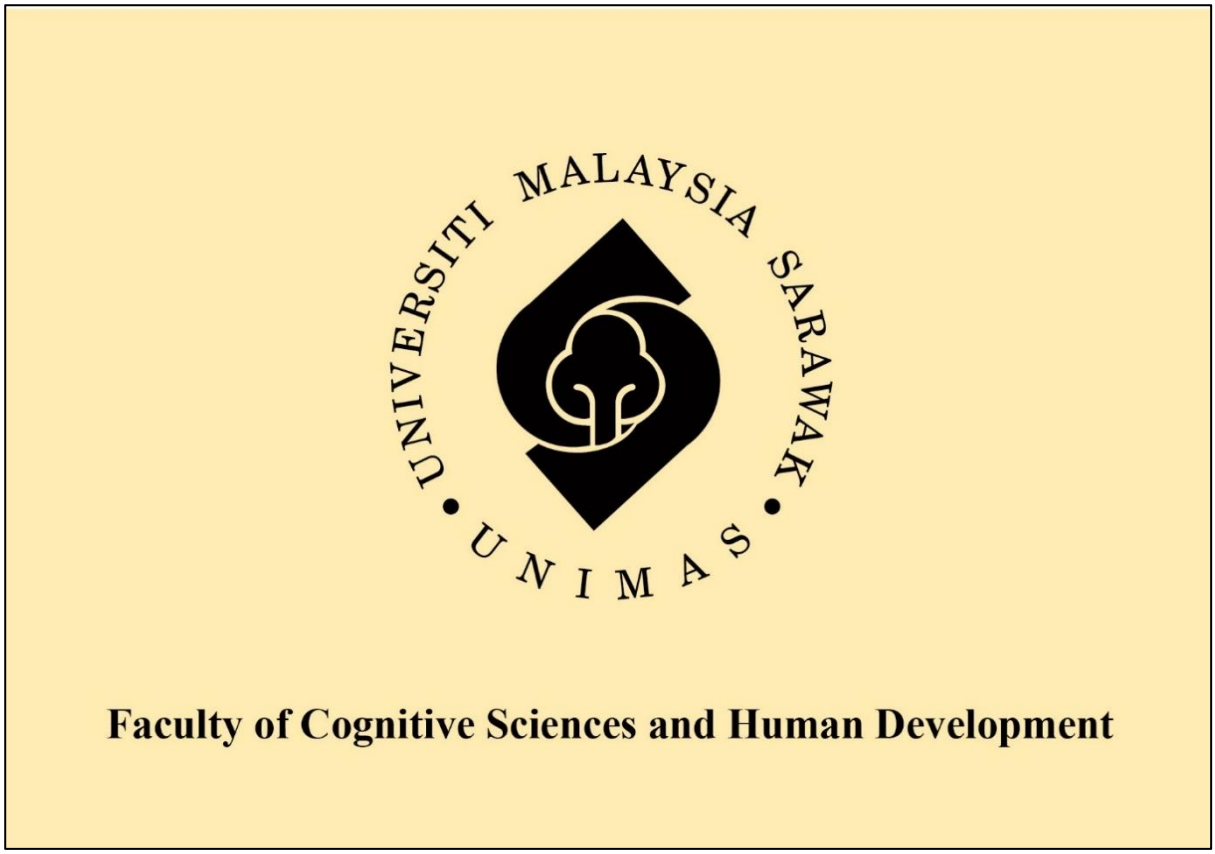

THE INFLUENCE OF INTERNET USAGE ON ATTENTION AND MEMORY

Yuen Cheng Lin

Bachelor of Psychology (Honours)

2022

UNIVERSITI MALAYSIA SAWARAK

Grade:
_____A_____

Please tick (√)
Final Year Project Report ☑

Masters ☐

PhD ☐

DECLARATION OF ORIGINAL WORK

This declaration is made on the 4th day of May 2022.

