

UNIVERSITY OF CAPE COAST

COMPARING READING AND UNDERSTANDING LEVELS OF JUNIOR
HIGH SCHOOL STUDENTS WHO READ ELECTRONIC TEXTS WITH THE
LEVEL OF THOSE WHO READ PRINTED TEXTS

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BY

PATRICK TEI KOFI QUARSHIE

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Education degree in Information Technology.

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: Date:

Name:

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature: Date:

Name:

ABSTRACT

An experimental posttest-only control-group design was used to assess the influence of electronic text on the reading comprehension of junior high school students of Akosombo Volta River Authority Junior High School No. 1. A convenience sample of 140 randomly assigned students was used for this research. Half of the students used passages from text read on screens while the other half used traditional print text passages. Data was collected during one class period in which the reading comprehension section of the ReadTheory Reading Test was administered. An independent t-test was used to analyze the reading comprehension data. The influence of electronic text on the reading motivation of junior high school students was examined using a quasi-experimental pretest-posttest control-group design. All participants took the initial Motivations for Reading Questionnaire, on the next day. A posttest MRQ was administered in which 27 participants completed the MRQ after reading a printed text passage, and 27 participants completed the MRQ after reading the same passage in electronic form. Reading motivation data was analyzed using a MANOVA. Results established no significant differences in either reading comprehension or motivation levels based on printed text format. It was recommended that additional research questions regarding the use of adjustments to readability features of electronic text, and data could be collected by inserting researcher-created questions at the end of the research instrument. Additionally, this study could be furthered by having the paper test administrators' record finishing times for a statistical comparison of the two groups.

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DEDICATION

To my wonderful siblings, William, Charles, Isaac, Christiana and Lawrence.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Choosing reading materials has been very difficult in recent years. Now the question is not just of what to read but whether on paper, tablet, e-reader, laptop, or perhaps even a phone, and people have strong opinions on which is best.

The effect of electronic texts as reading material has been examined in the past. In this era of technology, many people are attracted to technological devices and materials including electronic texts for reading comprehension. Users of these technology do not actually consider the effect, they only follow the masses and the attractions. In Cynthia Boris' article on pros and cons of swapping textbooks for digital versions, written in 2012, it was revealed that most of the time, users abandon these technologies due to one reason or the other. In 2011, Alex Thayer of the University of Washington conducted a study on e-reader use for academic purposes. Each student was given a Kindle DX loaded with books in the fall; by spring, just under 40 percent of them had stopped using the reader. Many electronic texts readers choose it without considering the influence it has on their understanding.

Many users of electronic readers complain about usability issues. Notes in the margins of printed textbooks help one to think; a careful reader wants to argue with the author, or amplify a point, or jot down an insight inspired by something freshly read. It has to be adjacent to the original, a separate notebook is ridiculous. However, the use of electronic books continues to expand as electronic books are

increasingly adopted by academic communities all over the world (Acker, 2011; Young, 2010). Some major publishers worldwide are working with educational institutions to expand electronic texts adoption. There are similar moves by some publishers in Ghana as well. Some colleges and universities globally now charge students a mandatory course materials fee; this fee includes the use of the course electronic books. Some Schools in some developed countries, such as The University of Virginia, and Cornell University now require the use of eBooks in certain courses (Abutaleb, 2012). Increased electronic books offerings, and obligatory use of electronic books for some college courses, will continue to drive expansion of electronic books into the educational setting. With the increased use of mobile devices, the *2011 Horizon Report* projected a one year or less timeframe for school systems to begin widespread use of electronic books (Johnson, Smith, Willis, Levine, & Haywood, 2011).

The use of electronic reading texts is the order of the day. In Ghana, there is an ongoing project to provide laptop computers to school children by the central government (Ministry of Education launches basic school computerization project, www.ghanaweb.com, 12 September 2011). Apart from this, there are other private organisations in the effort of hyping the use of digital stuffs in the classroom (school laptop project launched, www.modernghana.com, 13 September 2011). One such project is the Internet Study Mate (ISM). As electronic books are increasingly adopted in schools, it is necessary to consider their effect on academic performance.

Each texts read on either paper or screen must be understood by the reader. The essence of reading is to understand a piece of information or instruction being

sent across. Students at all levels of education read for comprehension to enhance academic excellence. Reading for understanding is a foundational skill, with instruction beginning in kindergarten and continuing throughout the educational process (Pardo, 2004). There is a direct link connecting level of understanding to the transaction between reader and texts (Kucer, 2001). Cognitive science views this transaction as occurring when the body engages the physical world and thus studies transaction in the contexts of interactions between people and environment (Gibbs, 2003). Reading a texts without comprehension is a useless venture of which effect must be made discourage it. This research aim at comparing the understanding levels of printed texts and electronic texts.

Research findings on the effect of format on reading for understanding has been mixed. Many researches done on printed texts versus electronic texts has established both positive and negative effects on each format. This has caused some level of confusion in the choice of texts format for reading. A study using random assignment of 40 adults required groups to read from either a paper or electronic texts and found no difference in recall level and information retrieval based upon texts format (Morineau, Blanche, Tobin, & Gueguen, 2005). A separate study found reading comprehension to be superior using the print format (Noyes and Garland, 2008). Noyes and Garland (2008) reported the results of studies conducted using Cathode Ray Tube screens, and admitted that technological improvements could lead to computer and paper equivalence. This contradiction in results displays the need for further research.

Another key factor in reading performance is reading motivation. Motivated readers work harder to build meaning in their reading and display increased comprehension (Pardo, 2004). Electronic books are currently being promoted as a less expensive and more efficient method for reading (Jones & Brown, 2011). Such efficient, inexpensive availability affects selection, and selection of high-interest material has been shown to increase motivation and engagement (Jones and Brown, 2011; Marinak & Gambrell, 2008). Thus, the effect of electronic books use on reading motivation is an essential component for researching electronic books and reading comprehension. If the electronic books format has positive or no effect on comprehension and motivation, the many benefits regarding portability and cost encourage continued use. If the effect is negative, however, the adoption must be reconsidered.

Statement of the Problem

The deficiency of research regarding the effect of electronic texts on reading comprehension and motivation at the junior high school level in Ghana was the problem addressed in this study. Junior high school stage is a very critical stage in education which requires much attention to be given. The reading and comprehension abilities of junior high school students should be of great importance to a nation's attempts in educating its citizens.

Reading comprehension is commonly defined as the process in which readers incorporate prior knowledge and experience with information in the texts in order to construct meaning, and is considered one of the most important skills for students to develop if they are to be successful (Pardo, 2004). Comprehension

is essential not only to learning in all academic areas, but to lifelong learning as well (Durkin, 1993). The West African Examination Council (WAEC) Chief Examiner's report (2012) viewed comprehension as such an essential part of the learning process that it was listed as one of the most important areas for further study. The junior high school students' performance in comprehension in the 2012 examination was poor.

Further, considerable research exists to directly link motivation and achievement (Gambrell, Palmer, Codling, & Mazzoni, 1996). This connection between motivation and achievement was of great interest in this research. It was established that students who succeed at reading and understanding easily are motivated to read while students who struggle with understanding do not perceive reading as a valuable task and do not show continued motivation to read. However, the issue of whether or not electronic texts can alter the cycle of demotivation on the part of those who struggle with reading is not clearly addressed in research in Africa. Thus, in Ghana, the effect of eBooks on the reading motivation level of junior high school students remains undetermined.

Purpose of the Study

The purpose of this experimental pretest-posttest control-group design study was to determine if there was a statistically significant difference in the reading comprehension level of Ghanaian junior high school students when reading electronic texts and printed texts. The purpose of this quasi-experimental study was also to determine if there was a statistically significant difference in the reading

motivation level of Ghanaian junior high school students when reading electronic texts and printed texts.

Research Objectives

The following research questions guided this study:

1. To find out the relationship between the media through which students read texts and their comprehension of the texts.
2. To assess the relationship between the media through which students read texts and their motivation levels in reading.

Research Hypotheses

H₁. There is a relationship between the media through which students read texts and their comprehension of the texts.

H₀₁. There is no significant difference in the level of reading comprehension between junior high school students reading printed texts and those reading electronic texts.

H₀₂. There is no statistically significant difference in junior high school students reading printed texts and those reading electronic texts in their mean scores for the linear combination of the reading motivation scales.

H_{02.1}. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Reading Efficacy scale.

H_{02.2}. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Reading Challenge scale.

H02.3. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Reading Curiosity scale.

H02.4. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Reading Involvement scale.

H02.5. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Importance of Reading scale.

H02.6. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Reading Work Avoidance scale.

H02.7. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Competition in Reading scale.

H02.8. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Recognition in Reading scale.

H02.9. There is no statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the Reading for Grades scale.

H02.10. Junior high school students reading printed texts and electronic texts will display no statistically significant difference in their mean scores for the Social Reasons for Reading scale.

H02.11. There is no statistically significant difference in junior high school English students reading printed texts and electronic texts in their mean scores for the Compliance scale.

H2.II There is a statistically significant difference in junior high school students reading printed texts and electronic texts in their mean scores for the linear combination of the reading motivation scales.

Significance of the Study

The research problem justifies a study that can address an important issue in junior high schools with regard to reading. The evolution to electronic books/textbooks due to an increasing implementation of technology within the educational system worldwide, and its possible cost effectiveness for school systems, seems certain to greatly impact the field of Junior high school education. Nevertheless, given its impending implementation, very little research has measured the impact such technology will have on students' reading comprehension and motivation at this level of education in Ghana and Africa at large. Monetary advantages are highly regarded in today's educational system, hence, the shifting from printed reading books to electronic reading books (Layton, 2011). Money, however, cannot be the driving factor. The effect on students' comprehension and motivation levels must remain the priority, and this research

was designed to establish the effect this transition on reading comprehension and motivation of junior high schools students.

Usually, studies relating to the effect of electronic books on reading comprehension and motivation level have focused on students in the developed countries. Another point is that, studies displaying the effect of this technology on students at junior high school level have been insufficient. This study also filled the gap in the literature by indicating the effect of electronic books on a sample of Junior high school students in Ghana.

Further, this research will directly contribute to the knowledge base of administrators' access in determining if their school should make the shift from the traditional print to digital format for textbooks which focuses on reading.

Delimitation of the Study

This study was carried out in one of the typical government junior high schools out of the lot in the Eastern Region of Ghana. Pupils in such a school are perceived to be from average homes.

The study did not cover practical-oriented subjects such as Mathematics, Integrated Science, and Creative Art, but rather on reading subjects such as English Language, and the likes. The researcher believes that performing practical activities in a digital environment will be complex for children in junior high schools.

