

**Gordon Institute
of Business Science**
University of Pretoria

**An empirical investigation of secondary school
students' behavioural intentions to use digital
textbooks**

Sumari Spies

16391480

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration

6 November 2017

ABSTRACT

The education sector has seen many technological changes over the last decade, all with the aim of improving learning efficiency and academic performance. These technological advancements are possible, with students now being capable of and familiar with using digital devices to share files and create content. One such advancement has been the use of digital textbooks, with a prediction that they will be used more than printed textbooks in the future. Whilst the use of digital textbooks offers many advantages, whether or not students will have positive behavioural intentions towards using books in this format, is a critical question that is consistently raised. This study aims to determine which factors may influence the behavioural intentions of secondary school students towards using digital textbooks. This will allow for developers of digital textbooks and schools to be aware of such factors and to design platforms and systems that will allow students to reap the benefits of using this technology.

A quantitative explanatory study was conducted using the technology acceptance model (TAM) as the theoretical underpinning to the study. The original TAM constructs, perceived usefulness and perceived ease of use, were tested, as were the added external variables to TAM, self-efficacy, perceived enjoyment and perceived convenience. A Likert-scale survey was designed and distributed to a single private school whose students all used digital textbooks mandatorily. A total of 369 surveys were collected from students across Grades 8 to 12. The dataset was analysed and a structural equation modelling was used, to test the proposed conceptual model that was derived from literature.

Through testing the various TAM constructs and extensions to TAM, all hypotheses were found to be statistically significant towards positive behavioural intentions. The result of this study, provides schools and developers, practical solutions to ensure students show positive behaviour towards the use of selected digital textbooks. The easier digital textbooks are to access, the more useful students will perceive them to be. If digital textbooks are convenient and enjoyable to use, and if students believe in their own abilities to master the skill to use them, they will be more willing to embrace and fully utilise such technology.

KEYWORDS

Digital textbooks, printed textbooks, e-learning, students' behavioural intentions.

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.



Sumari Spies

6 November 2017

TABLE OF CONTENTS

ABSTRACT	i
KEYWORDS	ii
DECLARATION.....	iii
TABLE OF CONTENTS	iv
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
LIST OF ABBREVIATIONS.....	ix
CHAPTER 1: INTRODUCTION	1
1.1 Introduction and description of the problem.....	1
1.2 Purpose of the Research	4
1.3 Research Problem	6
CHAPTER 2: LITERATURE REVIEW	8
2.1 Introduction	8
2.2. Digital Textbooks	9
2.2.1 Digital Textbooks Defined.....	9
2.2.2 Main features of digital textbooks	9
2.2.3 Perceived Benefits of Digital Textbooks	10
2.2.4 Perceived Shortcomings of Digital Textbooks	12
2.3 Technology Acceptance Model and Extensions	15
2.3.1 Technology Acceptance Model	15
2.3.2 External variables	18
2.3.2.1 Self-Efficacy.....	19
2.3.2.2 Perceived Enjoyment.....	20
2.3.2.3 Perceived Convenience.....	21
2.5 Conclusion	22
CHAPTER 3: RESEARCH METHODOLOGY	24
3.1 Introduction	24
3.2 Research Methodology.....	24
3.3 Unit of analysis	25
3.4 Population.....	25
3.5 Sampling method and size	25
3.6 Research instrument.....	26
3.7 Data Collection	28
3.8 Data analysis	28
3.9 Research Limitations	29
3.10 Conclusion	29

CHAPTER 4: PRESENTATION OF RESULTS	31
4.1 Introduction	31
4.2 Descriptive Statistics.....	31
4.2.1 Sample Size	31
4.2.2 Demographical Information	31
4.2.3 Processing of Data	34
4.3 Validity and Reliability Measurements	35
4.3.1 Validity	35
4.3.2 Factor Analysis	36
4.3.3 Reliability	36
4.3.4 Test for differences.....	38
4.3.5 Analysis of Variance	38
4.4 Structural Equation Modelling.....	39
4.4.1 Model fit measures	39
4.4.2 Hypotheses testing.....	41
CHAPTER 5: DISCUSSION OF RESULTS	43
5.1 Introduction	43
5.2 Discussion per Hypothesis	43
5.2.1 Hypothesis One	43
5.2.2 Hypothesis Two	44
5.2.3 Hypothesis Three	46
5.2.4 Hypothesis Four	47
5.2.5 Hypothesis Five.....	47
5.2.6 Hypothesis Six.....	48
5.3 Conclusion	49
CHAPTER 6: CONCLUSION	50
6.1 Introduction	50
6.2 Summary of Main Findings	50
6.2.1 Digital textbooks should be perceived as useful.....	51
6.2.2 Digital textbooks should be easy to use	52
6.3 Recommendations to Stakeholders.....	52
6.3.1 Developers of digital textbooks and platforms	53
6.3.2 Educational institutions: Schools	53
6.3.3 Students	54
6.4 Research Limitations	54
6.5 Recommendations of Future Research.....	55
6.6 Conclusion	56

7. REFERENCES	57
8. APPENDICES.....	63
Appendix 1: Test for Differences	63
Appendix 2: ANOVA results from SPSS.....	64
Appendix 3: AMOS output.....	65
Appendix 4: Consent Form Example.....	69
Appendix 5: Example of Questionnaire	71
Appendix 6: Ethical Clearance Letter	72
Appendix 7: Turnitin Report.....	73

LIST OF TABLES

Table 1: Question items used in the study	27
Table 2: Descriptive Statistics	34
Table 3: Pearson's Correlation.....	35
Table 4: KMO and Bartlett's Test	36
Table 5: Rotated Component Matrix	37
Table 6: Reliability Statistics	37
Table 7: Item-Total Statistics.....	38
Table 8: Computation of degrees of freedom from AMOS output.....	40
Table 9: Goodness of fit measures from AMOS output	40
Table 10: Hypotheses Summary	41

LIST OF FIGURES

Figure 1: Final version of TAM (Venkatesh & Davis, 1996, p. 453)	17
Figure 2: Proposed Conceptual Model.....	23
Figure 3: Students who participated in the study grouped according to gender	32
Figure 4: Students currently enrolled in the school grouped according to gender	33
Figure 5: Students who participated in the study grouped according to grade	33
Figure 6: Students currently enrolled in the school grouped according to grade	33
Figure 7: Path Coefficient Results of Conceptual Model.....	42
Figure 8: Conceptual Model of Factors that Influence Positive Behavioural Intentions towards Digital Textbooks	51

LIST OF ABBREVIATIONS

BI	Behavioural intentions
PEOU	Perceived ease of use
PU	Perceived usefulness
SE	Self-efficacy
PE	Perceived enjoyment
PC	Perceived convenience

CHAPTER 1: INTRODUCTION

1.1 Introduction and description of the problem

The education sector has experienced many technological changes over the last decade, all with the goal of improving learning efficiency and academic performance (Chun-Hua & Kai-Yu, 2014). These technological enhancements have been made possible because of students' developing ability to use digital devices and their familiarity with using technology to share files and create content (Joo, Park, & Shin, 2017; Stone & Baker-Eveleth, 2013). Instances of technological innovations in education have taken the form of collaborative learning, flipped classrooms, blended learning and digital textbooks (Chang, Yan, & Tseng, 2012; Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Mulholland & Bates, 2014; Stone & Baker-Eveleth, 2013). Teaching students who are competent with using technology has allowed for the implementation of these innovations, in order to improve learning experiences and make learning more efficient and diverse. Because of technological advancement, it has become necessary to investigate if these new developments are being accepted and utilised by students. Schools can implement as many innovations as they see fit, but without student buy-in and their intention to use this technology, the consequences may be money lost and time wasted.

Digital textbooks are an example of an innovation that has become a popular tool in the education industry. Initially, digital textbooks were predicted to grow much faster than the current rate (Stone & Baker-Eveleth, 2013; Sun, Flores, & Tanguma, 2012). The increased availability of tablets, smartphones and laptops, has caused digital textbooks to become a more prevalent form of study material in educational institutions, such as schools (Chun-Hua & Kai-Yu, 2014). Although, despite the advances made in technology in the classroom, a prevailing trend has shown the lack of student adaptation to employing digital textbooks as an enhanced learning tool (Terpend, Gattiker, & Lowe, 2014).