Student's Declaration:

I Yuen Cheng Lin (73222)**,** Faculty of Cognitive Sciences and Human Development hereby declare that the work entitled, "**THE INFLUENCE OF INTERNET USAGE ON ATTENTION AND MEMORY"** is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

04/07/2022
Date submitted

Yuen Cheng Lin (73222)

Supervisor's Declaration:

I Kartini Abd Ghani hereby certifies that the work entitled, "**THE INFLUENCE OF INTERNET USAGE ON ATTENTION AND MEMORY"** was prepared by the above named student, and was submitted to the "FACULTY" as a * partial/full fulfillment for the conferment of **BACHELOR OF PSYCHOLOGY(HONOURS),** and the aforementioned work, to the best of my knowledge, is the said student's work

Kartini

Received for examination by: Date: 4/7/2022
Kartini Abd Ghani

I declare this Project/Thesis is classified as (Please tick (√)):

☐ **CONFIDENTIAL** (Contains confidential information under the Official Secret Act 1972)*

☐ **RESTRICTED** (Contains restricted information as specified by the organisation where research was done)*

☑ **OPEN ACCESS**

Validation of Project/Thesis

I therefore duly affirmed with free consent and willingness declared that this said Project/Thesis shall be placed officially in the PeTARY with the abide interest and rights as follows:

- This Project/Thesis is the sole legal property of Universiti Malaysia Sarawak (UNIMAS).
- The PeTARY has the lawful right to make copies for the purpose of academic and research only and not for other purpose.

- The PeTARY has the lawful right to digitise the content to for the Local Content Database.
- The PeTARY has the lawful right to make copies of the Project/Thesis for academic exchange between Higher Learning Institute.
- No dispute or any claim shall arise from the student itself neither third party on this Project/Thesis once it becomes sole property of UNIMAS.
- This Project/Thesis or any material, data and information related to it shall not be distributed, published or disclosed to any party by the student except with UNIMAS permission.

Student's signature: _____ Supervisor's signature: Kartini

(Yuen Cheng Lin) (Kartini Abd Ghani)

Current Address:

G-1-1, Taman Pelangi, 75450 Ayer Keroh, Melaka.

Notes: * If the Project/Thesis is **CONFIDENTIAL** or **RESTRICTED**, please attach together as annexure a letter from the organisation with the period and reasons of confidentiality and restriction.

[The instrument was duly prepared by the PeTARY]

THE INFLUENCE OF INTERNET USAGE ON ATTENTION AND MEMORY

YUEN CHENG LIN

This project is submitted
in partial fulfilment of the requirements for a
Bachelor of Psychology with Honours

Faculty of Cognitive Sciences and Human Development
UNIVERSITI MALAYSIA SARAWAK
(2022)

The project entitled **'THE INFLUENCE OF INTERNET USAGE ON ATTENTION AND MEMORY'** was prepared by Yuen Cheng Lin and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Psychology with Honours

Received for examination by:

Kartini

(KARTINI ABD GHANI)

Date:

4 July 2022

Gred
A

ACKNOWLEDGEMENT

I would like to thank the members of the my community and other respondents for their contribution in the survey. Their participation has been invaluable in providing me with the collection of data which serve as valuable insights to the research questions.

I further wish to express my sincere gratitude to supervisors, Dr. Kartini Abd Ghani and Encik Azhari Abu Bakar for their supervision, guidance and advice throughout the research and report writing, which were extremely helpful.

I am also very grateful to my family whose existence alone is enough to support and encourage me in completing this research. My research could not be successful without their supports in all aspects of life.