Although the reading of electronic documents is associated with software and hardware-related aspects, this study did not consider this. This research was interested in only the resources on digital devices or screens. This study did not use online resources; all electronic texts was downloaded and modified versions

which were used offline on laptop and desktop computers. Most of the electronic reading materials were PowerPoint designed “*courseware*”.

This study was conducted using an average socioeconomic status sample taken from a school in which a 1:1 laptop computer program had been implemented. Therefore, all students who participated in the research were already familiar with using computers.

Limitations of the Study

This experimental post-test only control-group design and quasi-experimental pretest-posttest control-group design study made every effort to limit the threats to internal and external validity. Although this study accounted for participant selection and assignment, setting, and history, the limitations need to be recognized. This study used a heterogenetic sample and only students who were able to return permission forms were eligible to participate.

The Motivations for Reading Questionnaire was a self-report measure, and it was assumed that participants’ responses were a true representation of their level of reading motivation. The self-report measure is a possible limitation in that the researcher could not guarantee students were completely honest, accurate, and free from external influences (Campbell & Stanley, 1963). Any misleading responses given to the researcher by the respondents (students) could affect the outcome and integrity of the study.

Definition of Terms

ReadTheory Reading Test: A validated instrument for measuring reading comprehension, provides full statistical support for making the determination of effect of format on reading comprehension.

Motivations for Reading Questionnaire (MQR): A student-rated assessment of the extent to which each student is motivated to read. It contained 53 questions and measured 11 constructs of reading motivation (Wigfield & Guthrie, 1997).

Reading Efficacy: A construct that measured the expectation each student had for reading success (Wigfield & Guthrie, 1997).

Reading Challenge: A construct that measured the satisfaction each student feels when mastering complex issues within the texts (Wigfield & Guthrie, 1997).

Reading Curiosity: A construct that measured the desire to learn about a topic (Wigfield & Guthrie, 1997).

Reading Involvement: A construct that measured each student's enjoyment when reading new kinds of texts (Wigfield & Guthrie, 1997).

Importance of Reading: A construct that measured the value each student places on accomplishing the task of reading (Wigfield & Guthrie, 1997).

Reading Work Avoidance: A construct that measured what each student does not like about reading (Wigfield & Guthrie, 1997).

Competition in Reading: A construct that measured each student's desire to outperform other readers (Wigfield & Guthrie, 1997).

Recognition for Reading: A construct that measured the pleasure each student feels when receiving recognition for their reading accomplishments (Wigfield & Guthrie, 1997).

Reading for Grades: A construct that measured each student's desire to receive good grades in reading (Wigfield & Guthrie, 1997).

Social Reasons for Reading: A construct that measured the degree to which each student shares their reading with family and friends (Wigfield & Guthrie, 1997).

Reading for Compliance: A construct that measured the effect of external requirements on student reading (Wigfield & Guthrie, 1997).

Organisation of the Study

The study consists of five chapters. The first chapter dealt with the background of the study, statement of the problem, purpose of the study, research questions, significance of the study, delimitation and limitations of the study, and definition of terms as well as the organisation of the study. The second chapter reviewed related literature of the study. It covered the theoretical framework supporting the considerations of adopting electronic texts versus print texts.

Chapter three is the research methodology. It dealt with the research design, population, sample and sampling procedure, instrument, data collection and data analysis procedure. Chapter four covered the presentation and discussion of results. Lastly, chapter five presented the summary, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Reading is the springboard of any literacy programme. It does not only give learners an active place, but also places them in the centre of pedagogy and the curriculum (Corcoran & Evans, 1987). Reading is a very powerful and indispensable equipment for learning and acquisition of the varied skills and experiences needed by man to develop a satisfactory personal life (Fasick, A., Gagnon, A., Howarth, L., & Settingington, K. 2005). It is important that pupils/students should develop positive habits towards reading of books as a life-long learning experience (Eyre, G. 2003). This review will describe the reported differences between the media before examining the attempts at explaining and overcoming them.

The main purpose of the study was to determine if there was a statistically significant difference in the reading comprehension level of junior high school students when reading electronic texts compared to traditional print books. Another purpose of this study was to determine if there was a statistically significant difference in the reading motivation level of junior high school students when reading electronic texts compared to traditional print books.

The initial stage of this chapter reviews the cognitive framework upon which the study of reading comprehension and motivation was based. Later in this chapter also reviews the historical usage of electronic books in both general public and academic environments, and the overall benefits and limitations of using

electronic books in schools. Specific studies will be detailed in which comprehension and motivation were studied at the elementary level with special emphasis on what is missing in similar studies at the junior high school level.

Chapter Two will conclude with a summary of the literature review.

Theoretical Framework

Schema Theory

Piaget referred to an organized pattern of thought used to explain experiences as a scheme (Piaget, 1952; Shaffer, 2002). Cognitive scientists use the term schema to describe how prior knowledge is used to understand, organize, and store new information (Gillani, 2010; Zhang, 2010). According to Rumelhart (1982), schema is the building blocks of cognition since they serve as the network of information through which people make sense of new experiences. Schema theory expands this meaning to include the importance of general knowledge and concept understanding in reading comprehension, specifying that most reading difficulties can be traced to insufficient prior knowledge (Anderson et. al., 1984). Schema theory is based on Goodman's (1967) psycholinguistic model. The psycholinguistic model views reading as a psycholinguistic guessing game, involving an interaction between thought and language based not on a precise understanding of each element within the reading, but an ability to use a partial understanding of the material to process the unknown and make decisions regarding meaning (Goodman, 1967). According to the psycholinguistic model, the ability to anticipate that which has not been seen is vital to reading comprehension (Goodman, 1967). Proper anticipation is based upon key word understanding, and

schema theory indicates key words and concepts presented to the reader through the texts allow the reader to temporarily transfer information stored in long-term memory to short-term memory and use that information during reading to interact with, and construct an understanding of, new information (Pressley, 2003; Schallert & Martin, 2003). This information is often used to construct mental representations that allow the readers to exit the transaction with a mental image or summary of the texts (Pardo, 2004; van den Broek, 1994). The choice of printed texts or electronic texts formats for reading must be considered especially for academic work because each preference has its influences on reading comprehension.

Transactional Theory

The understanding of reading texts is related to the interaction between it and the reader. Many readers prefer a specific texts format based on comfort through the interaction with the texts. Rosenblatt's (1995), further explained schema theory using transactional theory of reader response. According to Rosenblatt, each reader breathes life into the texts as they consider the material through the lens of their individual experiences, and work to construct personal meanings. As readers interact with the texts, they make texts-to-texts, texts-to-self, and texts-to-world relations which leads to understanding (Keene & Zimmerman, 1997; Miller, 2002). This transaction between the reader and the texts leads to the understanding (Kucer, 2001; Rosenblatt, 1978). Culture is important to the transaction because the reader's culture must match the culture of the writer/texts (Pardo, 2004). This is due to the fact that transactional theory is based upon a model of comprehension that places equal importance on contexts and culture (Pardo,

2004). Contexts is also important to the transaction because each reader varies in the skills, knowledge, and cognitive development they bring to the texts (Butcher & Kintsch, 2003; Navarez, 2002). When the contexts and the culture of the reader and texts are similar, the transaction allows for the construction of meaning, and true comprehension of the texts occurs. The choice of either printed texts or electronic texts should also be critically examined based on this theory to ascertain the selection of reading texts for individuals.

Cognitive Science and Transaction

Cognitive science opinion is that, this transaction as occurs when the body engages the physical world and thus studies transaction in the contexts of interactions between people and environment (Gibbs, 2003). Transaction using the paper format, as measured in terms of reading comprehension, has thus far been superior to the electronic format (Noyes & Garland, 2008). Numerous studies have reported difficulties in reading from a computer screen (Clark et. al., 2008). Given that the readability of the texts, specifically font type and size, play a significant role in the transaction between reader and texts (Tracey & Morrow, 2002), difficulties reading from a screen present a significant issue for electronic texts success. However, the developments in screen technology have lessened the impact of reading difficulties, and improvements in the transaction using the electronic format have been noted (Noyes & Garland, 2008). Tablets such as Amazon's Kindle and Apple's iPad are having the greatest impact in terms of changing people's attitudes regarding reading on a screen. Electronic books now offer many opportunities for the reader to make adjustments to readability features. Font

adjustments are easily made, interaction with the texts via hyperlinks and glossaries is instantaneous, and new information can be researched, understood, and organized (Hancock, 2008; Larson, 2009). Electronic books have the ability to incorporate aspects of inquiry based learning in ways that traditional print resources cannot (Gillani, 2010). Tools for inquiry based learning can improve schema, which leads to increased comprehension. Students who comprehend what they read are more motivated to read. Thus, electronic books, through an improved interaction with the texts, offer an interesting opportunity to affect both reading comprehension and motivation.

A second purpose of this study is to determine the effect of electronic texts on motivation. The theoretical framework for this study's motivational research is based upon Social Cognitive Theory, specifically Bandura's ideas regarding self-efficacy and the major role this plays in the motivational level for any task.

Self-efficacy

The choice of reading texts format contributes to the motivation level of reading especially in kids. As a teacher, I have observed that many junior high school students prefer to read electronic texts due to its associated merits over printed texts. This could be the reason why such students are addicted to the use of mobile devices. This view of motivation asserts that efficacy beliefs, involving both intrinsic and extrinsic motivation as well as the individual's purposes for achievement, play an integral role in the decision to perform activities, and the amount of effort exerted in the chosen activities (Baker & Wigfield, 1999).

The use of technology and its related devices has gained the trust and confidence of many people including junior high school students. Many students rely on such devices to give them what they expect. Eccles (1983) built upon this framework in developing the expectancy-value theory of motivation, which states that motivation is influenced by the participant's expectation of failure or success, and by the attractiveness or value the participant places on the task. Ford (1992) furthered the expectancy-value theory's focus on the value of a task in his motivational systems theory, which states that participants are motivated to achieve goals they value and perceive as achievable. A key impact in value perception is the provision of materials (Jones and Brown, 2011; Marinak & Gambrell, 2008). It is of no thought that the high attractiveness of technological devices attract many students. Reading motivation and commitment are positively affected when high-interest material is available (Jones & Brown, 2011). Students who perceive reading to have personal value and importance engage with the texts to a much greater extent (Ames & Archer, 1988; Dweck & Elliot, 1983; Gambrell et. al., 1996; Paris, 1986). Engagement with the texts has been shown to be an accurate predictor of motivation to read and reading achievement (Jones & Brown, 2011).