Hao & Jackson (2014) define a digital textbook as being any digital materials which can be viewed on a computer, tablet or smartphone. A digital textbook serves the same purpose as a paper textbook, but with additional elements and functions such as "search words", access to links to extra resources, multimedia features, etc. (Mulholland & Bates, 2014; Sun et al., 2012). Because of these developments, the fate of printed textbooks has been questioned (Johnston, Berg, Pillon, & Williams, 2015; Mulholland & Bates, 2014). Printed textbooks are predominantly still in use; however, a new trend has

emerged and the market has begun to shift towards digital (Chun-Hua & Kai-Yu, 2014; Johnston et al., 2015; Mulholland & Bates, 2014). Some students have become more technologically inclined which has also sped up this shift significantly (Johnston et al., 2015). This rapid movement illustrates the business need for the study. Greater awareness of the benefits of using digital textbooks and the movement away from printed textbooks will cause a new digital market to open up. Furthermore, publishers and developers of printed textbooks will have to evolve towards providing their content on a digital platform.

Digital textbooks have presented several advantages. Firstly, they have proven to be cheaper than printed textbooks, which may be more cost effective for schools (Chun-Hua & Kai-Yu, 2014; Ji, Michaels, & Waterman, 2014; Johnston et al., 2015). Secondly, access to digital textbooks has also improved, and better internet availability has made it easier to obtain a diverse selection of material (Chun-Hua & Kai-Yu, 2014; Oliveira, 2012; Raynard, 2017; Stone & Baker-Eveleth, 2013). Moreover, digital textbooks have the potential to be updated more regularly by publishers, because the latest updated versions can be made available online (Joo et al., 2017; Raynard, 2017; Stone & Baker-Eveleth, 2013). Thirdly, the development and improvement of devices like tablets, smartphones and laptops has enabled various features which printed material lacks, for example, search options, collaborative and sharing functions, multi-media, and interactive links connected to external sources (Chun-Hua & Kai-Yu, 2014; Johnston et al., 2015; Joo et al., 2017; Mulholland & Bates, 2014; Stone & Baker-Eveleth, 2013). Lastly, the appearance of digital textbooks on devices has changed students' perceptions of learning, as the interface allows for animation, multi-media and other interesting elements, and the portability of these devices has served as a practical advantage (Chun-Hua & Kai-Yu, 2014; Johnston et al., 2015; Oliveira, 2012). By considering these advantages, digital textbooks seem to be an effective option, especially in developing countries, where it can be difficult to access, afford and distribute printed textbooks (Embong, Noor, Hashim, Ali, & Shaari, 2012). However, some literature explains that the adoption of digital textbooks is not very prominent in schools across the world, as many students still exhibit a preference towards printed textbooks (Foasberg, 2014; Terpend et al., 2014). It is important for schools who would want to incorporate digital textbooks as means of instruction in their system, to first determine which factors will influence students' behavioural and intention to use these books in their learning process.

One of the reasons thought to account for the slow growth rate of the use of digital textbooks has been that reading from a screen often causes fatigue and strains one's

eyes (Rockinson- Szapkiw, Courduff, Carter, & Bennett, 2013; Stone & Baker-Eveleth, 2013). Secondly, the difficulty of operating digital devices, as well as technical errors which sometimes occur, have also been considered as a setback (Joo et al., 2017). Lastly, research has suggested that students prefer reading and learning from printed text, especially for long periods of time or studying purposes (Chun-Hua & Kai-Yu, 2014; Raynard, 2017; Stone & Baker-Eveleth, 2013). Therefore, because the usability of digital textbooks is difficult and uncomfortable, printed text remains easier to use (Stone & Baker-Eveleth, 2013).

The theoretical need for this study is prominent, because of the limited extant research about students' perspectives as final users of the technology and their behavioural intentions on the use of digital books (Joo et al., 2017). Research is needed to understand the behavioural intentions of students and the factors which may influence their choice to use digital textbooks, as well as an understanding of their perceptions which influences behavioural intentions (Chun-Hua & Kai-Yu, 2014). This research is important for schools interested in this technology, because it can inform what kind of preparation is necessary before implementation, as well as how to enhance learning experiences (Johnston et al., 2015; Oliveira, 2012). Furthermore, predictions of students' behavioural intentions will be beneficial because it allows for greater certainty around such a change, which is expensive to implement and requires large capital layouts.

Johnston et al. (2015) suggests that research is needed on the behavioural and use of digital textbooks, as, while many studies has been conducted on preferences, there is little substantial research about actual usage. Through determining the factors which influence actual use, an understanding can be reached on the external factors which may impact behavioural intentions (Johnston et al., 2015). Moreover, Ye (2015) pointed out that studies on e-textbook adoption is mostly conducted on students who have voluntarily chosen to use an e-textbook and usually only in one subject. There is a need to investigate students' long-term usage of digital textbooks, in more than one subject, and their behavioural intentions when using these books over the long run as the mandatory learning tool, with no option of printed textbooks (Ye, 2015). Ye (2015) suggested this research is needed from students' perspectives and the current study aims to meet this theoretical need.

Literature on technology acceptance found that there are a vast array of theories which can be applied to investigate behavioural intentions (Abdullah & Ward, 2016; Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Wentzel, Diatha, & Yadavalli, 2013). Out of these numerous studies, the technology acceptance model (TAM) is one of the most

used theoretical models to determine students' behavioural intentions when using technology (Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Johnston et al., 2015). TAM has been used for variety of studies in information systems, but has also been applied and validated in educational settings (Abdullah & Ward, 2016; Chun-Hua & Kai-Yu, 2014; Venkatesh & Davis, 2000; Johnston et al., 2015). By using TAM, a better insight into students' behavioural intentions can be established in understanding their usage of digital textbooks (Johnston et al., 2015; Chuttur, 2009; Terpend et al., 2014). Although different researchers have added extensions to TAM, most have retained perceived usefulness and ease of use as the primary drivers in their models (Abdullah & Ward, 2016; Cheung & Vogel, 2013; Edmunds, Thorpe, & Conole, 2012; Johnston et al., 2015; Sánchez-Prieto, Olmos-Migueláñez, & García-Peñalvo, 2016; Sánchez & Hueros, 2010).

Following the literature and studies on TAM and TAM extensions, it has been decided that extensions should be added to the original TAM in this study in order to determine the behavioural intentions of secondary school students when using digital textbooks. Perceived ease of use and perceived usefulness are the original constructs of TAM and are measured to establish their influence on behavioural intentions when using digital textbooks (Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014). Various TAM extensions have been added to the hypotheses model, the first extension being self-efficacy. Self-efficacy is measured to show if a student's belief in their own ability has a positive influence on their behavioural intentions (Nikou & Economides, 2017; Sánchez-Prieto, et al., 2016; Sánchez & Hueros, 2010; Venkatesh, 2000; Venkatesh & Davis, 1996). Secondly, perceived enjoyment is measured to determine if a student's intrinsic enjoyment when using the technology makes acceptance easier (Abdullah & Ward, 2016; Hong, Hwang, Hsu, Wong, & Chen, 2011; Sánchez-Prieto et al., 2016; Venkatesh, 2000). Lastly, perceived convenience is included because it can shed important light on the portability and usability of digital textbooks at any time or place, which may increase user acceptance (Chang et al., 2012; Yoon & Kim, 2007). By measuring these constructs, a good indication can be ascertained about the influences these factors have, if any, on students' perception and behavioural intentions towards the use of digital textbooks.

1.2 Purpose of the Research

The purpose of this research is to test the constructs of the original TAM, as well as the added extensions to TAM, in order to determine the statistical significance of these factors towards the behavioural intentions of secondary school students when using

digital textbooks. Behavioural intentions is the main dependent variable in this study when predicting the acceptance and usage of digital textbooks by secondary school students. This study solely predicts system usage, and consequently, predicts the success of digital textbook utilisation in South African schools.

