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Masters

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**PAPER VERSUS SCREEN: EFFECT ON READING COMPREHENSION AMONG
UNIMAS UNDERGRADUATE STUDENTS**

NUR FARAHIN BINTI MOHD ZAFRI

This project is submitted
in partial fulfilment of the requirements for a
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The project entitled ‘Paper versus screen: Effect on reading comprehension among UNIMAS undergraduate students’ was prepared by Nur Farahin Binti Mohd Zafri and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

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16th June 2017

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ABSTRACT

Reading has shifted from reading on typical paperbound to digital document. Studies show that digital document has some physical drawback that might affect reading comprehension. The focus of this study is to find out if reading on paper and reading on screen yield different effect towards reading comprehension. Thirty-two undergraduate students in UNIMAS have participated in this study. There are two independent variables that were investigated in this research, reading material (paper versus screen) and time condition (free regulation versus time constrained). The results show that both reading material and time condition affect reading comprehension.

Keywords: reading comprehension, digital document, time condition, time constrained

ABSTRAK

Aktiviti pembacaan telah beralih dari pembacaan secara tradisional iaitu membaca atas kertas kepada membaca melalui dokumen digital. Kajian lepas telah menunjukkan bahawa pembacaan melalui dokumen digital mempunyai keburukan terhadap fizikal yang boleh mempengaruhi kefahaman pembacaan seseorang. Menerusi kajian ini, pengkaji berminat untuk mengetahui jika pembacaan diatas kertas and pembacaan diatas dokumen digital memberikan efek yang berbeza terhadap kefahaman pembacaan. Tiga puluh dua orang pelajar ijazah sarjana muda di UNIMAS telah terlibat dalam kajian ini. Terdapat dua pemboleh ubah manipulasi telah dikaji iaitu jenis bahan bacaan (kertas atau skrin) dan keadaan masa (tiada kekangan masa atau kekangan masa). Hasil kajian mendapati bahawa kedua-dua pemboleh ubah, jenis bahan bacaan dan keadaan masa mempengaruhi kefahaman pembacaan.

Kata kunci: kefahaman pembacaan, dokumen digital, keadaan masa, kekangan masa

CHAPTER ONE

INTRODUCTION

Today's generation is born and raised in the digital age where the technology is very common and more integrated into the daily lives. The information and entertainment are widely created and easily accessible in the digital format. The increasing of variety digital devices such as the computers, tablets, and smartphones have caused the transition of reading on papers to the digital formats since the cost is less (Kingsbury & Galloway, 2006), they are more portable (Coyle, 2008), they do not disintegrated or out of print (Clyde, 2005) and they are easily stored. Nowadays, almost all types of reading materials such as magazines, books, newspapers, and many more have their own digital versions that could be stored in any digital devices. This could help the users to bring reading materials in the forms of small devices to anywhere, as they are portable. As the consequence, more reading materials are now available in digital format which provide the reading facilities to become more ubiquitous than ever. Education field also has affected by this phenomenon where the learning process has become more digital than before. The students exposed frequently to the digital learning tools such as LCD screen and computers. Hence, the conventional teaching ways such as using blackboard, paper, and printed books are getting less frequent. At University Malaysia Sarawak (UNIMAS), the lecture notes and books are available online such as the e-learning website called Morpheus, MOOC, and other online sources. Hence, this phenomenon has led to an increasing number of students who involve in reading on digital screen as compared to reading on paper. This incident has attracted the researcher to perform a research on reading comprehension between both reading on paper and reading on screen.

The advancement of digital materials nowadays made many people wonder if it might cause the disappearance of the traditional printed reading materials. But in reality, many people still prefer the printed materials (i.e. books, magazines, newspaper) as their daily reading material instead of the digital screen. Despite the fact that the advancement of the technology has created reading on digital screen which has the same characteristics of reading on paper, it is still not enough to attract people to read on digital screen. For example, Apple Company has developed the iBook application that has the flip-pages feature instead of scrolling when reading to give the sense of reading a real book. However, readers still prefer to read on paper, even the present technology has become more advanced with the improvement of the screen, wireless technology, and also the improvement of flexibility and learnability of interaction with the digital devices.