Expectancy-value Theory and Achievement

Students who succeed at reading and understand easily are more motivated to read. Motivation and understanding are connected through the expectancy-value theory of motivation, which affirms that motivation is strongly influenced by expectation of success or failure (Eccles, 1983; Ford, 1992; Winne, 1985). Students who struggle with understanding do not perceive reading as a treasured task and do

not display continued motivation to read. Students who are motivated to read display greater academic achievement (Cox & Guthrie, 2001; Schunk, Pintrich, & Meese, 2007).

Observed Differences: Outcome versus Process Measures

Analysing reading is not a simple task and a distinction has been drawn between assessing reading behaviour in terms of outcome and process measures (Schumacher, 1985). Outcome measures concentrate on what the reader gets from the texts and considers such variables as amount of information retrieved, accuracy of recall, time taken to read the texts and so forth. Process measures are more concerned with how the reader uses a texts and include such variables as where the reader looks in the texts and how he/she manipulates it.

In the domain of electronic texts outcome measures take on a particular relevance as advocates proclaim increased efficiency and improved performance (i.e., outcomes) with computer presented material (aspects of direct concern to ergonomists). It is not surprising, therefore, to find that the majority of work comparing the two media has concentrated heavily on such differences. According to Andrew Dillion's publication uploaded in 2015 on reading from paper versus screens, he asserted that, with the emergence of hypertexts, however, navigation has become a major issue and process measures are gaining increased recognition of importance. In the following sections a summary of the observed differences between the media in terms of outcomes and processes presented.

The Shift to Electronic Textbooks

Present and Future Expected Data

Usage of electronic textbooks is growing rapidly. In 2009, the Association of American Publishers reported that electronic books still accounted for a very small percentage of total book sales, but their popularity had increased drastically and the increased availability and use of electronic books readers were still driving the growth. The popularity has caught up with many Ghanaians too, this is according to a Wikipedia publication on New media in Ghana. The link asserts to the fact that the use of new media in Ghana like elsewhere is growing. The Information and Communications Technologies (ICT) sector, which is based on a free market approach has promoted new media use. Most popular aspects of new media to Ghanaians is the Internet and its associated mobile and desktop applications for education, health, politics, business, publishing, governance and so on. Also popular is the use of mobile devices like smartphones and tablets and computers. This has been attributed to the growth of digital devices in Ghana.

At the beginning of April, 2011, at Amazon's site, 105 electronic books sold for every 100 traditional print books (Miller & Bosman, 2011). Amazon's predictions indicated that, within a decade, fewer than 25% of books sold would be print versions (Miller & Bosman, 2011). Increased adoption of electronic books by students and faculty has been projected over the next three years (Becker, 2010). The 2011 Horizon Report cites the time-to-adoption for electronic books as one year or less (Johnson et. al., 2011). A 2010 Educause survey revealed that almost every college student owns both a computer and phone and 80% own a laptop

(Smith and Caruson, 2010). This expansion is placing greater pressure on publishers to provide materials that can be accessed using laptops, tablets, and smartphones (Chesser, 2011). A similar expansion is also occurring within schools in Ghana. Many educationist have proposed the use of digital devices in second cycle schools. They argue that students are addicted to digital devices so it will be a better medium for supplying their reading materials. Estimates indicate digital textbooks will be the dominant format, with higher revenues within few years to come (Reynolds, 2011).

Lending further credence to the necessity of this study is the fact that Reynolds' (2011) estimate of digital dominance within seven years was published prior to the impact of Apple's iPad being measured. Many estimates are based on the expanding iPad market, yet there is a lack of research establishing the effect of tablet computers on reading comprehension and motivation.

Conflicting estimates regarding growth and market share require further exploration. While Murray and Perez (2011) predicted that only 11% of textbooks will be electronic by 2013, Reynolds (2011) expects digital textbooks to dominate within seven years. Significant differences in projections highlight the fact that these estimates are based on sales of electronic devices, and not on academic performance. Projections offer no data proving that sales will increase as a result of students displaying increased comprehension or motivation. The manner in which the electronic format affects academic performance, especially reading comprehension, must be determined prior to predictions of increased purchasing becoming a reality.

International Influence

It is a fact that some countries are rapidly shifting to the digital format. South Korea has a stated goal of digitizing all textbooks by the end of 2015, and this assertion has forced other countries, to increase the resources they devote to digital learning (Eason, 2011). The shift from traditional print to electronic book formats is occurring and will continue worldwide. While the shift is occurring rapidly within the general public, the focus of this study involves how the transition will affect academic environments. Data is available for this shift within academia at the elementary and collegiate levels, but more is needed for the junior high schools or middle school levels.

Libraries Systems

The shifting to electronic transition is being led by many libraries worldwide, especially within colleges and universities. A survey of 552 smaller college and university libraries reported that over 88% contained electronic books in their collections, with 45% of those surveyed containing greater than 10,000 electronic books (Korah et. al., 2009). There are even some universities that have moved this transition further implementing pay-per-view models for both electronic journals and books (Schell et. al., 2010).

Library transitions are based on monetary and storage savings. Data in these areas display the electronic format to have undeniable advantages in the library setting. Data does not, however, include explorations of effect on student performance. Money and space are significant within the library environment, but

libraries quickly lose their effectiveness if the electronic materials they provide do not maintain or improve comprehension.

Research conducted at Texas A and M's Medical Services Library on the usage of electronic textbooks, found the electronic versions of all 51 studied texts to have been accessed more frequently than print versions (Kimball, Ives, and Jackson, 2010; Ugaz & Resnick, 2008). Data pertaining to medical libraries present a view of textbook accessibility, not comprehension. Quick access to specific information is of great value in the medical setting, not the reading of entire chapters or books. Research has proven that information can be located quickly, but more research is necessary to determine if students in these libraries comprehend the information once it is located.

Off-campus Learning

By the nature and structure of distance learning, electronic texts best suit it. According to Hutton (2008), schools offering distance programs must ensure online students have equal access to books with traditional students and the electronic texts format fits this need. In an attempt to increase library offerings for off-campus students, some world known libraries such as Nova Southeastern University's Alvin Sherman library instituted a plan in which computer science, education, business, and psychology books were transitioned to electronic texts accessible to students through a MyiLibrary platform (Buckley & Tritt, 2011). A similar move is being adopted by Ghanaian universities, including the College of Distance Education (CoDE) of University of Cape Coast.

Statistics displaying the benefits of electronic books, especially those indicating decreased storage space and costs, make the transition from traditional print books to electronic books an attractive option for libraries. The need to offer sufficient library resources to off-campus and online students also remains a valid motivation for the transition. The positive effect on the budget, however, cannot override the focus on student development and achievement. Providing cheaper and more convenient access to reading materials remains an insignificant achievement in an academic environment if student performance is not positively affected. Before academic institutions implement this collegiate model in an effort to save money and increase access, the effect of this format on students must be determined. Some research has been conducted to this end.

Merits and Demerits of Electronic Books

Many studies has come out with several benefits and limitations associated with the use of electronic texts. The focus of research has been usability and preference. Accessibility, portability, and storage have been listed as significant benefits (Clark et. al., 2008). Discomfort with reading from a screen, inability to highlight and take notes within the texts, and the reality that many students simply prefer print have been listed as significant limitations (Kang et. al., 2009; Woody, Daniel, and Baker, 2010).

Demerits

First of all, problems related to reading from a screen have been reported. Reading from a screen can cause greater eye fatigue (Gunter, 2005; Lam et. al., 2009). Students have indicated they are more likely to skim electronic texts,

choosing to read in an “F” pattern searching for key words rather than line by line (Woody et. al., 2010). Students cited difficulty in taking notes using an electronic books as a significant drawback (Polanka, 2011). Three quarters of paper readers report marking notes in paper texts as they read while digital readers report the problem of having to type notes on a separate computer or use additional paper (Polanka, 2011). Noted limitations all relate to usability, not academic performance. Eye fatigue is an issue with electronic devices, but included data contains no information regarding the comprehension of what is being read. The fact that students are more likely to skim electronic texts may harm comprehension, but it is necessary to determine if comprehension is affected in situations where students choose to read carefully.

Secondly, the issue of print preference have also been noticed. Students have reported they were more likely to use special features accompanying traditional print books than those incorporated into electronic books (Woody et. al., 2010) and preferred traditional print books (Buzzetto-More, Sweat-Guy, & Elobaid, 2007; Gregory, 2006). Educational Marketer (2011) reports that 75.2% of college students prefer print over electronic textbooks. A preference for print includes no information regarding the effect of the electronic format on comprehension. The current research will seek to determine if a statistically significant difference in comprehension based on format exists especially in junior high school level in Ghana.

Merits

There are also some benefits of electronic books that studies have revealed. According to Tracey and Morrow (2002), the content of a texts, especially the difficulty or readability based upon font size and type as a factor in reader-texts interaction and comprehension. Digital reading devices have the capability to negate font distractions by allowing individual readers to adjust surface features (Abram, 2010; Larson, 2009). Additionally, electronic books have been cited as being convenient, lightweight, environmentally friendly, portable, and easily stored (Clark et. al., 2008; Shepperd et. al., 2008). Electronic books are also never out of stock since they are downloadable (Crestani, Landoni, & Melucci, 2005).

Additional advantages cited are updatable book versions, linkage of passages, and keyword searchability (Armstrong, Nardini, McCracken, Lugg, & Johnson, 2009; Crestani et. al., 2005).

The highlighted benefits offer strong support for the increased use of electronic books in academic environments, yet fail to include academic performance measurements. The effect on reading comprehension and motivation has yet to be determined, and is needed prior to using benefits associated with usability as valid reasoning for shifting to electronic books by schools.

Electronic Books for Academic work

University Trials

There has been many studies on university campuses. One of such studies was the one conducted at the University of Texas at Austin in which 1200 students were provided Amazon's Kindle e-reader as a replacement for traditional textbooks

(Butler, 2009). Students listed screen size as a significant restriction (Butler, 2009). The small size of the screens made the devices unsuitable to most textbooks, and was especially problematic with science texts. A 500-student trial also at Northwest Missouri State University replaced traditional textbooks with electronic texts using Sony e-readers, with the goal of utilizing electronic textbooks for all courses within five years (Butler, 2009). Dozens of the participants quit the trial after two weeks, citing the inability to flip through pages randomly, take notes in the margins, and highlight the texts as determining factors in their decision to purchase a print copy (Knutson & Fowler, 2009). Student focus groups reported the devices were not adequate to replace print textbooks, and the university transitioned to using laptops as the delivery devices in a further study (Tees, 2010). Another study comparing first-year graduate students at the University of Washington examined Kindle DX usage. All students began doing their academic reading using the Kindle DX, and seven months into the study, 40% of the students continued to use the device (Polanka, 2011). Students who continued to use the Kindle listed the need to read near a computer in order to look up references and take notes, or the continued need to carry paper for better note taking as significant drawbacks (Polanka, 2011). The major limitation noted in this study was sample size, with only 39 participants (Polanka, 2011).