TABLE OF CONTENTS

ACKNOWLEDGEMENT I

LIST OF TABLES I

LIST OF FIGURES III

ABSTRACT IV

ABSTRAK V

CHAPTER 1 INTRODUCTION 1

1.0 Introduction 1

1.1 Background of Study 2

1.2 Problem Statement 5

1.3 Research Objectives 9

1.3.1 General Objective 9

1.3.2 Specific Objectives 9

1.4 Research Questions 9

1.5 Research Hypothesis 10

1.6 Conceptual Framework 11

1.7 Significance of Study 11

1.8 Scope of Study 12

1.9 Definition of Terms 12

1.9.1 Nature of Internet usage 12

1.9.2 Memory 13

1.9.3 Attention 13

1.10 Summary 14

CHAPTER 2 LITERATURE REVIEW 15

2.1 The Internet 15

2.1.1 Internet Usage 15
2.1.2 Attention, memory and related theories 16
2.1.3 Effects on attention span 22
2.1.4 Internet use and memory 25
2.2 Individual Differences in Internet Usage 27
2.2.1 Gender Difference 27
2.2.2 Age Differences on the Attitudes and Preferences of Internet Use 30
2.3 Improvement in Present Study 33
2.4 Summary 34
CHAPTER 3 RESEARCH METHODOLOGY 35
3.0 Introduction 35
3.1 Research Design 35
3.2 Population, Sample and Sampling Procedure 36
3.3 Instrumentation 36
3.3.1 Section A - Respondent's Profile 37
3.3.2 Section B - Nature of Internet Usage 37
3.3.3 Section C - Attention Questionnaire 37
3.3.4 Section D - Everyday Memory Questionnaire (Lite) 38
3.3.5 Section E - More Questions on Internet Usage 38
3.4 Reliability and Validity 38
3.5 Procedure of Data Collection and Analysis 42
3.6 Limitations of the Study 43
3.7 Summary 44
CHAPTER 4 RESULTS AND DISCUSSION 45
4.0 Introduction 45

4.1 Interpretation of Results 45
4.1.1 Respondents' Profiles 45
4.1.2 Level of Internet Usage on Attention and Memory Performance 48
4.1.3 Interaction of Gender and Age and the differences in Cognition 52
4.1.4 Association between Attention and Memory 58
4.1.5 Level of Internet Usage and the Association with Gender and Age 60
4.1.6 Overview of Analysis 63
4.2 Discussion 64
4.3 Summary 72
CHAPTER 5 CONCLUSION AND RECOMMENDATION 74
5.0 Introduction 74
5.1 Conclusion 74
5.2 Recommendation 76
REFERENCES 78
APPENDIX 100
1.1 Survey Questionnaire Items 101
Section A: Respondents' Profile 101
Section B: Nature of Internet Usage 10202
Section C: Attention Questionnaire 1033
Section D: Everyday Memory Questionnaire (Lite) 1044
Section E: More Questions on Internet Usage 1055

LIST OF TABLES

Table 1	Reliability Statistics for Attention Questionnaire	39
Table 2	Attention Questionnaire: Item-Total Statistics	40
Table 3	Reliability Statistics for Everyday Memory Questionnaire (Lite)	41
Table 4	Everyday Memory Questionnaire (Lite): Item-Total Statistics	41
Table 5	Demographic Characteristics of Respondents	46
Table 6	Categories of Internet Use according to Gender and Age of Respondents	47
Table 7	Mean Attention and Memory for Different Level of Internet Usage	48
Table 8	Box's Test of Equality of Covariance Matrices across Level of Internet Usage	49
Table 9	Wilks' Lambda for Level of Internet Usage	49
Table 10	Tests of Between-Subjects Effects for Level of Internet Usage	50
Table 11	Post Hoc Multiple Comparison of Level of Internet Usage and Cognition	51
Table 12	Descriptive Statistics of Gender*Age Interaction	52
Table 13	Box's Test of Equality of Covariance Matrices	53
Table 14	Wilks' Lambda for Gender, Age and the Interaction	54
Table 15	Tests of Between-Subjects Effects for Gender and Age	55

Table 16	Kruskal-Wallis Test for Gender and Age	56
Table 17	Mann-Whitney Tests between Age Groups	57
Table 18	Spearman's Correlations of Attention and Memory	59
Table 19	Crosstab for Gender and Internet Usage	60
Table 20	Chi-Square Tests for Gender-Internet Usage	61
Table 21	Crosstab for Age and Internet Usage	62
Table 22	Chi-Square Tests for Age-Internet Usage	62
Table 23	Summation of the Analysis	63

LIST OF FIGURES

Figure 1	Conceptual Framework	11
Figure 2	Scatterplot with Fit Line of Memory by Attention	58