This statement can be strengthened as a research on university's student preferences of reading between a printed paper and a digital screen at Cukurova University in Tokyo by Kazanci (2015) shows majority of the university students still prefer reading on paper instead of digital screen. As this study is a longitudinal study, the questionnaires were distributed twice, which the first time was in 2008 that involved 400 students and the second time was on 2014 that involved 392 students at the same university. The result from both years shows that most students still prefer traditional printed paper than the digital screen. The difference of results between the two years are does not differ much. In 2008, 314 students preferred printed paper whereas in 2014, the number slightly decreased to 303 students. The decline could be caused by the decreasing sample population. As for the screen preferred students, in the year 2008, there were 86 students that preferred reading on screen, then the number slightly increased to 89. This result has shown that there is not much difference between both of the years as most of the students still preferred reading on printed paper than reading on screen.

Background of study

Research on reading has been done numerously and been seen in many different perspectives such as literacy, social sciences, psychology, cognitively and the most recent are from the perspectives of information and communication technology (ICT). This study was conducted to investigate reading from the perspective of technology. As more reading materials are now available digitally, the difference in reading comprehension between on screen and on paper was investigated. Hence, this study was aimed to investigate if there is an effect of reading on screen towards the university's students' reading comprehension and compared with reading on paper. In the review paper conducted by Dillon (1992), there were differences between reading on screen and reading on paper. Dillon (1992) further supported that digital screen is inconvenient for reading as a display medium. It causes ocular discomfort, polarity, and navigation. These aspects perform worst in digital screen than printed paper.

The issue related to reading comprehension between on screen and on paper has not shown a consistent result in the past. This could be caused by the difficulties in finding the best method to measure a reader's comprehension. A study conducted by Taylor (2001) has found that students can learn equally well from both digital and paperbound regardless the type of text the students read.

In contrast with the other research done by Mangen et al. (2012), it was found that reading linear narrative and expository text on the paper can perform better reading comprehension than reading on the computer screen. Apart from that, Mangen et al. also found that the implementation of text reading assessment task and response task in the same medium which is using computer can lead to additional cognitive cost (more cognitive task). In addition, Buchanan and Loizides (2007) had investigated the triage process between paper and electronic

documents. It was found that triage process in paper is much more effective than electronic documents.

The Problem Statement

Reading has tremendously improved in these past decades as the reading material has been through a transition from a traditional printed material into the digital material. The reading material is created in a digital form that is more accessible to readers. Even though there are many digital alternatives of paper documents such as hypertext applications, the web, digital libraries and other digital reading materials, the paper documents are still preferred as the main medium for reading activities. Although the flexibility of screen technology has improved significantly which the human and computer interaction components are available, many people still choose paper documents instead of digital documents.

Apart from that, previous studies that were conducted on this topic have shown inconsistent results in determining which types of reading material could alter the reader's reading comprehension. Hence, it is very interesting to investigate this problem in the population of UNIMAS's undergraduate students to see the effect towards Asians especially in Sarawak.

Research Hypotheses

H₀1: Test medium has no significant effect on reading comprehension test score.

H₀2: Time condition has no significant effect on the reading comprehension test score.

H₀3: Test medium and time condition interaction has no significant effect on reading comprehension test score.