The University of Illinois conducted a trial in which nursing students were provided eBook access on their Personal Digital Assistants (Williams & Dittmer, 2009). The study focused on the usability aspects of portability and accessibility. Students cited beside access to information as a significant benefit, but listed the

limited eight hour battery life of the device as a considerable challenge since nursing shifts were generally far longer (Williams & Dittmer, 2009).

The highlighted studies continue to display a significant gap in the literature regarding academic performance. Most studies at the collegiate level focus on usability, not academic performance. These studies fail to include a specific measurement of student reading comprehension or motivation, and focus solely on determining the reasons for student selections.

Kindergarten Trials

A focal point in electronic books research at the elementary level has been the effect of technology on low socioeconomic status kindergarten students (Shamir & Korat, 2007; Korat et. al., 2009; Shamir, 2009; Moody, 2010). Researchers attempted to determine if the students' lack of access and experience regarding these devices prevented the devices from positively impacting student achievement in the classroom. Students using electronic books were found to display increased motivation to read, increased curiosity regarding both the device and the books available using the device, and increased literacy development (Shamir & Korat, 2007; Korat et. al., 2009; Shamir, 2009; Moody, 2010). Problems noted with this research include the limited generalizability of the study, given the similarity of all three samples, and the vague description of what constitutes literacy development and emergent literacy (Shamir & Korat, 2007; Korat et. al., 2009; Shamir, 2009; Moody, 2010). Literacy development and emergent literacy encompass word meaning, word recognition, emergent writing, phonological

awareness, and letter naming (Scarborough, 2001; Shamir and Korat, 2007), but include no information on reading comprehension.

Junior high school Trials

Recent research has begun to focus on the “deep reading” of middle school students when using the electronic format. Fisher et al. (2011) studied 100 eighth grade students reading science and social studies information in both the electronic and paper formats. Students completed the readings and responded to questions in order to assess their comprehension and attention to detail. There were no significant differences between the groups on questions related to main themes, but electronic students performed significantly poorer on questions related to specific details. While this research took a significant step towards understanding the effect of the electronic format on reading for this age group, it lacked many aspects needed for a statistically significant determination. The first issue noted with this research was formatting. Articles from electronic journals were read as they appeared on the journal’s website, and were not formatted to resemble book passages.

The second major issue noted was research focus. Three aspects of electronic reading were considered: understanding the main theme, the three-dimensional nature of reading online, and deep reading (Fisher et al., 2011). Comprehension was not the main focal point, and researchers further admitted there were no significant differences in the overall responses, but rather focused on differences in questions related to very specific information. The final issue noted was instrument selection. The research did not use a validated instrument for the

measurement of reading comprehension, but rather researcher-created questions on the specific journal articles selected.

Student Preference

There have been few non-formal studies or observations of Ghanaian students' preference for electronic stuffs. A study conducted at the University of Illinois surveyed students, faculty, and staff to determine their acceptance of electronic textbooks. Results revealed that while only 10% of the students used electronic textbooks alone, 56 % of the students used a combination of traditional print and electronic texts (Shelburne, 2009). Further predictions indicated 11% of faculty and students expected to transition to using mostly electronic books, while 28% expected to use a combination of electronic and print books (Shelburne, 2009). This study was limited by sample size. Of the 47,000 community members invited to participate, only 3%, or 1547 members submitted responses (Shelburne, 2009). A study conducted at the University of Maryland Eastern Shore surveyed 261 freshmen and sophomore business students to determine their acceptance of electronic books (Buzetto-More et. al., 2007). Over 54% of the students surveyed preferred a print texts, but 44% stated they would purchase electronic book for a course if it was an option (Buzetto-More et. al., 2007). These studies continue to focus on usage, not performance. The decision to purchase, or continue to use eBooks, while significant to sales predictions, presents no information regarding the effect of this format on the student.

Academic Performance

Some studies have tried to focus on academic performance rather than usability of students who read electronic texts. A trial conducted at the University of Florida allowed some group of students to choose either traditional or electronic texts. The electronic texts group reported spending less time in their reading, yet displayed no statistically significant difference in the grades received for the course (Shepperd et. al., 2008). This study was limited by its admission that study habits were difficult to measure and open to multiple interpretations (Shepperd et. al., 2008). Results were based solely on final grade and a self-reported survey. Students were not required to report how much time they spent studying apart from reading the texts. It remains possible that students who read less insight have studied more, and study habits could have affected grades more than book format. Additional study would be required to determine if book format alone led to improved course grades. A pilot study conducted at a university in Virginia compared the use of electronic books and traditional print books on some group of student. Results reported higher psychomotor learning levels for students using electronic books, and no difference in actual learning between the groups (Rockinson-Szapkiw & Holder, 2011).

Effectiveness of Electronic Books as Learning Tool.

Some merits of electronic texts format includes; portability, convenience, reduced expense, storage capacity, and lessened environmental impact. As Rockinson-Szapkiw and Holder (2011), have highlighted, however, it is necessary to look beyond preferences and focus on the effectiveness of electronic books as

learning tools. If electronic book formats are to be fully implemented in educational settings these characteristics must match with increased student performance. Studies on the effect of electronic books has also been limited to usage and perception, with few studies focusing on effectiveness as a learning tool (Rockinson-Szapkiw et. al., 2011; Woody et. al., 2010). Research that has focused on the effectiveness of electronic books has focused on elementary and college students. Little studies demonstrating the effect on student performance at the junior high school levels has been located.

Additional Research is Needed

Studies on the effect of the electronic texts using digital and electronic devices are increasing. The focus, thus far, has been on usage and student acceptance. Academic research using validated measurement instruments has been limited. Studies using minimal sample sizes and researcher-created questions on electronic article postings, or surveys reflecting how students perceived electronic readers to affect their reading comprehension need to be replaced with research using validated reading comprehension measurement instruments administered to sufficient sample sizes of middle and high school students from which to draw statistically determined conclusions.

Summary

Popularity is not an accurate indicator of academic success. Research is needed to determine the effect this shifting to an electronic format, and usage of digital devices, will have on the reading comprehension and motivation of the students involved. While research has revealed extensive coverage regarding how

electronic books are being used at the elementary and college levels, few studies have reported at the junior high school level, with few studies being located that focus specifically on reading understanding and motivation. Few studies have detailed how the reading comprehension and motivation of junior high or middle school levels students will be impacted. Given the three possibilities of positive effect, negative effect, or no effect, this study represents an important determination. If electronic books usage has positive or no effect on comprehension and motivation, then the many benefits cited in this review encourage widespread inclusion of this format within junior high schools. If the effect is negative, however, the benefits must be bypassed in favour of student performance.

CHAPTER THREE

RESEARCH METHODS

Introduction

The section highlights the techniques and procedures used in carrying out this research. Many studies exist to indicate the effect of shifting to electronic books on university libraries (Croft & Davis, 2010; Kimball et. al., 2010; Schell et. al., 2010), and elementary students (Dundar & Akcayir, 2012; Larson, 2010; Rhodes & Milby, 2007; Shamir, 2009; Shamir & Korat, 2007), but only recently have research studies been conducted on middle and high school students (Fisher et al., 2011; Mardis & Everhart, 2011; Sherman, 2012). This study compared the effect of traditional books to electronic books on reading comprehension and motivation of students among Ghanaian junior high school students. This chapter deals with the research design, population, sample and sampling procedures used in this study, the instruments used, the data collection, and analyses.

Research Design

Research objective one was studied using a true experimental post-test-only control-group design. This design was chosen for its rigor, and due to the ability to randomly assign the sample. The choice to exclude a pre-test was based on the fact that administering a pre-test may have adversely affected scores on the post-test (Wiersma & Jurs, 2005; Gall, and Borg, 2007).

Research Objective two was studied using a quasi-experimental pre-test post-test control-group design. This design was chosen due to the inability of the researcher to randomly assign the sample on days two and three of the study; this

design is often used in educational settings and is thus appropriate for this study (Gall et. al., 2007). Quasi-experimental designs lack control over exposure to X; i.e., when to expose, to whom, and ability to randomize group assignment. However, they do have true experiment-like features regarding measurement; e.g., whom and when.

Population

All the participants of this study were from Volta River Authority Junior High School No.1 at Akosombo in the Eastern Region of Ghana. All these student were reading English Language as one of their core subjects for the Basic Education Certificate Examination (BECE). The total population available for the study was the 221 students in the double stream junior high school 1 to 3.

Sample and Sampling Procedure

All 221 students received an invitation to participate in the study as well as parent consent and student assent forms during their third term vacation class period about three weeks before this study. According to the database provided by the Headmaster of the school, approximately 88% of the total population were from average homes, 51% male, and 49% female.

A total of 152 consent/assent forms were received from students, a volunteer rate of 69%. For various reasons, including absence and nonpayment of school fess, 12 of the approved students were unable to participate in the reading comprehension portion of this study. As a result, the 140 student sample was divided into two 70-member groups; paper group and electronic group. Two students in the paper group were released to take part in a drama festival outside

Akosombo, and were unable to complete the downloaded and modified PowerPoint version of the ReadTheory Reading Tests, reducing the final participation to 138 students. The minimum sample for the study, based on Cohen's $d = 0.5$, Power = 0.8, and alpha level $p = 0.05$, was 128 students, with 64 per group (Soper, 2011). Out of the 152 participants available for the PowerPoint version of the ReadTheory Reading Tests, 88 (58%) were male and 64 (42%) female. Participants were randomly assigned to control and experimental groups for the ReadTheory Reading Tests administration. The population available for the MRQ post-test consisted of a total of 61 students. Forty (66%) of the potential participants were male, and 21 (34%) were female. Due to absenteeism, only 54 of the students participated.

Instruments

For the comprehension portion of the study, students were randomly assigned to the treatment or control group using a random number generator and both groups were simultaneously administered the treatment and instruments 10 minutes after the instructional school hours. Participants initially reported to the main dining hall of the school. Once all students were seated, each student received a number. Using a random number generator, the students were assigned to either the paper group or the electronic group. Electronic group members were then distributed to any available vacant classrooms. All electronic-group students were initially scheduled to remain in the cafeteria for the administration of the PowerPoint version of the ReadTheory Reading Tests. A Mini notebook computers were distributed to all electronic-group students. Treatment diffusion was

addressed using group separation, through instructions to not discuss any information related to the instrument administration, and through teacher monitoring to ensure no discussions regarding the research took place during administration of the instrument. Both groups were administered the same reading comprehension section of the ReadTheory Reading Tests. The only difference was in format. Paper-group students were administered the reading comprehension section using the traditional paper test booklets. Electronic group students were administered the reading comprehension section by accessing the PowerPoint version of the ReadTheory Reading Tests saved on mini-notebook computers.