For digital textbooks to be used successfully in schools, it is important to determine the factors that will influence the behavioural intentions of using digital textbooks (Joo et al., 2017; Stone & Baker-Eveleth, 2013). If students perceive digital textbooks to be easy to use and useful, their behavioural intentions will be positive, therefore leading towards greater acceptance of digital textbooks. Investigating other influences, such as self-efficacy, perceived enjoyment and perceived convenience, will provide better insight into whether or not these factors will have a positive statistical significance on behavioural intentions. Furthermore, understanding which elements affect behavioural intentions will assist schools in predicting and implementing factors which positively influence students' acceptance of digital textbooks, thus providing them with points to focus on when moving away from printed textbooks towards digital. Ideally, students should experience the benefits of using digital textbooks without the negative consequences of having a less effective learning experience or receiving lower marks (Johnston et al., 2015). For example, if students experience using digital textbooks as difficult and more of a burden, they will be less likely to use them, which can divert back to a need for printed textbooks, leading to a loss in investment for schools who have set up the necessary platforms for going digital.

Chun-Hua & Kai-Yu (2014) has suggested that there is a theoretical need for more research involving the understanding of students' willingness to use e-textbooks, the influential factors regarding usage, and the extent to which existing theories can explain or predict the acceptance of e-textbooks. The aim is to enable developers to gain better insight into how students use digital textbooks, in order for them to develop appropriate books and platforms (Huang, Liang, Su, & Chen, 2012). However, Ye (2015) states that current studies on the use of electronic textbooks have only been conducted on students who have voluntarily chosen to use them, thus the gap in the literature must be overcome by determining the usage behavioural of students who must use digital textbooks mandatorily.

Mohammadi (2015) suggests that there is also a theoretical need for development of e-learning tools such as digital textbooks, which calls for more research on potential factors affecting using technology as e-learning tools, especially in developing countries. Hence, an investigation into digital textbooks as an e-learning tool is warranted. It is important to

determine whether there is a positive or negative between students' perceptions and their behavioural intentions to use digital textbooks, as this can be an important indicator of system success (Mohammadi, 2015). Thus, the business need for this research is significant as it may illustrate that, despite the quality of books and e-learning tools which aim to improve the learning experience of students, the success of the market is reliant on students' perspectives and acceptance of the technology. If the innovations in this system are not perceived as useful or effective by students, sales will be fruitless and losses will be made on the development of these digital books, platforms and e-learning tools.

Therefore, this study attempts to fill a research gap by addressing the relationship between perceived convenience, perceived enjoyment and self-efficacy towards perceived ease of use and perceived usefulness, with student's behavioural intentions (as main dependent variable) toward digital textbooks.

1.3 Research Problem

The aim of this research is to test the statistical significance of certain factors, to predict the behavioural intentions that may influence secondary school students' acceptance of using digital textbooks. It is important to be aware of these factors, as they can provide developers of devices and digital textbook platforms with the information necessary to innovate products that are more widely accepted and useful.

This research aims to:

1. Describe the concept of digital textbooks, and the perceived benefits and drawbacks they offer.
2. Establish the factors which are perceived to affect the behavioural intentions of using digital textbooks by secondary school students.
3. Test the statistical significance of the identified factors so as to determine whether or not these will positively influence behavioural intentions towards digital textbook acceptance.

This research paper is organised into six chapters. Chapter 1 has introduced the research question and the theoretical and business need for the study. Chapter 2 consists of an in-depth consideration of the definition of a digital textbook, as well as a reflection on the perceived benefits and drawbacks determined from literature. The technology acceptance model (TAM) and extensions to the model are explained with a proposed hypothesis, including each identified factor that is seen to have an influence

on the use of digital textbooks. Using the literature reviewed in Chapter 2, a conceptual model shall be proposed to indicate which factors have been deemed important for testing in this study. Chapter 3 will discuss a detailed analysis of the research instrument used, sampling, and the method used for data collection. Chapter 4 consists of a discussion of the results of the data collected which then will be discussed further in Chapter 5. Finally, Chapter 6 will conclude the research and indicate key findings, implications and the limitations of the research, followed by suggestions for future studies.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This study aims to explore whether the external factors identified from literature will influence secondary school students' behavioural intentions towards using digital textbooks, under the circumstances where the school they attend has made it mandatory to use digital textbooks with no option to use printed textbooks. Ye (2015) stated that research studies have been done on the behavioural intentions of e-learning tools in education on a voluntary basis, but not many have been conducted on the behavioural intentions of students who are part of a school-wide adoption of e-learning tools. In this study, the e-learning being considered is digital textbooks.

If schools were to reflect thoroughly upon the benefits of using e-learning technology, it would more likely be considered (Stone & Baker-Eveleth, 2013). When a school wishes to implement an e-learning technology, for example digital textbooks, not voluntarily, but as a mandatory tool, it is important to be aware of the factors that may influence the behavioural intentions of students in order for such a system to be successful and consistently ongoing, rather than just as a once-off project (Stone & Baker-Eveleth, 2013).

It is essential for a school or institution, who considers the implementation of digital textbooks as a replacement of printed textbooks as means of instruction, to understand the main features that digital books can offer, but more importantly, to understand the factors that may influence behavioural intentions of students in accepting such a change. If students do not accept the technology, the resources which have been spent on effecting this change will be lost.

Firstly, this section considers what digital textbooks entail and their perceived benefits and disadvantages. Secondly, an explanation of the technology acceptance model (TAM) followed by an analysis of previous studies that have been conducted using TAM, will be employed to determine which external factors may influence the behavioural intentions and acceptance of digital textbooks. Finally, from this analysis, a conceptual model shall be proposed to illustrate these influential factors that may affect the use of digital textbooks by secondary school students.

2.2. Digital Textbooks

2.2.1 Digital Textbooks Defined

Mulholland & Bates (2014) have defined e-books as “digitised versions of paper-based books that can be delivered on a variety of electronic platforms, ranging from PCs to mobile devices” (p. 493). Rockinson-Szapkiw et al. (2013) have defined e-books as “texts that are digital and accessed via electronic screens” (p. 260). Jeong (2012) have described an e-book as “a text analogous to a book that is digitally displayed on the screen of a computer, a personal digital assistant, or a specifically designed reader; it may comprise of text, graphics, video, animation, and/or sound” (p. 391). For the purposes of this study, an e-book or electronic textbook will be referred to as a “digital textbook” and will be defined to be electronic textbooks which are used by students in place of printed textbooks, with additional features which printed textbooks do not offer, for example search tools, links, animations and other functions which are utilised in an electronic environment (Bando, Gallego, Gertler, & Fonseca, 2017; Embong et al., 2012; Mohammadi, 2015).

A digital textbook is compiled in mostly the same format as a printed textbook. The extra features offered in digital textbooks that are not available in printed textbooks often provide the learner with a better learning experience (Embong et al., 2012; Joo et al., 2017; Mulholland & Bates, 2014). Digital textbooks can make diverse and abundant resources available to students in an interactive manner. One such example of this is the use of online assessments, such as quizzes. Another example would be the links included in a digital format, which may give the learner access to external sources of information (Mulholland & Bates, 2014). Furthermore, the resources included in digital textbooks are available at any time and can be accessed at any place (Embong et al., 2012; Joo et al., 2017). Additionally, learning material can also be individualised to cater for each learner’s individual needs (Joo et al., 2017).

Following the different academic literature, the main features, perceived benefits and drawbacks of using digital textbooks shall be discussed next.

2.2.2 Main features of digital textbooks

Because digital textbooks have been predicted to be the main source of learning material in the future, many features have been improved and enhanced over the past few years to make user experience better. These features shall be discussed below.

Over the past few years, the devices which are used for digital textbooks have improved drastically. Devices like smartphones, tablets, laptops and other digital platforms, now provide more user-friendly interfaces with features where students can highlight, make notes, bookmark and turn pages in their digital textbooks (Hao & Jackson, 2014; Johnston et al., 2015; Joo et al., 2017; Sun et al., 2012; Ye, 2015). The enhanced appearance and ease of use has influenced students' perceptions of using digital textbooks (Chun-Hua & Kai-Yu, 2014).

With the improvements made on digital platforms, students can now find it easier to use the search function to look up key terms. Most platforms enable students to print from their digital textbooks, and some offer the functionality to select key passages and paste them into other documents (Hao & Jackson, 2014; Jeong, 2012; Terpend et al., 2014). However, Ye (2015) has observed that some interactive features, such as embedded quizzes, note-taking and sharing online, or watching built-in tutorials, were not found to be useful by students.