The Conceptual Framework

Figure 1

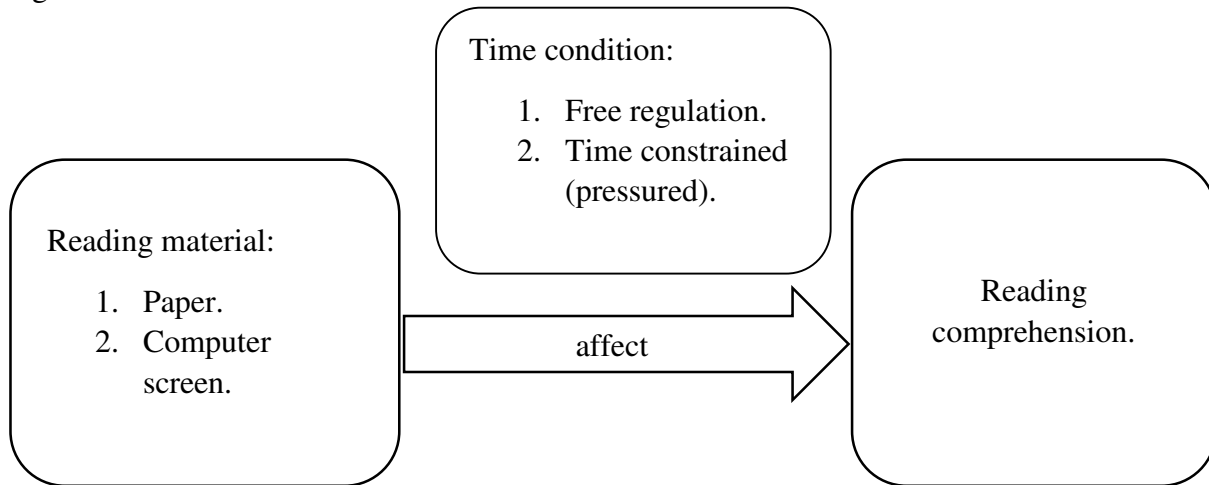


Fig 1.0: The conceptual framework

The figure shows the relationship between the independent variables, which are paper and screen and the dependent variable, which is the respondent's reading comprehension score on the reading comprehension test given. Another variable that affects the relation between reading material and reading comprehension is also investigated which is the time condition: free regulation and time constrained.

Definition of Key Terms

Reading

Conceptual Definition

According to Panigrahib and Panda (1996), reading is an effective process of unconscious learning that influences the accuracy of information, attitude, moral, belief, judgment, and action of the particular reader.

Operational Definition

In this study, reading is referred to the cognitive process that happens in the reader's mind in order to make sense of the reading material shown whether on the screen or on the printed paper.

Reading Comprehension

Conceptual Definition

Reading comprehension can be regarded as relating relevant aspects of the world (written language) to the knowledge, intentions, and the modification of what we already know as the consequences of our interaction with the world. (Smith, 1994)

Operational Definition

In this study, reading comprehension is referred to the respondent's ability to understand the text given through reading process and able to answer the reading comprehension test based on the text. The reading comprehension will be assessed by looking at the participant's score in a set of reading comprehension test that comprised of 10 questions.

Expository text

Conceptual Definition

Expository text is a non-fiction text that is used to inform, analyze, and explain on an issue (Brown, 2011). The expository text is usually written to communicate information to the readers. Expository text is usually used in the technical manual, textbooks, and encyclopedia articles.

Operational Definition

In this study, expository text is the text that conveys information about an issue so the participants need to understand the text to be able to answer the comprehension test.

Time pressured

Conceptual Definition

According to Beevis (1999), people experience time pressure when the time required to execute tasks is more than 70% of the total time available for the tasks.

Operational Definition

In this research, time pressure refers to the time limit that the students have when taking the reading comprehension test. The students that were assigned in time pressured condition only had 10 minutes to complete the comprehension test.

Students could take as much time as they need to complete it but cannot drag the test, student needs to complete in time for the test.