On the second day, participants reported to their assigned venues after normal instructional school hours for the Motivations for Reading Questionnaire pretest. All participants completed the Motivations for Reading Questionnaire. On the third day, participants reported to their normally venues 13 minutes after normal school instructional hours for the Motivations for Reading Questionnaire post-test. All participants read a reading comprehension assessment passage by ReadTheory entitled "*Tools for persuasion*", and completed the Motivations for Reading Questionnaire. The paper-group read the passage in paper form prior to responding to the MRQ. Three classrooms were assigned to the electronic-group and read the same passage in electronic form using their mini-notebook computer prior to responding to the MRQ.

The electronic passage for the comprehension section was designed in such a way that only one paragraph was displayed at a time. Animations and colours were used to enhance the interface. Each question was also displayed at a time with

appropriate navigation buttons provided below. Readers did not have to scroll. On the other hand the paper version was designed in a form of a pamphlet in black print on white A4 sheets.

The independent variable for research question one was book format. There were two levels to the independent variable: (1) Print book format, and (2) Electronic book format. The dependent variable for research question one was student reading comprehension as measured using the ReadTheory® Reading Tests. This research focused only on comprehension and, thus, required 35 minutes for the administration of the comprehension assessment. The reading passage was selected for similarity to both school-related and recreational reading and included fiction and non-fiction as well as different styles of writing. The ReadTheory® Reading Tests uses levelled tests for students in varying ability groups from prereading through adult reading. This research used the Level 8 version, which was designed to provide a general assessment of reading for students in junior high school 1-3.

The ReadTheory® Reading Tests has a test reliability coefficient of approximately 0.90, and a reading comprehension reliability coefficient of approximately 0.89 just as The MacGinitie Reading Test (MacGinitie et. al., 2006). The reliability estimates indicate strong total test and subtest consistency levels. Worksheets from ReadTheory® elicit the use of critical thinking skills at every level. While some questions required the reader to peruse the passage for particular details, most questions involved the use of deductive reasoning, conclusion making, logical inference, sequential analysis, tonal awareness, and an understanding of

scope. These materials are highly effective in supplementing the education of verbal reasoning and critical thinking skills on behalf of the reader. Both the print and the electronic tests were scored by the researcher using the Answers and Explanations manual provided Raw scores were used for statistical analysis in this study.

The independent variable for research objective two was book format. There were two levels to the independent variable: (1) Print book format, and (2) Electronic book format. The dependent variable was student reading motivation as measured using the Motivations for Reading Questionnaire (MRQ; Wigfield and Guthrie, 1997). The MRQ was also given as a pre-test. Originally developed by Wigfield & Guthrie in 1995 and including 82 items, the MRQ was revised to its current form in 1997 with 53 items (Wigfield & Guthrie, 1997). As a group, students read the instrument directions and completed the remaining questionnaire independently. The response format for the 53 items is a 4-point Likert scale with 1 = Very different from me, 2 = A little different from me, 3 = A little like me, and 4 = A lot like me (Wigfield & Guthrie, 1997). Eleven constructs of reading motivation are measured (Wigfield & Guthrie, 1997). Of the 53 total questions, responses to three items determine Construct One - Reading Efficacy; five questions determine Construct Two - Reading Challenge; six questions determine Construct Three - Reading Curiosity; six questions determine Construct Four - Reading Involvement; two questions determine Construct Five - Importance of Reading; four questions determine Construct Six - Reading Work Avoidance; six

questions determine Construct Seven - Competition in Reading; five questions determine Construct Eight Recognition for Reading; four questions determine Construct Nine - Reading for Grades; seven questions determine Construct Ten - Social Reasons for Reading; and five questions determine Construct Eleven - Compliance (Wigfield & Guthrie, 1997).

The MRQ was initially administered to 371 fifth and sixth grade students, 52% girls and 48% boys, attending six elementary schools in a large mid-Atlantic city (Baker & Wigfield, 1999). Wigfield and Guthrie (1997) reported reliability values for the MRQ to range from 0.52 to 0.81. The Work Avoidance and Reading for Grades constructs initially reported the lowest reliabilities at 0.44 and 0.43 (Wigfield & Guthrie, 1997). Twenty-eight of the original items were dropped to improve the instrument in these areas, and further studies have revealed reliabilities for the two constructs to have risen to 0.60 and 0.59 (Baker & Wigfield, 1999; Wigfield & Guthrie, 1997). The remaining nine constructs have consistently displayed internal reliabilities approaching or exceeding 0.70, and reaching 0.81 (Baker & Wigfield, 1999; Wigfield & Guthrie, 1997). Goodness-of-fit index for the instrument was reported as 0.90 (Baker & Wigfield, 1999). Unrau and Schlackman (2006) reported validity of the MRQ, following its use with a sample of 2000 6th, 7th, and 8th grade students with a confirmatory fit index (CFI) of 0.90. The sample consisted of students who were 75 % Hispanic, 20 % Asian, and 5 % African-American, American-Indian or White (Unrau & Schlackman, 2006). Internal consistency estimates of reliability were calculated for the survey using Cronbach's coefficient alpha for the present data and reported here.

As usual the scoring was executed by the researcher. Students were assigned an overall score by summing the scores of all items with the exception of the Work Avoidance dimension. Students were assigned individual construct scores by summing the item scores and dividing by the total number of questions used to measure the construct (Wigfield & Guthrie, 1997). An exception was noted for the Compliance construct. To obtain an accurate score for this scale, the first two items were reversed; a score of 1 was converted to a 4, a score of 2 converted to a 3, a score of 3 converted to a 2, and a score of 4 converted to a 1 (Wigfield & Guthrie, 1997).

Data Collection Procedure

On the first day of testing the participants for this study, students participated in the ReadTheory® Reading Tests. This test was administered about 20 minutes after normal school instructional hours, with some volunteer teacher serving as test administrators, and required a single 35-minute session. After all participants had seated at the approved venue, each student was given an index card containing a specific number. The researcher then guided the administrators to assign each participant to either the experimental group or the control group based upon the index card's number given. Participants in the control group remained in the gathered venue, that is, the dining hall of the school, while the participants of the electronic group were redistributed to three of the vacant classrooms. Each group was instructed to not discuss the research, and was monitored by teachers during movement to the alternative locations and during instrument administration. Students in the experimental group did not receive paper materials, but rather each

student was given a mini-notebook computer on which he/she could access the downloaded and modified PowerPoint version of the ReadTheory Reading Tests offline. In addition, each student in the electronic group was given only the questions portion of the ReadTheory Reading Tests and pen to be able to answer the test questions. Students in the control group were provided test booklets and pens to read and respond to the ReadTheory Reading Tests passage using the traditional print format. Both groups read the same passages; only the format differed. All materials were returned to the researcher immediately following administration.

On the next day of the testing, students participated in the Motivations for Reading Questionnaire pre-test at approximately the same time as the first day of the testing for this study. The test was administered in a single 20-minute session, that is, no additional scheduling was necessary. Students were seated and provided paper copies of the MRQ. Administrators then allowed the necessary time for MRQ responses to be circled. Response forms were collected by the teachers serving as proctors and returned to the researcher for grading. MRQ scoring was conducted by hand using directions provided by the questionnaire's authors.

On the third day of the testing, students participated in the Motivations for Reading Questionnaire post-test some minutes after normal school hours at the usual venues. The control group students read a paper-printed passage titled "*Tools for of Persuasion*" by ReadTheory Reading Tests. Each experimental student used his/her assigned mini-notebook computer to access the passage saved on it.

Administrators then allowed the necessary time for MRQ responses to be circled. Response forms were collected by the teachers serving as proctors and returned to the researcher for grading. MRQ scoring was conducted by hand using directions provided by the questionnaire's authors. Scores data were statistically analyzed using MANOVA; a *t*-test was conducted on pre-test scores and determined there was not a significant difference in the scores for control group students ($M = 2.62$, $SD = 0.50$) and experimental group students ($M = 2.56$, $SD = 0.42$) on the conditions; $t(138) = 0.73$, $p = .47$.

Data Analysis

The first research question was analyzed using an independent *t*-test to evaluate the null hypothesis that there is no relationship between the media through which students read texts and the comprehension of the texts as measured by the ReadTheory Reading Tests. This was the appropriate statistical test due to the fact that the research was testing hypotheses of difference with one independent variable having two levels, one dependent variable, and no covariate (Gall et. al., 2007). The alpha level for the study was $p < 0.05$ in order to prevent the incorrect rejection of the null hypothesis (Sprinthall, 2003). The number of participants calculated with an alpha level of $p < 0.05$, Cohen's *d* value of 0.5, and a power level of 0.80 provided a minimum sample size for an independent *t*-test of 128 (Soper, 2011). Effect size was reported as Cohen's *d* (Ary, Jacobs, Razavieh, and Sorenson, 2006). Prior to conducting the analysis, assumption testing was conducted. Normality was assessed using histograms (Sprinthall, 2003). Equal variance was assessed using Levene's test of homogeneity (Sprinthall, 2003). Large

sample sizes (i.e., when both groups have >25 subjects) and equally sized groups made this test robust to violations of normality and homogeneity of variance assumptions (Diekhoff, 1992); thus, minor violations were not a concern. The sample for this research included 138 students divided into a paper-group of 68 and an electronic-group of 70. The presence of outliers was examined using box plots (Howell, 2008). Outliers resulting from errors were eliminated. Representative outliers forced a drop from interval to ordinal tests of significance (Sprinthal, 2003).

The second research question used a one-way multivariate analysis of variance (MANOVA) to evaluate the null hypothesis that junior high school students reading a passage entitle Tools of Persuasion by ReadTheory in traditional print and electronic formats would display no statistically significant difference in their mean scores for the linear combination of the reading motivation scales as measured using the Motivations for Reading Questionnaire. A MANOVA was chosen because it tests the significance of group differences between two or more groups when there are correlated dependent variables (Tabachnick & Fidell, 2007). The optimal number of participants per group range from 20 to 10 times the number of dependent variables for this analysis (Swanson & Holton, 2005); the convention for the design used 54 post-test participants in two groups of 27, exceeding the 15 per group minimum set by Gall et al. (2007), and providing a sufficient, but small sample size. A $p < 0.05$ level of significance was used for all analyses to determine if the null hypotheses could be rejected. The effect size was calculated using the Eta squared statistic and interpreted using Cohen's d (1988).