Digital textbooks can connect directly to the internet, which has made it possible to have access to the latest resources as the publisher makes them available (Joo et al., 2017). It also ensures that extra searches can be done outside of the textbook, to enhance learning and understanding. This search option is also available 24 hours a day and is not limited to a specific timeframe (Jeong, 2012). Moreover, digital textbooks allow for the availability of multiple materials and a variety of textbooks on one device. If a specific subject requires, for example, more than only a textbook, but reference books, workbooks and dictionaries too, these can all be made accessible on one device (Hao & Jackson, 2014; Joo et al., 2017). The portability of these books is also considered as advantageous, because it allows students to use one device, rather than carrying multiple books around with them (Chun-Hua & Kai-Yu, 2014; Hao & Jackson, 2014; Jeong, 2012; Johnston et al., 2015; Oliveira, 2012; Sun et al., 2012).

Martinez-Estrada & Conaway (2012) has found that students identified internet access and the ability to have many books on one device as the most important factors to them. Other high-ranking factors were battery life and readability of the screen. The least relevant factors found were the book costs and the capacity for a text-to-speech function.

2.2.3 Perceived Benefits of Digital Textbooks

A study by Sun et al. (2012) established that digital textbooks are not just replicas of paper textbooks in the sense that students just read from them, but rather, they provide

a platform where students are able to engage in their learning. Thus, digital textbooks have the potential to be a valuable tool for innovative learning with several advantageous elements.

Firstly, digital textbooks have been considered to be cheaper than printed textbooks which can reduce costs for schools (Chun-Hua & Kai-Yu, 2014; Foasberg, 2014; Ji et al., 2014; Johnston et al., 2015). Schools and publishers of educational textbooks can save money when they use digital textbooks, in the sense that they can have moderated distribution costs, in terms of ordering and delivering of textbooks, and paper usage is reduced, which means more savings can be made by no longer producing paper-based textbooks (D'Ambra, Wilson, & Akter, 2013; Ji et al., 2014; Terpend et al., 2014). Additionally, the use of digital textbooks is also more environmentally friendly, as they require fewer natural resources to be produced, and create fewer greenhouse emissions and less waste than printed books (Hao & Jackson, 2014; Terpend et al., 2014).

Secondly, Oliveira (2012) conducted a study which investigated the advantages digital libraries can offer to universities, and these factors may also be applicable to schools. A library comprised of digital textbooks can lessen the task of finding space for storing these books. Moreover, learning institutions are able to order an adequate amount of books without having too many, and shelving and distribution of books can be made easier (Oliveira, 2012; Raynard, 2017). Ordering of digital textbooks is an instant process as they can be downloaded immediately on devices without having to go to a central point, such as a library or bookstore (Oliveira, 2012; Raynard, 2017). Digital textbooks also allow for usage statistics to be collected (Sun et al., 2012). Additionally, there is no risk of books being stolen, lost or damaged. The only potential risk is that the actual device on which the digital textbook is used may be damaged or stolen (Oliveira, 2012; Raynard, 2017).

Thirdly, access to digital textbooks has also advanced, due to better internet connectivity and improved availability of a greater variety of user-friendly platforms which host digital textbooks (Chun-Hua & Kai-Yu, 2014; Mulholland & Bates, 2014; Oliveira, 2012; Raynard, 2017; Stone & Baker-Eveleth, 2013). Digital textbooks can also be updated more regularly by publishers, making the latest versions of diverse learning resources available sooner to students (Joo et al., 2017; Raynard, 2017; Stone & Baker-Eveleth, 2013; Terpend et al., 2014).

Fourthly, as previously mentioned, the development and improvement of devices like tablets, smartphones and laptops has enabled features which cannot be utilised when

using printed books, for example, search options, collaboration, sharing, multi-media and online links (Chun-Hua & Kai-Yu, 2014; Johnston et al., 2015; Joo et al., 2017; Mulholland & Bates, 2014; Stone & Baker-Eveleth, 2013). These elements allow for more engaged reading (Hao & Jackson, 2014; Terpend et al., 2014) and facilitate exploratory learning, whereby students are able to click on links which present alternative reading paths and additional sources (Hao & Jackson, 2014; Sun et al., 2012).

Fifthly, the appearance of textbooks on digital device interfaces has also changed the way students perceive digital textbooks, as they can include animation and multi-media (Chun-Hua & Kai-Yu, 2014). Students who use digital textbooks may find this technology fun and interactive due to attractive features, such as the capacity to enlarge font size, inclusion of graphics in colour, animation and the use of sound. These features add to students' creativity and independent learning (Embong et al., 2012; Huang et al., 2012).

Sixth, because digital textbooks can be stored on one device, which has the capacity to house all the necessary learning resources, students no longer have to carry heavy suitcases loaded with textbooks. This lighter burden may reduce the potential damage to students' lower backs and the deterioration to their postures, which often only become eminent in adulthood (Embong et al., 2012).

Lastly, digital textbooks support personalised and advanced learning through self-evaluation features. Consequently, students' learning processes can be monitored, documented, categorised and assessed by educators (Edmunds et al., 2012; Martinez-Estrada & Conaway, 2012). Collaborative learning is also possible where students can interact with their peers or educators either through chats or discussion boards (Joo et al., 2017; Sun et al., 2012). Furthermore, communicating about learning material via chats and discussion boards broadens social constructed learning for students (Huang et al., 2012).

2.2.4 Perceived Shortcomings of Digital Textbooks

On the contrary, there are several shortcomings which accompany the use of digital textbooks. First of all, in order to use digital textbooks, a student requires a device they use them on, namely a tablet or laptop. There are a few issues that may be experienced when using digital textbooks on these devices, such as limited storage capacity and limited power outlets to charge the device's battery when power is low. Moreover, students will not have any textbooks available if their device is out of power, therefore,

causing them to miss out or lose track of lessons because they are unable to follow the material (Embong et al., 2012; Sun et al., 2012; Terpend et al., 2014).

Secondly, teachers and lecturers may find using digital textbooks stressful and uncomfortable. They are not always able to implement special features incorporated in digital textbooks, like tracking student use and online assessments (Johnston et al., 2015). Additionally, teachers and lecturers can lack the essential skills needed if they do not receive suitable training on how to use functions optimally during teaching (Embong et al., 2012). Those presenting lessons may have a fear of technical problems arising during a lecture and causing a disturbance in the lesson. Anxieties about students being unable to study due to technical problems are also experienced by educators (Nicholas & Lewis, 2013).

Thirdly, studies have found that reading from a screen may cause eye strain and fatigue (Johnston et al., 2015; Mulholland & Bates, 2014; Oliveira, 2012; Rockinson- Szapkiw et al., 2013; Stone & Baker-Eveleth, 2013). This is viewed as a barrier to the use of digital textbooks; however, technology undergoes regular updates to improve this issue (Hao & Jackson, 2014; Johnston et al., 2015). Furthermore, researchers have found that reading from an electronic textbook on handheld devices takes longer compared to from printed textbooks (Rockinson- Szapkiw et al., 2013). It was also observed that students prefer reading and learning from printed text when the reading is for longer periods of time or involves studying (Chun-Hua & Kai-Yu, 2014; Foasberg, 2014; Johnston et al., 2015; Oliveira, 2012; Raynard, 2017; Stone & Baker-Eveleth, 2013).

Fourthly, Stone & Baker-Eveleth (2013) has suggested that using digital textbooks may have made it easier to deliver content, but it has not yet made it more convenient for students to read and study off of a digitised platform. It has been recognised that students prefer only to page through a digital textbook to find information, but not to read an entire book electronically (Mulholland & Bates, 2014). A reason for preferring to read printed text may be because students are still able to annotate hard-copy documents faster and easier than electronic note-taking. Thus, if students do not find it convenient to make notes, they will be less likely to use digital textbooks. Furthermore, a study conducted by Johnston et al. (2015) has discovered that 80 percent of the participants found it easy to navigate in digital textbooks and install access; however, reading online was rated the lowest in his study. Finally, Foasberg (2014) has found that when students do read off of electronic devices, it is most often non-academic materials. The results from his study have shown a major concern for e-textbook adoption, especially in academic settings, which has raised the issue of usefulness.

Fifthly, struggling to operate digital devices and the technical errors given by the devices are also considered as a major disadvantage (Joo et al., 2017; Terpend et al., 2014). The ability to use e-textbooks effectively is also a concern as it can take up valuable time trying to access digital books and navigate efficiently, which has raised the issue of ease of use (Johnston et al., 2015; Terpend et al., 2014). Stone & Barker-Eveleth (2013) have confirmed that the usability and ease of use of digital textbooks are not yet as simple as using printed text (Stone & Baker-Eveleth, 2013).