CHAPTER TWO

LITERATURE REVIEW

Reading

Reading is an important activity performed by human to acquire knowledge from written text. Reading allows one to gain information about the world and making connections between them. At the basic level, reading is the process of translating symbols on paper or nowadays on the digital screen into sound (Fairbairn & Fairbairn, 2002). The reading process begins with the eyes making a saccadic movement influenced by some factors such as the predictability of the text and reader's individual difference in reading (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2011). To understand the reading material, the reader uses a variety of contextual cues such as the information from pictures and sentences surrounding the unknown words. When a reader is having difficulty in understanding the text, the working memory will aid by decoding the ambiguous sentences and unravel the unfamiliar words that the reader encounters.

However, many people argue that reading is way more complicated than this. According to Panigrahi and Panda (1996), reading is an effective process of unconscious learning that influences the accuracy of information, attitude, moral, belief, judgment, and action of the reader. Through reading, the person will undergo a process that will alter the person's mental dictionary. This process will keep repeating as the reader keeps on reading.

Reading also can be seen from the cognitive perspective as stated by Smith (1994), explained in his book entitled "*Understanding Reading*" that reading is a creative and constructive activity that has four fundamental characteristics which are purposeful, selective, anticipatory and based on comprehension. This explains that reading must have its own reason to

read, the reading process happens selectively which the anticipatory of the reader should happen and the most important element is the comprehension as, without comprehension, the reading process does not successfully encode into the memory. All of the fundamental components are happening cognitively. Smith (1994) also states that reading enables one to manipulate time itself, to involve in the ideas or events at a rate the one choose regardless of the manner of text produced.

Differences between reading on paper and on screen

Reading on paper or screen definitely has its differences that could affect the way a person's attitude towards reading on that particular reading material. In a study conducted by O'Hara and Sellen (1997), a few differences can be identified between reading on paper and reading on screen. Firstly, the annotation while reading on the paper is much easier and quicker than on screen. Annotation is important for some people as annotation could help the reader to understand the text better. On paper, the reader could easily annotate such as adding notes, scribbling, and highlighting the important points. Even though the reader can put annotation while reading digital documents as it provides many annotation features, the readers still find it hard to annotate in the digital way. Apart from this, O' Hara and Sellen (1997) also found that movement through documents between both reading materials is different as navigation through the paper when reading is a lot faster, automatic and interwoven than on screen.

Apart from this, the spatial layout of both material differs from each other. For some readers, spatial layout is important to gain sense of the whole text and for better cross reference between the pages. O'Hara and Sellen (1997) found that spatial layout in the paper is better than on screen as paper allows more flexible and dynamic access between the pages whereas the digital screen requires the readers to plan on how to view the pages by determining the size and

position of the window. It was shown that there are many differences between these two reading materials as it could affect the reader's way of reading.

Reading comprehension between on paper and on screen

The studies done for assessing reading comprehension between on paper and on screen previously has generally shown inconsistent results. O'Hara & Sellen (1997) have done an experimental study between the paper condition and on-line condition which data was collected from the participants by observation and interview. The study involved 10 participants which was comprised of an administrative team that used computer as a daily basis. Meanwhile, five of the participants were assigned randomly to "Paper" condition and the other five participants were assigned to the "Online" condition. The participants were required to do a summarization of 4 pages of general science article. At the end of the study, it was reported that paper provides more benefits such as it provides better interactivity than on screen for the readers to understand the text (comprehension) than the on-line material.

In addition, a study done by Mangen et al. (2012) shows that participants in printed paper reading condition performed better on reading comprehension than participants in the computer screen condition. According to Mangen et al. (2012) study, the team investigated on 72 students from 10th grade. The students were required to answer multiple-answer questions in the comprehension test after reading the passage on paper and on the digital screen respectively. In contrast, the study done by O' Hara and Sellen (1997) used summarization in measuring comprehension. The study has shown that participants in the printed paper condition scored higher than the participants in the computer screen condition.

On the other hand, research done by Taylor (2011) also used experimental design between the paper and digital materials but the data collected in the form of questionnaire has

shown that there is no comprehension difference between reading on paper and on digital material. The study included about 74 psychology students that claimed never took economic classes. They were selected randomly to receive either the paperbound text or digital screen text in which they were required to answer the 20 questions based on two types of economic texts given. The method used in assessing reading comprehension is quite similar with the study done by Mangen et al. (2012) which is multiple-choice questions (MCQ).