Assumption testing was conducted prior to the analysis. The assumption of outliers was examined using boxplots (Sprinthall, 2003). The assumption of normality was examined using a One-Sample Kolmogorov-Smirnov test with Lilliefors's correction, (Lilliefors, 1967; Shapiro & Wilk, 1965). Mahalanobis distance was calculated to test for multivariate normality. Correlations and scatterplots were analyzed to evaluate assumptions for linearity, singularity, and multicollinearity. The assumption of homogeneity of variances and covariance was completed using Levene's test and Box's *M* test (Box, 1949; Sprinthall, 2003). The assumption of sphericity was examined using Bartlett's and Mauchly's tests (Mauchly, 1940; Snedecor & Cochran, 1989).

An independent t-test of the MRQ pretest scores was conducted to determine if there was a significant difference in scores based on group assignment. No significant difference was found between the scores for control group students ($M = 2.62$, $SD = 0.50$) and experimental group students ($M = 2.56$, $SD = 0.42$) on the conditions; $t(131) = 0.73$, $p = .47$. The finding of no statistically significant difference between the groups on the pre-test led to the use of MANOVA for data analysis as there was no need to determine the effect of a covariate.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter contains a summary of the results for each of the research questions, and a detailed description of the decisions regarding the research hypotheses for this study. The data presented in this chapter describe the effect of traditional printed book format in comparison to the electronic format on the reading comprehension and motivation of junior high school students. The findings are also discussed in relation to existing literature and conclusions drawn.

Relationship to Prior Research

The purpose of this study was to determine if there was a statistically significant difference in the reading comprehension levels of junior high school students when using electronic books compared to traditional print books. The purpose of this study was to determine if there was a statistically significant difference in the reading motivation levels of junior high school students when using electronic books compared to traditional print books. Through the researcher's search of the literature, using databases such as ERIC and Education Research Complete, I was unable to locate research that specifically studied the effect eBooks have on the reading comprehension and motivation levels of junior high school students. That is, research to make such a determination for students at the junior high school level was needed.

Research conducted at the collegiate level indicated little effect on academic performance. A University of Florida trial allowed undergraduate psychology

students to choose either traditional or electronic texts. The electronic text group reported spending less time in their reading, yet displayed no statistically significant difference in the grades received for the course (Shepperd et. al., 2008). Another study conducted at a university in Virginia compared the use of eBooks and traditional books on undergraduate student learning in an educational history course. While results reported higher psychomotor learning levels for students using eBooks, no difference in actual learning between the groups existed (Rockinson-Szapkiw & Holder, 2011). The current study's retention of the null hypothesis that junior high school students using traditional print and electronic books will not display statistically significant different levels of reading comprehension as measured using the Gates-MacGinitie Reading Tests supports previous results indicating no change in academic achievement based on either format.

Research at the elementary level has displayed electronic books to improve reading motivation. A study of kindergarten students using electronic books displayed increased motivation to read (Shamir & Korat, 2007; Shamir, 2009; Korat et. al., 2009; Moody, 2010). A study of second grade students who read a story using an e-reader also displayed increased motivation when compared to those students who had read traditional print versions (Rhodes & Milby, 2007; Larson, 2010). Results of a meta-analysis of studies using electronic books with K-5 students indicated the technology to be significant in terms of reading motivation (Zucker et. al., 2009). The current study's retention of the null hypothesis that junior high school students using traditional print and electronic books will not

display significantly different levels of reading motivation as measured using the Motivations for Reading Questionnaire does not support generalizing these conclusions for students beyond grade 5.

Research has begun to be conducted on reading using the electronic format at the junior high school levels (Fisher et al., 2011; Mardis & Everhart, 2011). Previous studies, however, have relied upon researcher generated assessments or student surveys in making determinations of effect. The current study's use of the Gates-MacGinitie Reading Tests, a validated instrument for measuring reading comprehension, provides full statistical support for making the determination of effect of format on reading comprehension.

Theoretical Implications

The results of this study provide support for the theory that schema dictate level of reading comprehension regardless of the text format. Piaget referred to an organized pattern of thought used to explain experiences as a scheme (Piaget, 1952; Shaffer, 2002). Rumelhart (1982) referred to schema as the building blocks of cognition, and schema theory expanded this meaning to include the importance of general knowledge and concept understanding in reading comprehension, specifying that most reading difficulties can be traced to insufficient prior knowledge (Anderson et. al., 1984). Schema theory is based on Goodman's (1967) psycholinguistic model, which places the ability to anticipate that which has not been seen as vital to reading comprehension (Goodman, 1967). This research supported schema theory in that the format of the text had no effect on reading comprehension. The students' raw scores on the GMRT comprehension section

were based on their ability to access prior knowledge to process the unknown and make inferences regarding meaning, and were not affected by format.

The use of schema in understanding reading is further explained using Rosenblatt's (1995) transactional theory of reader response. According to Rosenblatt, each reader considers the material through the lens of their individual experiences, and works to construct personal meanings as they interact with the text (Keene & Zimmerman, 1997; Miller, 2002). It is during this transaction between the reader and the text that comprehension occurs (Kucer, 2001; Rosenblatt, 1978). This study provides support for the transactional theory of reader response in that format had no effect on comprehension. The students' raw scores on the GMRT were dependent upon their interaction with the text, and their ability to construct personal meanings as they interacted with the passages, not on format.

Noyes and Garland (2008) discussed how developments in screen technology lessened the impact of reading difficulties, and noted improvements in the transaction using the improving technology involved in the electronic format. This research provides support for this viewpoint in that the current study utilized tablets to access Riverside Publishing's (2012) Testing Interface. This newer technology resulted in not only improvements in the transaction using the electronic format, but equivalence in the transaction as measured using GMRT reading comprehension raw scores.

The theoretical framework for this study's motivational research is based upon Social Cognitive Theory, specifically the role of Bandura's (1997) ideas regarding self-efficacy in the motivational level for any task. This view of

motivation asserts that efficacy beliefs, involving both intrinsic and extrinsic motivation as well as the individual's purposes for achievement, play an integral role in the decision to perform activities, and the amount of effort exerted in the chosen activities (Baker & Wigfield, 1999; Bandura, 1997; Eccles et al., 1998; Wigfield et al., 1998). This research provided support for this view of motivation as book format was found to have no significant effect on the motivation to read. The motivation each student reported for reading was based upon their purposes for achievement and the effort they were committed to exerting to reading, and not based upon the format of the reading.

Practical Implications

The results of the current study lead to implications for educational practices in the area of school purchasing and testing. Results indicated no significant relationship between either reading comprehension or reading motivation and book format. In this study, junior high school students displayed no statistically significant difference in reading comprehension or motivation based upon using paper or electronic books. Given these results, junior high schools in which students are participants in 1:1 computer programs, or have access to sufficient technology, have a statistical determination of standardized testing results using the electronic format upon which to base testing format decisions. The fact that students using online versions of a standardized test such as the GMRT showed no statistically significant difference in raw scores provides schools capable of making the transition to the electronic testing format confidence in knowing the move will not adversely affect their students' academic performance. In addition to the testing

confidence provided, results allow administrators to fully consider making the transition to the electronic format for educational materials. In an educational environment in which the *2011 Horizon Report* projected a one year or less timeframe for school systems to begin widespread use of eBooks (Johnson et al., 2011), and the *2012 Horizon Report* followed with a prediction of widespread use of tablet computers within a one-year timeframe (Johnson et al., 2012), this study's results provide statistical evidence that students comprehend such text in an equivalent manner to traditional paper texts.

Background Information on Respondents

Students involved in this study were junior high school students drawn from Volta River Authority Junior high school No.1 at Akosombo in the Eastern Region of Ghana. A total of 138 respondents were used for the study. Their average age was 14 years, with 12 years as the youngest age and 15 years as the oldest.

Objective One

The first research objective was, "To find out the relationship between the media through which students read texts and their comprehension of the texts." An independent two-tailed *t*-test was performed to determine if a statistically significant difference existed between the experimental group and the control group in the level of reading comprehension as measured using raw scores from the ReadTheory Reading Tests. Group assignment, experimental (electronic) or control (paper) was used as the independent variable when evaluating the equality or differences among population means. The means and standard deviations for

reading comprehension as represented by the participants' group assignments are reported in Table 1.

Table 1: Mean GMRT scores for Reading Comprehension based on Group Assignment

Dependent Variable	Experimental Group (<i>n</i> = 70)		Control Group (<i>n</i> = 68)	
	M	SD	M	SD
GMRT Raw Score	37.87	7.63	37.71	7.33

Assumption testing was performed to determine whether the following assumptions were tenable: Normality, homogeneity of variance, and no extreme outliers. Normality and no extreme outliers were assessed using histograms and box plots. There were no extreme outliers presented in the graphs to indicate any errors or inconsistencies in the data.

Equal variance was assessed using Levene's test of homogeneity. For this research, Levene's test reported significance of 0.75, indicating the two variances were approximately equal (Sprinthall, 2003). Independent *t*-tests are also robust to violations of normality and homogeneity of variance assumptions when sample sizes are large (i.e., when both groups have > 25 subjects) (Diekhoff, 1992).

Among junior high school students who took part in the GMRT (*N* = 138), there was not a statistically significant difference between the paper group (*M* = 37.71, *SD* = 7.33) and the electronic group (*M* = 37.84, *SD* = 7.63), $t(136) = -.11$, $p = 0.92$.

Therefore, the research failed to reject the null hypothesis. Cohen's effect size value ($d = 0.02$) suggested low practical significance, and observed power = 0.83.

Objective Two

The second research objective was, "To ascertain the relationship between the media through which students read texts and their motivation levels in reading" A one-way multivariate analysis of variance (MANOVA) was performed to identify whether a significant difference between the experimental group and the control group in the level of reading motivation. The linear combination of the 11 subscales of the Motivations for Reading Questionnaire served as the dependent variables. These variables included reading efficacy, reading challenge, reading curiosity, reading involvement, importance of reading, reading work avoidance, competition in reading, recognition in reading, reading for grades, social reasons for reading, and compliance. Group assignment, experimental or control, was used as the independent variable when evaluating the equality or differences among sample means. The means and standard deviations for each of the 11 subscales represented by the participants' group assigned are reported in Table 2.