ABSTRACT

The internet has been expanding in both access and contents over the past decades, and is become increasingly vital in everyday life that it literally transformed people's lifestyle and habits, better or worse. People have different opinions toward the consequences of internet usage on active users, particularly the topics related to cognitive psychology. The primary purpose of this study was to identify the nature of internet access and usage, and explore the relationship between the level of usage, gender and age in determining their effects on users' attention and memory, while evaluate if the results are in line with the Working Memory model, level of processing effects and other stated theories. A number of 522 Malacca residents were volunteered to participate in the survey, where they were being administered with self-reported questionnaire through online media. Exposure variables included time spent on general internet use, information seeking, social networking, communication, gaming, entertainment and looking on current news and trending. The results indicated that male and younger age (youth and young adults) users have greater tendency of becoming heavy or even excessive internet users, although the association between gender and level of internet usage is not statistically significant. Heavy internet users have relatively poorer memory and attention compared to light and moderate users. Moderately strong positive correlation was discovered between attention and memory capacity, but did not imply causation. Male also found to spend more time in gaming, reading news and trending and seeking information while female made intense use of internet in communication, social networking and entertainment. Time spent on general internet use was prospectively associated with reduced attentional span and worse memory for both genders but more prominent on younger users. Further studies should focus on other demographic characteristics, while also consider the exposure variables as risk factors relating to the mechanism of cognitive functioning.

Keywords: attention, memory, cognitive, internet, psychology

ABSTRAK

Teknologi internet yang masih berkembangan dari segi akses dan kandungan sejak dekad yang lalu telah menjadi semakin luas pengaruhnya dalam kehidupan seharian sehingga boleh diperkatakan telah berubah gaya hidup dan tabiat manusia, sama ada lebih baik mahupun buruk.Orang ramai mempunyai pendapat yang berbeza terhadap impak penggunaan internet kepada pengguna terutamanya peggnuna aktif yang mempunyai kebergantungan yang amat ketara, apabila melibatkan subjek kognitif. Tujuan utama kajian ini adalah untuk mengenal pasti sifat akses dan penggunaan internet, di samping meneroka hubungan antara tahap penggunaan, jantina dan umur pengguna dalam menentukan kesan terhadap tahap tumpuan dan kapasiti memori. Selain itu, kajian ini boleh dinilai sama ada dapatan atau fenomena tersebut boleh dijelaskan dengan menggunakan Model Ingatan Kerja, Model tingkat pemprosesab dan teori lain. Kaji selidik ini melibatkan seramai 522 responden yang secara sukarela yang terdiri daripada residen Melaka. Melalui kajian ini didapati pengguna internet lelaki dan generasi muda (belia dan dewasa muda) lebih cenderung kepada penggunaan berlebihan dan tanpa kawalan, walaupun analisis tidak menunjukkan hubungan yang signifikan antara jantina dengan tahap penggunaan internet. Pengguna internet berat sendiri mempunyai memori yang lebih lemah dan daya tumpuan yang kurang berbanding dengan pengguna internet ringan dan sederhana. Korelasi positif yang serderhana kuat juga ditemui antara daya tumpuan dengan kapasiti memori, tetapi korelasi tersebut tidak dijadikan pemerangan sebab munasabab. Kaum lelaki didapati meluangkan lebih banyak masa dalam permainan dalam talian, membaca berita terkini dan popular, serta mencari maklumat, manakala kaum wanita lebih meminati menggunakan internet untuk tujuan komunikasi, joaringan sosial dan hiburan. Masa yang diluangkan dalam penggunaan umum telah dijangka mempunyai korelasi dengan kemerosotan daya tumpuan dan memori bagi pengguna lelaki dan perempuan, tetapi lebih ketara dalam kalangan muda. Penyelidik boleh melanjutkan kajian dengan memberi perhatian dalam ciri-ciri demografi yang lain, selain mengambil kira faktor-faktor risiko yang dapat dihubungkaitkan dengan mekanisma kognitif.