Lastly, the distractions accompanied with using digital textbooks are also viewed as a concern, due to students being able to visit other sites, for example, checking emails or social media sites, which can hamper the learning process (Bando et al., 2017; Huang et al., 2012; Terpend et al., 2014).

From the above explanations and the considerations of the features, perceived benefits and drawbacks related to digital textbooks, it can be established that, from a school or institution's viewpoint, using digital textbooks provides several advantages, such as easy distribution, cost effectiveness and minimal required storage space. However, when examining the associated shortcomings, it seems as though the use of digital textbooks may not be as advantageous from a student's perspective, because they may not be as easy, useful, enjoyable or convenient to use as printed textbooks. If students believe that digital textbooks are difficult to use and that they won't be able to work as fast or efficiently on them as on printed materials, it will influence their behavioural intentions. Due to students being the final user of these books, a lack of awareness from schools of students' behavioural intentions toward using digital textbooks could negatively impact students' learning experience and make it more difficult for them to access materials. Consequently, this can then lead to students taking longer to study, which may put even more strain on them to achieve the academic results they want. Additionally, students may revert back to normal printed books in these circumstances, which can lead to a capital loss for businesses who develop and implement platforms from which to distribute digital textbooks, and schools would lose the resources they used to implement the change.

In the next section, the application of the technology acceptance model is discussed as well as extensions to the model, to obtain a better understanding of behavioural intentions of students using digital textbooks.

2.3 Technology Acceptance Model and Extensions

2.3.1 Technology Acceptance Model

In order to be able to determine the factors that will influence the behavioural intentions of using digital textbooks by secondary school students, the technology acceptance model (TAM) has appeared to be a suitable starting point (Al-Gahtani, 2016; Cheung & Vogel, 2013; Davis, 1989; Johnston et al., 2015; Terpend et al., 2014; Venkatesh & Davis, 2000; Venkatesh, 2000; Venkatesh & Davis, 1996). TAM is a popular theoretical model used by scholars to determine the acceptance of new technologies in the workplace and in an educational setting (Al-Gahtani, 2016; Davis, 1989; Johnston et al., 2015; Terpend et al., 2014). Studies on acceptance of technology in education, especially e-learning, are popular amongst researchers and different extensions are added in these studies to test the original model (Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Chuttur, 2009; Edmunds et al., 2012; Johnston et al., 2015; Terpend et al., 2014)

TAM was initially designed to predict user acceptance of computers (Davis, 1989). The degree of use of new technology can be predicted by considering user motivation, which is influenced by external factors. TAM has been derived from Fishbein and Ajzen's (1975) Theory of Reasoned Action (Venkatesh & Davis, 2000; Venkatesh, 2000; Venkatesh & Davis, 1996). The original TAM explains and predicts the behavioural intentions to use a technology and is thus applicable to predict the acceptance of digital textbooks by secondary school students (Chun-Hua & Kai-Yu, 2014; Davis, 1989; Venkatesh & Davis, 2000; Venkatesh, 2000; Venkatesh & Davis, 1996).

By studying literature on TAM, it can be recognised that TAM assumes that an individual's behavioural intentions to use a technology is determined by two factors: perceived usefulness and perceived ease of use (Al-Gahtani, 2016; Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Johnston et al., 2015; Terpend et al., 2014; Venkatesh & Davis, 2000; Venkatesh, 2000; Venkatesh & Davis, 1996).

Perceived usefulness has been defined by Davis (1989) as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320). Therefore, the technology implemented should be advantageous and valuable (Davis, 1989). Students' intention to use digital textbooks will be more positive when they perceive the usefulness of digital textbooks to be better. Students will find using digital textbooks to be useful if they perceive that they perform better because of the

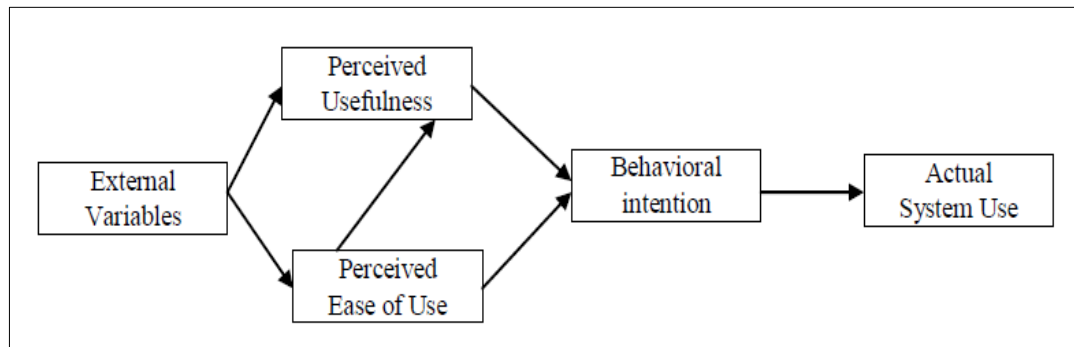
technology, for example, if they are able to obtain and use a greater variety of resources than that which normal textbooks offer, or if using digital textbooks enhances their learning and academic performance. In this case, students' behavioural intentions towards digital textbooks tends to be more positive. Added features such as note taking, highlighting, searching and being able to connect to the internet to find more resources, can also lead to them being more positive towards using digital textbooks (Terpend et al., 2014).

Perceived ease of use has been defined by Davis (1989) as "the degree to which a person believes that using a particular system would be free of effort" (p. 320). This explanation has suggested that using a digital textbook should be made easy to use for a student. Students should be able to read from the screen, navigate and search in the book, and connect to the internet with ease (Joo et al., 2017). Additionally, they should be able to use their digital books at any time and place (Jeong, 2012). Installing digital textbooks on devices and gaining access to them should also be uncomplicated, and the added function of printing, copying and pasting from a digital textbook should also be made simple (Hao & Jackson, 2014; Jeong, 2012; Terpend et al., 2014).

Perceived usefulness may be influenced by perceived ease of use (Davis, 1989; Venkatesh & Davis, 2000). With external influences being equal, Venkatesh (2000) has stated that if a system is easy to use, it will be more useful to the user. A student's perception that digital textbooks are useful to them and that using them may increase their performance, will be influenced by how easy or difficult it is to use such technology. For example, digital textbooks supply students with additional features, such as diversified resources, search functionality and more. These functions are made available on one device which students are able to use at any time and place with the aim of increasing their performance at school. Students will not accept this system if it is too difficult for them to employ these extra features. Therefore, there is a direct relationship between perceived usefulness and perceived ease of use (Davis, 1989).

Figure 1 illustrates the final version of TAM by Davis (Venkatesh & Davis, 1996). It demonstrates that perceived usefulness and perceived ease of use will influence behavioural intentions and system usage. It also shows that perceived ease of use will influence perceived usefulness.

Figure 1: Final version of TAM (Venkatesh & Davis, 1996, p. 453)



A study by Johnston et al. (2015) used TAM and tested perceived ease of use and perceived usefulness in a study to measure student experience using a multi-platform e-textbook pilot. The results from the study showed that perceived ease of use was high with most students, as they were able to install, access, navigate and read online. The perceived usefulness of e-textbooks, for example, being able to highlight, take notes and search, also tested positively. However, the study showed that not all students participating in the study made use of these functions. A concluding result from the study was that students seemed to make use of e-textbooks easily and were able and willing to use all the functions provided. It should be noted that this study was conducted on voluntary usage and not mandatory usage.

A study by Cheung & Vogel (2013), which investigated which factors would influence students' intention to use Google Applications, found that perceived usefulness and perceived ease of use were statistically significant in predicting behavioural intentions. The study also found that perceived ease of use affected usefulness.

Mohammadi (2015) conducted a study on users' perspectives on e-learning. This study showed a statistically significant relationship between perceived usefulness and behavioural intentions. However, contrary to the original TAM, it did not find a statistically significant relationship between perceived ease of use and behavioural intentions in e-learning usage. Consequently, the research discovered that there was an indirect relationship between perceived ease of use and perceived usefulness (Mohammadi, 2015).