Table 2: Mean values of subscales for Reading Motivation per groups

Dependent Variables	Experimental Group (<i>n</i> = 27)		Control Group (<i>n</i> = 27)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Reading Efficacy	2.72	0.68	2.85	0.78
Reading Challenge	2.60	0.68	2.47	0.64
Reading Curiosity	2.76	0.69	2.74	0.61
Reading Involvement	2.56	0.68	2.50	0.58
Importance of Reading	2.40	1.05	2.65	0.77
Reading Work Avoidance	2.66	0.69	2.46	0.56
Competition in Reading	2.47	0.76	2.67	0.71
Recognition in Reading	2.41	0.89	2.62	0.81
Reading for Grades	2.55	0.81	2.90	0.66
Social Reading	1.67	0.63	1.70	0.44
Compliance	2.62	0.62	2.94	0.52
Linear Combination	2.51	0.39	2.57	0.46

Prior to conducting the MANOVA, assumption testing was completed to determine whether the following assumptions were tenable: sample size, normality, outliers, homogeneity of variance-covariance, linearity, and multicollinearity/singularity. For a MANOVA, there should be more cases in each cell than total dependent variables for the study (Pallant, 2011). For this study, the sample size assumption was satisfied by having 27 cases in each cell with only 11 dependent variables. The Kolmogorov-Smirnov statistic was examined to check

univariate normality. For this test, an alpha value greater than 0.05 indicates normality (Pallant, 2011). Normality was present in all dependent variables. As an additional check for normality and univariate outliers, histograms, Q-Q plots, and boxplots were examined. Boxplots revealed four extreme outliers for the Reading Involvement scale and one for the Reading Avoidance scale. The outliers were first checked to ensure they were not the result of recording errors (Gall et. al., 2007). Since MANOVA is tolerant to outliers if values are not too extreme and N greater than the number of dependent variables, the outliers were not removed (Tabachnick and Fidell, 2007). A Mahalanobis distance statistic was calculated to examine multivariate outliers; the Mahalanobis distance values were assessed using χ^2 (11, N = 54) = 32.9, $p < 0.001$. The Mahalanobis distance value was compared against a critical value to determine if there was a violation of this assumption within the data set (Pallant, 2011). The critical value of 32.9 was determined using a chi-square table with the number of dependent variables (11) as the degrees of freedom and an alpha value of $p = 0.01$. There were no violations of this assumption as none of the cases were larger than the critical value, indicating a lack of multivariate outliers for this study. The assumption of homogeneity of variance-covariance was tenable based on Box's $M = 98.92$, $F(66, 8621) = 1.16$, $p = 0.18$.

A matrix of scatterplots was generated to check for linearity assumptions. The plots showed no evidence of non-linearity; therefore, the assumption of linearity was satisfied. Pearson's r correlations coefficient determined were to examine multicollinearity among the dependent variables. A Pearson's r correlation coefficient shows the strength of the relationship between groups of students on

each of the 11 scales (Reading Efficacy, Reading Challenge, Reading Curiosity, Reading Involvement, Importance of Reading, Reading Work Avoidance, Competition in Reading, Recognition in Reading, Reading for Grades, Social Reasons for Reading, and Compliance). Correlations coefficient exceeding 0.8 is reason for concern (Pallant, 2011). For this data set, the correlations coefficient among the dependent variables were all below 0.8; therefore, the data set did not violate the assumptions of multicollinearity and singularity (Table 3).

Table 3: Pearson’s Correlation Matrix of 11 subscales of Reading Motivation

	EFF	CHA	CUR	INV	IMP	WA	CR	RR	RG	SR	C
Reading Efficacy	1	0.58**	0.64**	0.52**	0.52**	-.43**	0.40**	0.48**	0.43**	0.28*	0.36**
Reading Challenge	0.58**	1	0.76**	0.63**	0.53**	-.47**	0.42**	0.39**	0.46**	0.55**	0.44**
Reading Curiosity	0.64**	0.76**	1	0.49**	0.47**	-.43**	0.33*	0.30*	0.36**	0.37**	0.39**
Reading Involvement	0.52**	0.63**	0.49**	1	0.57**	-.41**	0.39**	0.43**	0.30*	0.50**	0.54**
Importance of Reading	0.52**	0.53**	0.47**	0.57**	1	-.34*	0.69**	0.74**	0.71**	0.63**	0.58**
Reading Work Avoidance	-.43**	-.47**	-.43**	-.41**	-.34*	1	-.09	-.26	-.29*	-.27*	-.32*
Competition in Reading	0.40**	0.42**	0.33*	0.39**	0.69**	-.09	1	0.74**	0.60**	.59**	0.54**
Recognition in Reading	0.48**	0.39**	0.30*	0.43**	0.74**	-.26	0.74**	1	0.73**	0.58**	0.58**
Reading for Grades	0.43**	0.46**	0.36**	0.29*	0.71**	-.29*	0.60**	0.73**	1	0.58**	0.54**
Social Reasons	0.28*	0.55**	0.37**	0.50**	0.63**	-.27*	0.59**	0.59**	0.58**	1	0.52**
Compliance	0.36**	0.44**	0.39**	0.54**	0.58**	-.32*	0.54**	0.58**	0.54**	0.52**	1

Note: **Correlation is significant at the 0.01 level.

*Correlation is significant at the 0.05 level.

Table 3 shows the Pearson's correlations coefficient among the dependent variables and was also used to determine if the MANOVA was the most appropriate choice of analysis. The MRQ was designed with multiple subscales and each of those subscales served as a dependent variable in this study. In previous research, the subscales have been significantly correlated. All subscales are significantly positively correlated with one another, with the exception of the subscale Work Avoidance (Wigfield and Guthrie, 1997). This subscale is negatively correlated with other subscales (Wigfield and Guthrie, 1997). Consistent with previous research, Table 3 demonstrates that the subscales in this study was significantly positively correlated with the exception of the Work Avoidance scale. Given the significant correlations among the dependent variables, the MANOVA was conducted and deemed appropriate as the MANOVA considers the interrelationship between variables and determines whether groups differ on more than one dependent variable (Gall et. al., 2007). Wilk's Lambda was used to indicate statistically significant differences among the variables since there were no violations.

The results of the MANOVA indicated there was not a statistically significant difference between reading motivation levels based on book format, Wilk's lambda = 0.750, $F(11, 42) = 1.27$, $p = 0.27$, partial $\eta^2 = 0.25$. Further, Cohen's effect size value for the linear combination of the reading motivation scales was $d = 0.26$. Based on the no significant results, the decision was made to fail to reject the null hypothesis. Observed power = 0.59, which indicates a 59% probability that failing to reject the null hypothesis was correct.

The impact of book format on responses to the Motivations for Reading Questionnaire was evaluated using the effect size statistic, and partial eta-squared. Results revealed that book format was associated with overall reading motivation for only 1.6% of participants. A further breakdown of results based on partial eta-squared showed that 0.8% of students' reading efficacy, 0.9% of students' reading challenge, 0.0% of students' reading curiosity, 0.3% of students' reading involvement, 1.8% of students' reading importance, 2.5% of students' reading avoidance, 1.9% of students' reading competition, 1.6% of students' recognition for reading, 5.6% of students' reading for grades, 0.1% of students' social reasons for reading, and 7.5% of students' reading compliance was associated with book format.

In summary, the F-statistic was not significant, indicating that the junior high school English students who used the electronic format did not differ significantly in their mean scores with respect to the 11 subscales of the Motivations for Reading Questionnaire than the students who used the paper format (Gall et. al., 2007; Howell, 2008). Since the MANOVA F-statistic was not significant, individual ANOVAs for each dependent variable were not performed (Gall et. al.,2007).

Summary of Results

An independent *t*-test was used to investigate research objective 1: *What is the relationship between the media through which students read texts and their comprehension of the texts?* Results indicated there was not a statistically significant difference in comprehension in the usage of both media; Students in the experimental group did not display significantly different levels of reading comprehension when compared to students in the control group. Results provided statistical support for full transition to electronic testing within the research population's school as groups displayed no statistically significant difference in raw scores. Given the importance of comprehension as a foundational skill essential to the understanding and success of students in any academic discipline, these results have wide-ranging implications for the research school. The fact that students performed equally well in the electronic format suggests that students at the research school would not be adversely affected by the implementation of either electronic texts or electronic testing. Since academic achievement will not be adversely affected, the school now has a statistical basis upon which to implement further electronic transitions.

A MANOVA was used to investigate research objective 2: *What is the relationship between the media through which students read texts and their motivation levels in reading?* Results indicated there was not a statistically significant difference in motivation based in the usage of both media; Students in the experimental group did not display significantly different levels of reading motivation when compared to students in the control group. It must be noted that

observed power for the MANOVA was 0.59, indicating a 59% probability that failing to reject the null hypothesis was correct. Results provided statistical support for continued transition to the electronic format. While motivation was not improved using electronic books, neither was it harmed.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview

This chapter looked at an overview of the research problem and methodology, summary of major findings, conclusion and recommendations, and suggestions for further studies.

Summary

The purpose of the study was to compare the reading and understanding levels of junior high school students who read electronic texts with the level of those who read traditional printed texts.

A convenience sample of Ghanaian junior high school students ($N = 138$) at a public school in Akosombo was randomly assigned to an experimental and a control group.

Key Findings

1. The results of the data analysis displayed no statistically significant differences between the experimental and control groups for this study. Based on the results, the research failed to reject the null hypotheses for the following research objective: (1) *What is the relationship between the media through which students read texts and their comprehension of the texts?* and (2) *What is the relationship between the media through which students read texts and their motivation levels in reading?*

2. An independent t-test displayed no statistically significant difference in reading comprehension based on book format. Preliminary assumption testing was conducted to check for normality, outliers, and homogeneity of variance. Among junior high school students 1 to 3 taking the GMRT ($N = 138$), there was no statistically significant difference between the paper group ($M = 37.71, SD = 7.33$) and the electronic group ($M = 37.84, SD = 7.63$), $t(136) = -.11, p \geq .05$. Therefore, the study failed to reject the null hypothesis that junior high school students using traditional print and electronic books will not display significantly different levels of reading comprehension as measured using the ReadTheory Reading Tests.
3. A one-way between groups multivariate analysis of variance was performed to investigate group differences in students' reading motivation based on book format. Eleven dependent variables were used: Reading Efficacy, Reading Challenge, Reading Curiosity, Reading Involvement, Importance of Reading, Reading Work Avoidance, Competition in Reading, Recognition in Reading, Reading for Grades, Social Reasons for Reading, and Compliance. The independent variable was book format. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity. Results displayed no statistically significant difference between the experimental group and control group for reading motivation based on book format.

Conclusion

The purpose of this study was to determine the effect of electronic books on the reading comprehension and motivation levels of junior high school students. Results indicated there was not a statistically significant difference in either comprehension or motivation levels of reading electronic text to the traditional text print format. Students in the experimental group using electronic books displayed similar GMRT raw scores and similar reading motivation scores when compared to students in the control group using traditional paper materials. Based on the results, electronic books were found to have no effect on the reading comprehension and motivation of junior high school students.