Kata kunci: tumpuan, memori, kognitif, internet, psikologi

CHAPTER 1

INTRODUCTION

1.0 Introduction

Internet has always been, and will always be one of the most powerful inventions that mankind had created. With the exponential growth and advancement in Information and Communication Technologies (ICT) globally for the past decade, increasing number of people are acquiring PC, laptops, smartphones and many other kinds of devices, which in turn provide easy access to the Internet. Directly or indirectly, it alters the way of life of billions of world population by having their thoughts, habits and behaviors reshaped to intertwined with the internet life. The Internet is a worldwide interconnected system linking computers that permits instantaneous access to and dissemination of information (Ruzgar, 2005). We habitually flip to the internet to assist us with the needs of our current lifestyle. The internet essentially presents us with an outlet for research, an opportunity to delve deeper into subjects for extensive understanding, and to further expand the knowledge already available to us. Essentially, as the internet becomes increasingly blended into our daily lifestyles, a question has grasp the attention and require further inquiry: what are the consequences of our increased yet inevitable reliance? Looking at how digital information is conveyed, as short bits of information. People are simply Googling, reading the first sentence or title of whatever comes up and then they are done, without digest the topics, analyze, and as a whole, critically think and process information (Sparrow et al., 2011; Storm et al., 2016).

The first chapter will discuss on the background of study regarding on usage of internet and how they are integrated into our daily lives, influencing our daily routine.

The problem statement, research objectives and research questions and respective hypotheses will also be stated. This chapter also presents the conceptual framework that shows the independent and dependent variables, the significance of study, cope of study, and lastly, the definitions of terms.

1.1 Background of Study

The internet continues to grow in influence and has become increasingly vital in everyday life. Directly or indirectly, it completely reinvented and transformed the ways in which people engage in their life, from traditional, slow-paced style to more open, progressive type that includes, but no limited to the methods and tools people establish connection with others, information searching and sharing, entertainment, healthcare, organization and management, etc. Nearly 4.66 billions people worldwide are accessing the Internet frequently, according to the data published April 7, 2021 on the webpage statista by Johnson (2021). However, bear this in mind that the data is nothing more than a pure estimation without considering the factor of outbreak of COVID-19 pandemic that could lead to underestimation of the data. With the astonishing growth of the Internet in Malaysia, alongside with an exponential growth in the prevalence of laptops, smartphones and other technological gadgets within classrooms, it is undoubted that Internet addiction will become more widespread and common among Malaysian, especially the youngsters. How and at what possible costs or benefits can people's brain and mind adapt? Internet Users Survey conducted by Malaysian Communications and Multimedia Commision (MCMC) in 2020 found that about 23.67 millions 88.7% of the population are internet users who use it on a daily basis and with the time spent online increasing on a yearly basis. Constrained by Covid-19 pandemic, during which a significant number of activities are being shifted

from face-to-face, physical interaction to Internet, society is driven to embrace new technology, which in turn leads to more vigorous digital transition and integration. Ultimately, we could expect accelerating Internet use and coverage, and changes in cognitive abilities and behaviors. The influence it can have on the structure and function of our brain, however, remains a central research topic.

Since the use of the internet is often related to individuals' ability to multitask, Internet users are likely to involved in increased multitasking behaviors that are associated with increased distraction and poor executive control skills (Loh & Kanai, 2015; Ophir et al., 2009). Growing up with the Internet, the netizens gravitate towards superficial information processing behavior, which is characterized by rapid shifting of attention and breaking of reflection, while displaying higher prevalence and open-mindedness of Internet addictive behavior that reflects altered self-control and distorted reward processing. Parents and policy makers have raised concerns about the impact of internet use on the emerging generation of adolescents and young adults. (George & Odgers, 2015). Their concerns were not unnecessary because internationally, most of the surveys conducted on the internet use found that younger and more educated people are some of the most common users (Bashir et al., 2008). However, results obtained from continuous experiments remain far cry in answering the change in cognition due to internet usage. Prior to the Internet, findings from various researches had shown that the human brain is somewhat malleable to environmental influences due to its capacity for neural plasticity, particularly in terms of learning new processes or experiences (Draganski et al., 2004). To properly address the question, researchers can look into the use of internet in real life or even incorporate the specific elements of internet use in experiments or surveys design.