Chun-Hua & Kai-Yu (2014) investigated the behavioural intentions of undergraduates towards e-textbook adoption. In the study, it was established that all TAM paths were significant, but it was not found that perceived ease of use played a more decisive role than perceived usefulness in prediction behavioural intentions. Additionally, Nikou & Economides (2017) has found that behavioural intentions towards mobile-based

assessment is statistically significantly to perceived ease of use and perceived usefulness. The concluding result from the study was that if mobile-based assessment is perceived as easy and useful, students would be more willing to use it. It was also found that perceived ease of use has a direct positive effect on perceived usefulness and on behavioural intentions. Therefore, perceived usefulness had a direct positive effect on behavioural intentions to use (Nikou & Economides, 2017).

Lee & Lehto (2013) has discovered in their research on the acceptance of using YouTube in procedural learning and with testing the main constructs of TAM, that perceived usefulness is statistically significant to behavioural intentions, but did not find any statistical significance between perceived ease of use and behavioural intentions, or perceived ease of use and perceived usefulness. The explanation for not finding significance was due to the fact that most of the respondents had already used YouTube for over a year, hence, it served as the construct, not a predictor, to behavioural intentions for the study. In another study on e-learning acceptance and assimilation, Al-Gahtani (2016) has found that all TAM constructs measured positively when tested in an Arabian culture.

The following hypotheses based on TAM are proposed:

- H₁ Perceived usefulness will positively influence behavioural intentions toward using digital textbooks.
- H₂ Perceived ease of use will positively influence behavioural intentions toward using digital textbooks.
- H₃ Perceived ease of use will positively influence perceived usefulness.

2.3.2 External variables

External variables can be included in the original TAM to test how these may affect perceived ease of use and perceived usefulness (Cheung & Vogel, 2013; Abdullah & Ward, 2016). A study by Abdullah & Ward (2016) analysed 107 research papers. These papers all investigated and tested external factors added to TAM but in the context of e-learning. In total, 152 variables were studied as external factors to TAM. From these studies, Abdullah & Ward (2016) has identified that self-efficacy, subjective norm, perceived enjoyment, computer anxiety and experience were considered as most generally used external factors. From the results of the research, it was found that the best predictors for a students' perceived ease of use were self-efficacy, followed by perceived enjoyment. The best predictor for a student's perceived usefulness was found to be perceived enjoyment when using e-learning.

In the current study, self-efficacy and perceive enjoyment will be used as constructs to predict students' behavioural intentions in using digital textbooks. An added construct included as an external factor for this study will be perceived convenience. The reason for the choice of including this construct was because it has been relatively unexplored in previous studies, but may show interesting results (Chang et al., 2012; Yoon & Kim, 2007).

2.3.2.1 Self-Efficacy

Venkatesh (2000) has defined self-efficacy as “one’s belief about his/her ability to perform a specific task/job using a computer” (p. 347). It is the confidence an individual has to perform tasks that need to be carried out using technology (Abdullah & Ward, 2016; Al-Gahtani, 2016; Cheung & Vogel, 2013; Lee & Lehto, 2013; Sánchez & Hueros, 2010; Venkatesh, 2000), and their willingness to partake in such an activity (Terpend et al., 2014). Cheung & Vogel (2013) has tested self-efficacy in a study on using collaborative online tools in teaching. Self-efficacy was tested as an important component of a student's belief in his or her own ability to use collaborative online tools. The study found that self-efficacy had a direct influence on behavioural intentions, which led to system usage. However, a study by Terpend et al. (2014) has found that self-efficacy did not have a direct influence on behavioural intentions and adoption of e-text, and that when a student has to decide on buying an e-text, they were not concerned about if they would be able to use it, but rather if it would be easy for them to use. Abdullah & Ward (2016) has compared numerous studies on e-learning adoption, specifically self-efficacy, and the effect it has on perceived ease of use, and found that most of these studies found a significant positive relationship between self-efficacy and perceived ease of use. This indicates that students with high self-efficacy are more likely to use e-learning than students with lower self-efficacy, who may avoid using it (Abdullah & Ward, 2016).

Testing self-efficacy in secondary school students can show if they will perceive using digital textbooks as being easy to use and thus if this, in turn, will influence their behavioural intentions. If a student believes, before using digital textbooks, that he/she does not have the skills to master the use of digital textbooks on their own, they will have more trouble with adapting to digital technology than a student who considers using digital textbooks to be easy to use on their own (Abdullah & Ward, 2016; Terpend et al., 2014). Predicting if self-efficacy influences ease of use will enable management of schools to be aware of the fact that students need to have confidence in their own ability

to use digital textbooks, as this can form the basis of their judgement about how difficult or easy usage will (Venkatesh, 2000). Therefore, the final proposed hypothesis is:

H₄ Perceived self-efficacy will positively influence perceived ease of use

2.3.2.2 Perceived Enjoyment

Perceived enjoyment is considered to be a component of internal motivation (Venkatesh, 2000). Perceived enjoyment was added as an external variable to TAM as users became more experienced in using a system and attributes of enjoyment were observed in using the system, which contributed to them continuing to use the system (Venkatesh, 2000). Venkatesh (2000) has defined perceived enjoyment as “the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use” (p. 351).

The more students become experienced in using digital textbooks, the more they will show perceived enjoyment (Venkatesh, 2000). For this reason, the platform and interface that digital textbooks are provided on must be fun to use and likeable, as students need to be stimulated for them to prefer using digital textbooks, and not to look for another option like printed books. Developers of the interface of digital textbooks must ensure enjoyment is experienced when using it and that they make the use of the system easy and entertaining. When students become used to the system, this element of enjoyment can dissipate and then the system may become arduous to use (Venkatesh, 2000).

By comparing different studies in their research study, Abdullah & Ward (2016) found that perceived enjoyment in most studies significantly impacted perceived ease of use and perceived usefulness, and that this increased the student’s behavioural intentions towards using e-learning tools. The concluding results from the study illustrated that if a student believes that using e-learning systems is enjoyable, then he or she is more positively inclined towards using the system, because of greater perceived ease of use and perceived usefulness.

If a user experiences enjoyment when using a new technological system (in this study, digital textbooks), their mental burden of using it will be lowered, and, consequently, will foster favourable user perceptions. This can be attributed to the user not experiencing the difficulty of learning to use the system, and thus being able to put their effort into work (Park, Son & Kim, 2012).

Studies by Al-Gahtani (2016) and Sánchez & Hueros (2010) also tested perceived enjoyment as an external variable that may influence perceived ease of use and perceived usefulness. Al-Gahtani (2016) has found a significant positive relationship between perceived enjoyment and perceived ease of use. The proposed hypotheses are first to test if perceived enjoyment will positively influence perceived ease of use, but also to see if perceived enjoyment will positively influence perceived usefulness. The proposed hypotheses are:

H_{5a} Perceived enjoyment will positively influence perceived ease of use

H_{5b} Perceived enjoyment will positively influence perceived usefulness

2.3.2.3 Perceived Convenience

Perceived convenience is not a TAM extension that has been tested in many studies, but can give good insight into the behavioural intentions of using an e-learning technology in a certain setting (Chang et al., 2012). Chang et al. (2012) has defined perceived convenience as “a level of convenience toward time, place and execution” (p. 812). This definition was formulated by Yoon & Kim (2007) in their study on how convenience will influence perceived usefulness of adapting to using wireless LAN. The three dimensions used to construct convenience, as per the definition, is time, place and execution (Chang et al., 2012; Yoon & Kim, 2007). The time dimension for the present study is the degree of perception of students, in order for them to be able to use digital textbooks at any time that is convenient to them. The place dimension refers to the degree of the perception of students that they will be able to use their digital textbooks at any place that is convenient to them, being at school, at home or even on holiday. The execution dimension is the degree of perception held by students that using digital textbooks will help them complete their work efficiently and effectively (Chang et al., 2012; Yoon & Kim, 2007). Terpend et al. (2014) have found that convenience and price play a role in behavioural intentions of students using digital textbooks.

In a study by Chang et al. (2012), who investigated the application of TAM and the factors affecting the usage of the Taiwan digital archives system, perceived convenience was included to determine its relationship with perceived usefulness. The study found that perceived convenience had a significant positive relationship with perceived usefulness. This finding showed that the more convenient the English mobile learning system was, the more useful it was perceived to be. Yoon & Kim (2007) conducted a study on acceptance of wireless LAN and also found perceived convenience to be significantly positively related to perceived usefulness. By considering the studies from Chang et al.

