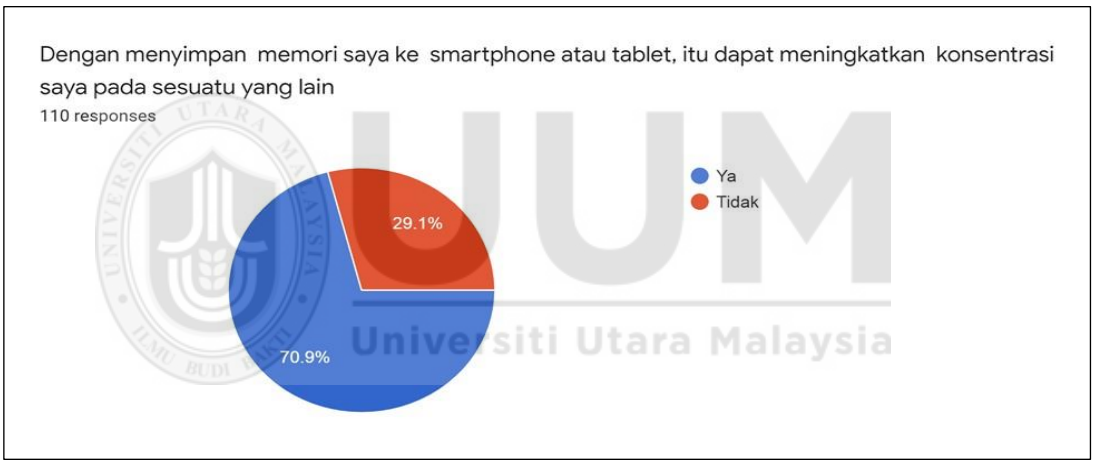
Appendix 29 : External memory as the remainder



Appendix 30 : Transactive memory and concentration



Appendix 31 Digital devices and memory retention



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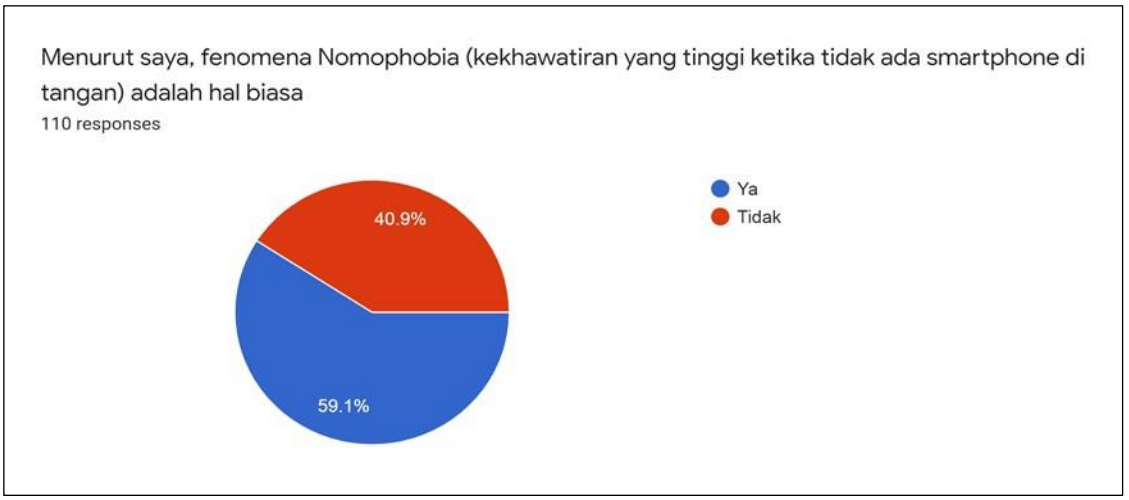
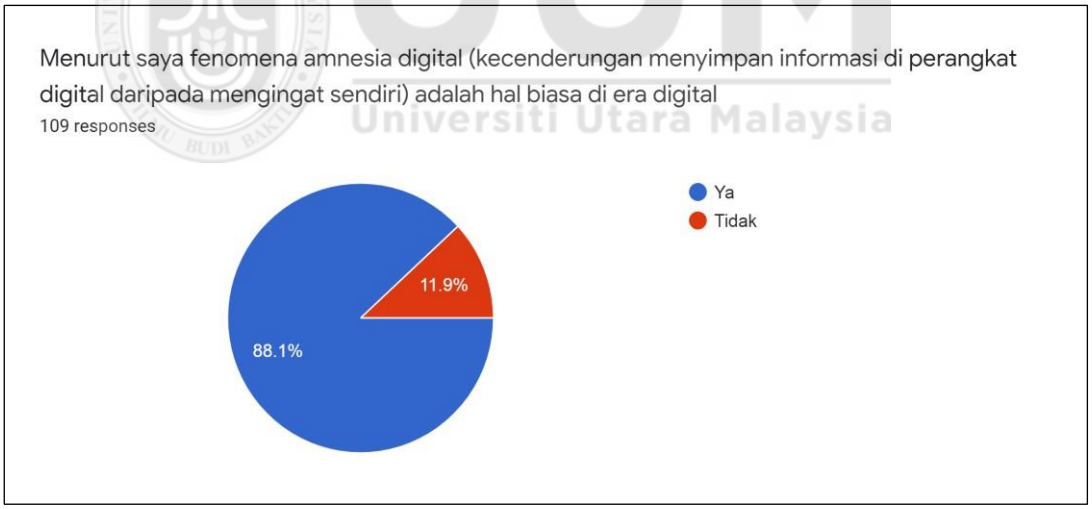
Appendix 32 Students' Perception of nomophobia



Appendix 33 Students' Perception on Google effect

Appendix 34 Students' Perception about Digital Amnesia Behaviour



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