These results suggest the time for changeover to the electronic text format has arrived; The decreased cost, maintenance, environmental impact, and portability offered using the electronic text format, along with a statistical analysis displaying how this transition does not adversely affect student academic achievement, provides sufficient incentive for schools to make the electronic transition if they are technologically equipped to do so.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. The literature review highlighted the belief of multiple researchers that adjustments to readability features possibly using electronic books may alter interaction with the texts, and thus affect comprehension. An extension of the current research could include additional research questions

regarding the use of these features, and data could be collected by inserting researcher-created questions at the end of the research instrument.

2. A study should be conducted to determine individual grade level differences that may exist within a population. Previous research cited within the literature review indicated that electronic books improved reading motivation for lower primary school pupils. This research found no effect on reading motivation for students in grades 6-12. Further research is necessary to determine if such a grade level difference truly exists, and if so, at which grade level the change in effect on motivation occurs.
3. The review of literature also indicated that despite student acceptance of the electronic format, many students still simply preferred print. The current study could easily be furthered through an additional research question, and an accompanying researcher-created survey to collect student format preferences.

This focus on preference should also be expanded to include teachers. The current study's use of the GMRT's PowerPoint offline version and the accompanying Interactivity displayed for the researcher the ease with which results can be obtained via the electronic format. The provision of tools increasing the efficiency of grading may impact format preference for the teachers involved, and the inclusion of additional research questions could be used make this determination.

4. An additional recommendation for research involves the time required to finish electronic reading. Research has indicated students are more likely to skim electronic texts, reading in an “F” pattern searching for key words rather than line by line. The current study could be furthered by having the administrators of paper test record finishing times for a statistical comparison of the two groups.

Areas for Further Study

Continued research regarding reading texts format is critical. As school's further transition to the use of electronic formats, statistical evidence for technological implementation will guide administrative decisions. The current study represents a step towards our understanding of the effect of the electronic book format on junior high school students, but more research is necessary to guide how far the technological transition is taken within secondary education.

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APPENDICES

APPENDIX A

University of Cape Coast Approval letter

UNIVERSITY OF CAPE COAST
College of Distance Education

Tel No: 03321 - 36947 Fax: 03321 - 36946 E-mail ccc@ucc.edu.gh		University Post Office Cape Coast
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Our Ref. No: CCE/MED/17/Vol.1/068 19th June, 2015

Your Ref. No:

TO WHOM IT MAY CONCERN



Name: PATRICK TEI KOFI QUARSHIE

Registration No: ED/ITP/13/0021

Topic: Comparing Reading and Understanding levels of Junior High school students who Read Electronic Text with the level of those who read Printed Text....

This is to certify that the bearer of this letter is pursuing a two year Master of Education Degree in Information Technology at the University of Cape Coast and is conducting a research in the topic stated above.
We will strongly appreciate any courtesy extended to him.

Thank you.



Paul Nyagorme (PhD)
For: Provost, CoDE

APPENDIX B

Parental Consent Form

Dear parent/guardian, your child/ward is invited to participate in a research study designed to comparing reading and understanding levels of junior high school students who read electronic texts with the level of those who read printed texts. They were selected as a participant because English language is one of their core subject at school.

This study is being conducted by Patrick Quarshie, Med IT student of University of Cape Coast.

Counting on your cooperation. Thank you.

Parent's Signature

Date

Researcher's Signature

Date

APPENDIX C

Free version of ReadTheory Reading Tests



"Tools of Persuasion"

Reading Comprehension Assessment

ReadTheory.org

For exciting updates, offers, and other helpful information, follow us on Facebook at www.facebook.com/ReadTheory and Twitter at www.twitter.com/ReadTheory.

Comprehension materials similar to those featured in this workbook are available online at www.ReadTheory.org -- an interactive teaching tool where students can take reading comprehension quizzes, earn achievements, enter contests, track their performance, and more. Supplementary materials to this workbook are available in printable worksheet form at www.EnglishForEveryone.org.

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Name _____
Date _____

• Reading Comprehension Assessment

Directions: Read the passage. Then answer the questions below.

Tools of Persuasion

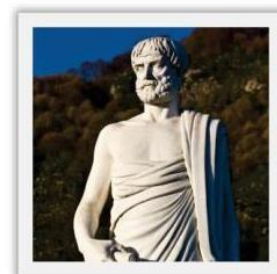
Persuasion is the art of convincing someone to agree with your point of view. According to the ancient Greek philosopher Aristotle, there are three basic tools of persuasion: ethos, pathos, and logos.

Ethos is a speaker's way of convincing the audience that she is a **credible** source. An audience will consider a speaker credible if she seems trustworthy, reliable, and sincere. This can be done in many ways. For example, a speaker can develop ethos by explaining how much experience or education she has in the field. After all, you would be more likely to listen to advice about how to take care of your teeth from a dentist than a firefighter. A speaker can also create ethos by convincing the audience that she is a good person who has their best interests at heart. If an audience cannot trust you, you will not be able to persuade them.

Pathos is a speaker's way of connecting with an audience's emotions. For example, a speaker who is trying to convince an audience to vote for him might say that he alone can save the country from a terrible war. These words are intended to fill the audience with fear, thus making them want to vote for him. Similarly, a charity organization that helps animals might show an audience pictures of injured dogs and cats. These images are intended to fill the viewers with pity. If the audience feels bad for the animals, they will be more likely to donate money.

Logos is the use of facts, information, statistics, or other evidence to make your argument more convincing. An audience will be more likely to believe you if you have data to back up your claims. For example, a commercial for soap might tell you that laboratory tests have shown that their soap kills all 7,000,000 of the bacteria living on your hands right now. This piece of information might make you more likely to buy their brand of soap. Presenting this evidence is much more convincing than simply saying "our soap is the best!" Use of logos can also increase a speaker's ethos; the more facts a speaker includes in his argument, the more likely you are to think that he is educated and trustworthy.

Although ethos, pathos, and logos all have their strengths, they are often most effective when they are used together. Indeed, most speakers use a combination of ethos, pathos, and logos to persuade their audiences. The next time you listen to a speech, watch a commercial, or listen to a friend try to convince you to lend him some money, be on the lookout for these ancient Greek tools of persuasion.



1) As used in paragraph 2, what is the best antonym for **credible**?

- A. unintelligent
- B. boring
- C. dishonest
- D. amazing

2) Amy is trying to convince her mother to buy her a pair of \$200 shoes. She says: "Mom, the shoes I have are really old and ugly. If I don't get these new shoes, everyone at school is going to laugh at me. I will be so embarrassed that I will want to die." What form of persuasion is Amy using here?

- A. pathos
- B. ethos
- C. logos
- D. a combination of ethos, pathos, and logos

APPENDIX D

Motivations for Reading Questionnaire

1

Name _____ Date _____

Teacher _____

Motivations for Reading Questionnaire

We are interested in your reading.

The sentences tell how some students feel about reading. Listen to each sentence and decide whether it talks about a person who is like you or different from you. There are no right or wrong answers. We only want to know how you feel about reading.

For many of the statements, you should think about the kinds of things you read in your class.

Here are some ones to try before we start on the ones about reading:

I like ice cream.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

If the statement is **very different from you**, circle a 1.

If the statement is **a little different from you**, circle a 2.

If the statement is **a little like you**, circle a 3.

If the statement is **a lot like you**, circle a 4.

I like spinach.

Very	A Little		
Different	Different	A Little	A Lot
From Me	From Me	Like Me	Like Me
1	2	3	4

If the statement is **very different from you**, what should you circle?

If the statement is **a little different from you**, what should you circle?

If the statement is **a little like you**, what should you circle?

If the statement is **a lot like you**, what should you circle?

Okay, we are ready to start on the ones about reading. Remember, when you give your answers you should think about the things you are reading in your class.

There are no right or wrong answers, we just are interested in YOUR ideas about reading. To give your answer, circle ONE number on each line. The answer lines are right under each statement.

Let's turn the page and start. Please follow along with me while I read each of the statements, and then circle your answer.

1. I like being the best at reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

2. I like it when the questions in books make me think.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

3. I read to improve my grades.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

4. If the teacher discusses something interesting I might read more about it.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

5. I like hard, challenging books.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

6. I enjoy a long, involved story or fiction book.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

7. I know that I will do well in reading next year.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

8. If a book is interesting I don't care how hard it is to read.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

9. I try to get more answers right than my friends.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

10. I have favorite subjects that I like to read about.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

11. I visit the library often with my family.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

12. I make pictures in my mind when I read.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

13. I don't like reading something when the words are too difficult.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

14. I enjoy reading books about people in different countries.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

15. I am a good reader.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

16. I usually learn difficult things by reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

17. It is very important to me to be a good reader.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

18. My parents often tell me what a good job I am doing in reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

19. I read to learn new information about topics that interest me.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

20. If the project is interesting, I can read difficult material.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

21. I learn more from reading than most students in the class.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

22. I read stories about fantasy and make believe.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

23. I read because I have to.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

24. I don't like vocabulary questions.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

25. I like to read about new things.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

26. I often read to my brother or my sister.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

27. In comparison to other activities I do, it is very important to me to be a good reader.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

28. I like having the teacher say I read well.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me
-----------------------------------	---------------------------------------	--------------------------	------------------

29. I read about my hobbies to learn more about them.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

30. I like mysteries.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

31. My friends and I like to trade things to read.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

32. Complicated stories are no fun to read.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

33. I read a lot of adventure stories.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

34. I do as little schoolwork as possible in reading.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

35. I feel like I make friends with people in good books.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

36. Finishing every reading assignment is very important to me.

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4
-----------------------------------	---------------------------------------	--------------------------	-----------------------

37. My friends sometimes tell me I am a good reader.

Very	A Little
------	----------

Different From Me	Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

38. Grades are a good way to see how well you are doing in reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

39. I like to help my friends with their schoolwork in reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

40. I don't like it when there are too many people in the story.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

41. I am willing to work hard to read better than my friends.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

42. I sometimes read to my parents.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

43. I like to get compliments for my reading.

Very Different	A Little Different	A Little	A Lot
-------------------	-----------------------	----------	-------

From Me	From Me	Like Me	Like Me
1	2	3	4

44. It is important for me to see my name on a list of good readers.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

45. I talk to my friends about what I am reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

46. I always try to finish my reading on time.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

47. I am happy when someone recognizes my reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

48. I like to tell my family about what I am reading.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

49. I like being the only one who knows an answer in something we read.

Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
1	2	3	4