(2012) and Yoon & Kim (2007), convenience can then be included in the hypotheses model to extend TAM for this study. The more convenient it is for students to use digital textbooks to execute work easily at any time and any place, the more positive students will be towards using digital textbooks. Therefore, the proposed hypotheses are:

H₆ Perceived convenience will positively influence perceived usefulness

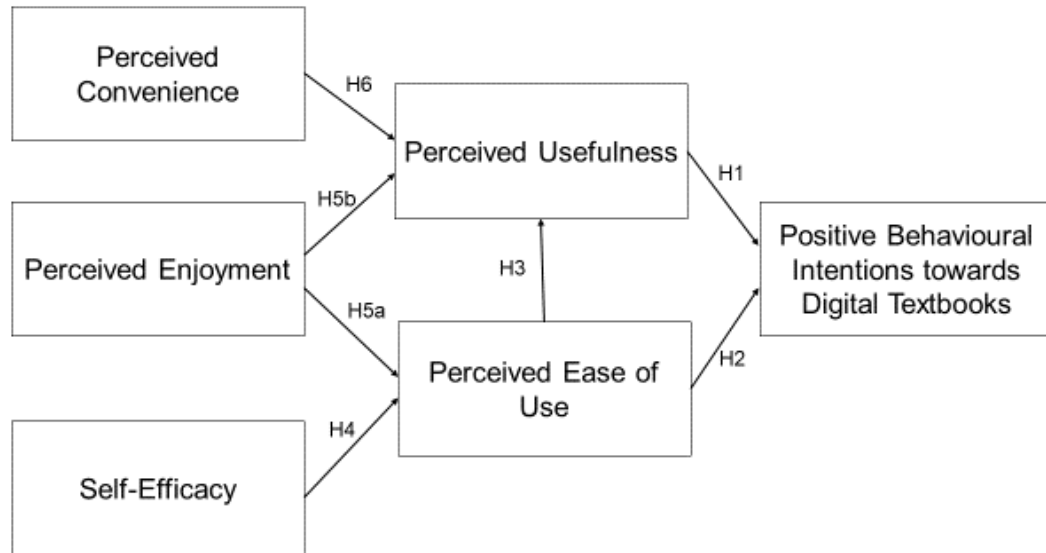
2.5 Conclusion

Digital textbooks offer many advantages which are not available when using printed textbooks. From a school's perspective, the fact that books do not need to be ordered and stored, and can simply be downloaded by the student, makes for easy distribution, as well as money and time savings. Being able to add extra resources into digital textbooks and using functions like highlighting, searching and note-taking, are considered to be advantageous; however, one may question whether these functions are what students are looking for. Even if these functions provide benefits to students, if they do not find them to be useful and convenient, their behavioural intentions towards the use of digital textbooks will not be positive. Testing perceived ease of use and the enjoyment factor is important, as students may become bored with using digital textbooks, causing them to divert back to printed textbooks, which can have cost implications for them and their schools. Testing the effect of self-efficacy on perceived ease of use is also important, as students must believe that they are capable of mastering the skills to use digital textbooks, in order to use digital textbooks successfully.

The research problem, to determine which factors will influence the behavioural intentions of using digital textbooks by secondary school students, aims to give insight into the acceptance of digital textbooks. Ye (2015) has suggested that there is a need for a study where students do not have a choice between printed textbooks and digital textbooks, but where a whole-school adoption of digital textbooks is in place, to get a better understanding of their behavioural intentions without the option to opt out and start using printed textbooks. Furthermore, Ye (2015) has stated that many studies have been done on digital textbook acceptance, but these studies were based on voluntary usage or only per one subject. Therefore, the present study aims to show if perceived convenience, perceived enjoyment or self-efficacy as external factors, will have a positive relationship with perceived ease of use and perceived usefulness, which, in turn, will positively influence the behavioural intentions of students. The distinguishing factor from other studies is that the use of digital textbooks is not voluntary in this study, but

mandatory for all students and in all subjects in a school. Figure 2 represents the proposed conceptual model for this study.

Figure 2: Proposed Conceptual Model



CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the research methodology that was used to test the proposed hypotheses framework, derived from literature in Chapter 2, will be discussed. The research considers the constructs which have been previously tested in e-learning studies with the use of the technology acceptance model (TAM). The research method, research design, research instrument and data collection, as well as data analysis methods, will be discussed, followed by the limitations experienced during the research.

3.2 Research Methodology

The study aimed to predict factors that would have an influence on the behavioural intentions of secondary school students using digital textbooks. The independent variables: perceived enjoyment, self-efficacy and perceived convenience, and their relationship with the dependant variables: perceived ease of use and perceived usefulness, were tested to determine if they had a statistically significant relationship with behavioural intentions. The reasoning behind this approach was to allow schools and developers of digital textbooks, to gain awareness about these factors, so that they can be considered and integrated into the implementation of digital textbooks or the designing of platforms on which to use them.

Two popular research methods are the qualitative approach and the quantitative approach (Kothari, 2004). If the research question was concerned with investigating students' feelings and thoughts about using digital textbooks, a qualitative study would have been conducted with in-depth interviews (Kothari, 2004). This is not the focus of this research study and thus, a quantitative study method was employed. This study aimed to quantify collected data from a sample of secondary school students (Park & Park, 2016). The reason for using quantitative research was to collect data, and then to determine if there was statistically significant correlation between the identified variables from the literature and the behavioural intentions of students. The results of the study could be used by schools and developers of digital textbooks to guide them during development and implementation stages of changing from printed textbooks to digital textbooks.

The type of study conducted was in the style of an explanatory research. Explanatory research is conducted when a researcher wishes to investigate certain factors, for instance, this study aims to explore the factors which influence students' behavioural

intentions towards using digital textbooks (Saunders & Lewis, 2012). When implementing a change, for example, a change from printed textbooks to digital textbooks, developers and schools should pay attention to which factors will influence behavioural intentions, in order for them to develop and design their product in a manner which will be used effectively by schools and most importantly, by students, otherwise the product will fail. This explanatory study has intended to predict if perceived usefulness (PU), perceived ease of use (PEOU), perceived convenience (PC), perceived enjoyment (PE) and self-efficacy (SE) have a positive influence on the behavioural intentions (BI) of secondary school students who use digital textbooks.

This study is a cross-sectional study, as it was carried out at a specific point in time. A longitudinal study was not conducted due to time constraints (Saunders & Lewis, 2012). This research study was a survey-based study, which consisted of a Likert-scale questionnaire which was sent out to secondary school students who all used digital textbooks (Saunders & Lewis, 2012).

3.3 Unit of analysis

The unit of analysis for this study was the perceptions of secondary school students of their use of digital textbooks.

3.4 Population

According to Saunders & Lewis (2012), a population is the complete set from which the sample was drawn. The population for this study was secondary school students from a private school in South Africa, who made use of digital textbooks as mandatory means of learning material, with no option to use printed textbooks.

3.5 Sampling method and size

There are several different sampling techniques. For this study, a non-probability sample was used as the sample was selected deliberately by the researcher (Kothari, 2004). The purpose for using non-probability sampling was due to the fact that no complete list of the population was available to indicate how many students only use digital textbooks and not printed textbooks. Secondary school students were selected purposively. Purposive sampling denotes a sample whereby the sample members are chosen based on the researcher's judgement (Saunders & Lewis, 2012). Secondary school students were chosen from a private school, who, at the time of the study, used digital textbooks as the only means of textbook, with no printed textbooks available for students to use;

this can be regarded as representative of the population (Kothari, 2004, Saunders & Lewis, 2012). Purposive sampling was necessary because only students with signed consent forms from a parent were able to participate in the study.

A Likert-scale survey was used to collect data, and according to Hinkin (1998), the more respondents that complete the survey, the greater the statistical significance. The private school at which the survey was distributed, had 689 students enrolled at the time the survey was conducted. Consent forms were sent out to each student and 410 forms were returned. Consent forms were needed, because the subjects of the research study, the students, were under the age of 18 and needed permission from a parent to participate. 369 surveys were completed. The sample consisted of students ranging from Grades 8 to 12.