The various adverse consequences of internet use (pathological or addictive) were discussed in past researches, such as poorer health status (Kim & Chun, 2005), altered students' daily routines, bad academic performance, degraded teachers-parents relation (Yang & Tung, 2007), poorer sense of time and management, in addition to emotional and behavioral problems (Cao & Su, 2007). Surfing Internet as well reduced attentional scope (Peng et al., 2018). Adolescents might have greater risks of getting poor school performance, physical and psychological issues (Cao & Su, 2007; Cao et al., 2007), which was further supported by the paper of Haq and Chand (2012) that students' academic performance are adversely affected by Facebook usage. Growing interests on how internet can influences cognitive development include how free and continuous access to loads of information can actually interrupt memory abilities or utilize of effortful thinking (Näsi & Koivusilta, 2012), how multi-tasking between online and offline, or between online activities could have shorten the attention spans or the ability to concentrate has resulted in further empirical studies. In fact, the data from previous researches support the idea that excessive media multitasking negatively influence the ability for sustained concentration (Jeong & Hwang, 2016; Ophir et al., 2009; Uncapher & Wagner, 2018). On the other hand, a body of literature also indicated that finding additional information at one's fingertips without caution could hinder the retention of information sought (Sparrow et al., 2011). Instead of keeping the information internally, people are more likely to remember the location of information to be accessed.

Although overwhelming evidences are supporting that internet usage (particularly prolonged use) do erode human cognition, there are however, exceptions that users can benefit from reasonable internet use. For instance, a dual study on the theory of Workplace Internet Leisure Browsing (WILB) implicated that giving short

time to relax and cool down that include non-work related internet browsing (e.g surfing Facebook for five minutes) can enhance workers' attention to their tasks, especially the younger workers (Coker, 2013). Studies related to the increase in media multitasking with the proliferation of ubiquitous internet access have reached conflicting results, with some found no adversities on attention (Ralph et al., 2013), while some even indicated that it can be associated with increased performance in such aspects of cognition as multisensory integration (Lui & Wong, 2012) and better inhibitory control (Baumgartner et al., 2014).

The current study aims to further examine the mechanisms by which internet use can affect human cognition, particularly in light of recent evidence on the effects of Internet use on attention and memory due to the exponential growth of researches in these two areas. The current study focuses particularly on cognitive processes rather than neural correlates or neural development. Although the study is focusing on internet usage, few would contradict that people today are living in a hyper-stimulating world. So could this be making it difficult for some in ignoring incoming distractions and to filter out unnecessary information?

1.2 Problem Statement

We know that the Internet is changing the way we interact with the information, however, it is often accused of destroying our attentional span (Purcell et al., 2012). Is it true? The Internet and its browser undoubtedly become the ideal means and platforms in obtaining valuable information and updated trending for internet users of all ages and occupations, and more importantly, people are having great experiences and enjoyment from the interactivity provided by graphical user interface (GUI) that

is user-friendly. They are given much freedom and accessibility in doing anything as desired, such as learning new knowledge, video gaming, chatting, online shopping, gossiping, and much more to go. The Internet is not a simple, uniform technology, either in its composition, or in its use. Therefore, the central problem that will be addressed is the potential consequences that internet usage has on cognition, particularly the aspects of memory and attention.

To explain how internet use can affect people's cognitive development, it is first necessary to describe how they use internet, particularly among adolescents and young adults, and this can sometimes be overwhelming. Young people commonly are reported engaging in various online activities, ranging from connecting with, commenting on and discussing things with others through social networking and instant messaging, to sharing or creating of interest topics, to online gaming, but these many aspects of internet use involve peer-to-peer communication. A study in Malaysia found that show that younger generations are at greater risk of exhibiting addictive behavior, while college and university students are the most vulnerable population group to be problematic internet users (Choo, Ramadass, Altaher & Arjuman, 2011). Yet, addictive behaviors towards the internet do not necessary be harmful; rather it is subjected to the intention behind the actions that decide whether they are beneficial or detrimental to users. Questions would often arise from the excessive use of the Internet such as trying to relate with the cognitive factors or functions including but not limited to attention, decision making, reasoning and memory (Danili & Reid, 2006), and motivation. Despite the concerns about the negative implications of excessive internet use, there is still a lack of examination of moderating variables underlying the relationship between internet usage and cognition.