Furthermore, another study also used the multiple-choice test but this study also investigated the result when time limitation conditions (pressured condition) were applied (Ackerman & Lauterman, 2012). The participants were assigned into two conditions which were paper condition and on-screen condition. In each condition, the group was then divided into two conditions which one group was required to answer the comprehension test based on the text without any time limitation (free regulation condition) whereas another group was given time limitation (pressured condition) which was 5 minutes to read the text and another 7 minutes to answer the test. The result has shown that there is no significant difference in both paper and on-screen conditions for the test score under free regulation condition. In contrast, the on-screen condition group achieved lower than on paper condition group under pressured condition.

Reading comprehension in expository text

Traditionally, Weaver & Kintsch (1991) have divided text into two types: narrative and expository. Basically, narrative text is written as an entertainment for the readers whereas expository text is written to communicate information with readers (Weavers & Bryant, 1994). The examples of expository text are textbooks, non-fiction books, education books, and encyclopedias. Weaver and Bryant (1994) investigated the comprehension between the narrative and expository text. In this study, 94 students were assigned into different groups under two

conditions, namely narrative condition and expository condition. The participants were given the text based on their conditions and answer 16 questions based on the text. The result showed that the participants who read the expository text obtained better correlation with the comprehension than those who read the narrative text.

In a research done by Mangen et al. (2013), an experiment was conducted among 72 10th grade students with similar reading abilities to study narrative text and expository text that were prepared in pdf format and printed in paper format. After that, the students were required to answer the questions based on the text that they read previously. The result shows that students that were under printed paper reading condition performed better than those under computer reading condition regardless the type of text that they read. As the previous research yielded inconsistent results, a study regarding this issue was conducted among the undergraduate students in Malaysia.

Reading between in free regulation and time constrain (pressured)

Regarding the issue of reading in different time condition: free regulation and time constrained, many people argued that it does affect the reader's reading comprehension. Reading in free regulation means that reading is performed without any time allocated such as reading a magazine leisurely. Whereas reading in time constrain means the reader needs to complete the reading in the required time allocated such as reading in an examination.

A research done by Brooks, Case and Young (2003) investigated the difference between the timed (time pressured) and untimed (free regulation) towards student's test performance. The result showed that the score in untimed reading shows slightly better than reading in timed condition. Whereas in a research done by Huesman and Frisbie (2000), it was shown that disabled students performed significantly better under extended time (free regulation)

condition than fixed time (time pressured) condition. Unlike research by Huesman and Frisbie (2000), Falke (2008) proposed that that time limit does not affect the frequency distribution of their rate of correct and incorrect responses per minute.

CHAPTER THREE

RESEARCH METHOD

Research Design

This study was conducted using an experimental design. Experimental design is often used to investigate the direct relationship between two variables. Experimental design incorporates a high degree of control in which if it is used properly, the researcher could establish a causal relationship among the variables investigated (Bordens & Abbott, 2011). For this study, an experiment was conducted which the respondents were grouped into two groups. The first group read on the screen and the second group read on the paper. These groups were then tested in the same controlled condition but at two different time slots.

Samples

The total of the sample involved was thirty participants which fifteen participants were assigned for reading digitally while another 15 participants were assigned to read on the paper. The participants involved in the study were University Malaysia Sarawak's undergraduate students. Their ages were in the range between 19 years old to 25 years old. These students came from different backgrounds and courses. Generally, the participants were capable of communicating and understanding at least two to three languages mainly in English, Bahasa Malaysia, Mandarin or Iban. The participants were also degree students that obtained Band 4 and above in MUET test. To ensure that all participants achieved MUET test results with Band 4 and above, they were required to log in to the e-pelajar UNIMAS to show their biodata, particularly their MUET result.