Some past findings showed that excessive use of the Internet ruins our memories as Internet itself is slowly but steadily replacing the brain functioning by "serving as the external hard drives for our memories" (Wegner & Ward, 2013), and users are more likely to let information that could be accessed instantaneously slip away, as opposed to those that they though do not have access to (Sparrow et al., 2011). Available data also supports that perpetual flow of sources of information on the Internet are encouraging people to engage in excessive media multitasking, which indeed interferes with sustained concentration (Moisala et al., 2016; Peng et al., 2018). However, past research also provided that there exists a positive correlation between internet use and cognitive skills as internet communication demands increased visual attention and planning to capitalize on the Internet as a source of information (Johnson et al., 2007). Thus these factors may have facilitated an increase in that cognitive skill. The process of "cognitive offloading" might seems to take a toll in memory capacity, but it permits deeper level of information processing, such that when a note-taker is able to link a lecture to other materials (Einstein et al., 1985). It can also release the cognitive resources, that in turn will be reallocated toward utilizing and expanding higher-level cognitive abilities (Storm & Stone, 2015). Thus, the researcher had also been covering up the issue that whether there are correlation between the cognitive processes, or are they independent of one another. In addition, it has been assumed widely that males and females will differ fundamentally in the ways they view and use the Internet. Some researchers even hypothesize that males are more comfortable with and spend longer time on internet. Thus, gender difference was considered as an important variable for the current study.

Studies regarding cognitive abilities such as memory and attention span are typically associated with the field of clinical or cognitive psychology, as much of the

research that measures these particular abilities is done in laboratories under controlled environment or using neuroimaging techniques. However, despite the growth of research in this area and increased penetration of Internet and ICTs, there is still limited number of studies in examining the relationship between internet usage and cognition and it is unclear whether the results of previous findings could be generalize to the population of Malaysia. To summarize up, there are three (3) important gaps that yet to be resolved despite the interest in excessive internet use:

1. lack of examination of moderating variables underlying the relationship
2. most of the studies in current literature focused on particular factor group
3. limited empirical evidence to be applied in the context of Malaysia

Very little research, if any, is available on the consequences of internet use towards Malaysian internet users in the area of memory and attention. Therefore, in this study, the researcher attempted to reach out to as much as possible the targeted population without setting boundaries so that the respondents were comprehensive and inclusive of the targeted aspects (e.g. age, gender) and conditions to be compared and studied. Moreover, the researcher could identify other factors that would otherwise be excluded, such as the differences in preferences of online activities and the duration of time in accessing the internet for gender and age, and how these would actually influence the consequences on their attention and memory.

1.3 Research Objectives

1.3.1 General Objective

The general objective in this study is to identify the difference in level of internet use on cognitive processes among internet users in Malaysia; to examine the nature of usage and demographic factors that need to be taken into account for the change in attention and memory of the users. Demographic factors include age and gender. The nature of internet use refers to the extent to which internet users spent on accessing the Internet (heavy, moderate or mild), and the online activities they involved in. This study will identify the difference in the consequences of internet usage on users' attention and memory, while focusing on the correlation between memory and attention, to see if the change in attention would also lead to the change in memory or vice versa.

1.3.2 Specific Objectives

Based on the main objective, the following objectives of this study are sets to: (1) investigate the duration/distribution of time spent on Internet daily, (2) identify online activities that users usually engaging in, (3) identify the impact of different level of internet usage to attention and memory, (4) determine whether the moderating variables influence both the usage of internet and respective outcomes on attention and memory, and (5) look into the correlation between attention and memory.

1.4 Research Questions

Based on the objective, few research questions are addressed:

(1) How frequently do people access the internet and what are the online activities they engage in?