3.6 Research instrument

The measurement instrument used in this study was a questionnaire. This is a useful instrument to use for collecting data from school students, as it allowed for the same questions to be asked in the same order (Saunders & Lewis, 2012). The questionnaire was divided into two parts. The first section consisted of two demographic questions: age and grade. The second section of the questionnaire consisted of a five-point Likert-scale survey, to give students the opportunity to indicate how strongly they agreed or disagreed with the included statements that were constructed to measure their perceptions toward the use of digital textbooks. These statements were based on the constructs derived from the literature and previous studies conducted. Additionally, the questions were grouped together in such a manner as to answer the proposed hypotheses from Chapter 2. The scales offered ranged from: strongly disagree, disagree, uncertain, agree and strongly agree. (See Table 1 for detailed constructs, questions and sources used in the survey.) The survey was kept short to minimise prejudiced responses due to the students perhaps becoming bored or fatigued by answering too many questions (Hinkin, 1998).

As mentioned above, before the surveys were distributed to students, a consent form needed to be signed by parents to give permission for a student to partake in the survey, because they were underage. The consent form briefly outlined the purpose of the study and that, in partaking in the study, the student participated completely voluntarily and could opt out at any time. Details of the researcher and supervisor were provided on the form, in case parents had questions around the survey and completion process.

Table 1: Question items used in the study

Construct	Code	Measuring item	Source of literature
Perceived Usefulness (PU)	PU1	Using digital textbooks increase my performance at school	Venkatesh & Davis (2000), Venkatesh (2000), Cheung & Vogel (2013), Chun-Hua & Kai-Yu (2014), Davis (1989)
	PU2	I am able to get more work done when I use my digital textbooks	
	PU3	Using my digital textbooks makes learning easier for me	
	PU4	Using my digital textbooks makes my learning quicker	
Perceived Ease of Use (PEOU)	PEOU1	Using my digital textbooks is clear and understandable	Venkatesh & Davis (2000), Venkatesh (2000), Cheung & Vogel (2013), Davis (1989)
	PEOU2	Using my digital textbooks does not require me to think a lot on how to use the system	
	PEOU3	I find my digital textbooks easy to use	
Behavioural Intentions (BI)	BI1	I intend to use my digital textbooks as much as possible	Venkatesh & Davis (2000), Venkatesh (2000)
	BI2	I will continue to use my digital textbooks in my school career	
	BI3	I intent to use my digital textbooks frequently for my school work	
Self-Efficacy (SE)	SE1	I feel comfortable using digital textbooks on my own	Chun-Hua & Kai-Yu (2014), Venkatesh (2000), Cheung & Vogel (2013)
	SE2	It is easy for me to use my digital textbooks on my own	
	SE3	I would be able to use digital textbooks even if there is no one around to show me how to use it	
Perceived Enjoyment (PE)	PE1	I find using digital textbooks to be enjoyable	Venkatesh (2000)
	PE2	The actual process of using digital textbooks is pleasant	
	PE3	I have fun using digital textbooks	
Perceived Convenience (PC)	PC1	I am able to study at any time with my digital textbooks	Chang et al. (2012), Yoon & Kim (2007)
	PC2	I am able to study at any place using my digital textbooks	
	PC3	I feel using digital textbooks is convenient for me in my learning	

3.7 Data Collection

A pre-test was conducted to obtain feedback from a select group of students in their understanding of the questions asked in the questionnaire. The students selected were in Grade 12, and 15 students completed the pre-test. The selection of the students was based on convenience and was voluntary. The students worked through the questions and discussed it with each other to clarify understanding. Corrections were made to the survey from the feedback students had given involving their understanding, question flow, spelling and to ensure that there were no ambiguous questions. A major critique was the length of the survey and the students felt that many of the questions were repetitive.

After the pre-test, corrections were made to the survey and negatively slanted questions were changed to be positive in order to ease analysis. It was ensured that the questions were clear and easy to interpret.

An online survey was prepared using Google Forms. A link was created and sent to each student who had written permission to participate in the study and who had returned their signed consent form. The link was sent to each student's school email address, which enabled them to click on the link which led them to the online survey. The results were collected digitally on a spreadsheet and were used for analysis. Printed copies of the survey were made available to those students who wished to complete the survey in a paper format, but no student made use of this option.

3.8 Data analysis

Data analysis was conducted to understand the characteristics of each measurement item. The data was analysed using the software Statistical Package of Social Sciences (SPSS) version 24. Raw data was arranged, coded and edited before it was used in the analysis.

Firstly, descriptive statistics were conducted to give an understanding of the respondents. Secondly, validity and reliability were determined. By determining the validity of the data set, the degree to which the instrument measured what is was supposed to measure, was ascertained (Kothari, 2004). To reduce the instrument items into scales, a factor analysis was performed to determine which variables inserted into which constructs. Hair, Black, Babin, & Anderson (2010) has suggested that factor loading levels of 0.40 are necessary to measure and benchmark against. Testing for reliability established how well the set of questions were grouped together. The

constructs were measured for internal consistency, using Cronbach's Alpha. Nunnally and Bernstein (1994) have suggested that a cut-off of 0.70 is required as evidence of adequate scale reliability. Thirdly, Levene's test for differences was run in order to reveal if males and females scored differently, followed by a one-way ANOVA to elucidate any differences between the different grades. Lastly, the hypotheses were tested. The software package AMOS version 24 was used. Model fit measures were done, including accuracy of fit measures, to indicate whether the data was valid and reliable. The independent variables were perceived enjoyment (PE), perceived convenience (PC) and self-efficacy (SE). The dependant variables were perceived ease of use (PEOU), perceived usefulness (PU) and behavioural intentions (BI). Behavioural intentions was the main dependent variable. Structural equation modelling (SEM) was used to test the hypotheses to establish any statistical significance between the dependent and independent variables, and a path analysis was calculated to show a positive or negative relationship between the dependent and independent variables (Hair et al., 2010). A p-value of $p < 0.05$ indicated that the relationship between the variables was statistically significant and the hypotheses ought to be accepted. A p-value of $p > 0.05$ indicated the hypotheses ought to be rejected as having no significant association between the variables (Saunders & Lewis, 2012).

3.9 Research Limitations

Some of the limitations to the study were that:

- More independent variables could have been tested; however, it was kept to only three, as the data set was gathered from secondary school students who would become tired and non-responsive if too many questions were asked.
- The sample was only from one school, and could have included more schools for a broader analysis.
- More questions per construct could have been asked, but this was kept to a minimum of three, to avoid students becoming non-responsive because of too many questions.
- Only TAM was used as a model, thus other models and measurements could have been used, for example, theory of reasoned action (TRA) and unified theory of acceptance and use of technology (UTAUT), to give a better perspective on student's behavioural intentions.

3.10 Conclusion

In this chapter, the research method, design and strategy were defined. The sampling size and population were discussed and an explanation for the survey structure, design

and collection of survey data was provided. The data analysis methods of validity and reliability were explained, and the limitations of the research were highlighted. In the following chapter, the survey results will be presented with explanation of the findings.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

This study aims to determine which factors influence the behavioural intentions of secondary school students towards using digital textbooks. In this chapter, the results from the study will be presented. Firstly, an explanation of the sample size and the demographics of the participants will be provided. This is followed by the testing of validity and reliability of the data set. The chapter concludes with the results from testing the structural equation model, to show the statistical significance between the independent and dependent variables. In this study, the independent variables were perceived convenience (PC), perceived enjoyment (PE) and self-efficacy (SE). The dependent variables were perceived ease of use (PEOU), perceived usefulness (PU) and behavioural intentions (BI), which was the main dependent variable. SPSS 24 was used for analysis of the measurement model and AMOS 24 was used for testing the structural model.

4.2 Descriptive Statistics

4.2.1 Sample Size

The survey data was collected from students at a private school in Pretoria. All students are required to use digital textbooks in all their subjects as a mandatory school-wide adoption of digital textbooks. The college consists of Grades 8 (14 years old) to 12 (18 years old). At the time of the study, 689 students were enrolled in the school. All students were given a consent form to be signed by their parents in order for them to have permission to participate in the study, as they are under the age of 18 years. A total of 410 forms were returned with permission to participate in the study. The survey link was sent to those students who had written permission via a link to their school email accounts. From the 410 emails sent out, 369 students completed the survey.

4.2.2 Demographical Information

All students are required to have devices on which to use their digital textbooks, for example, either a tablet or laptop. Digital textbooks are provided to students on a digital platform which is used by all the students in this particular school. Wi-Fi is provided at the school to all students. The digital textbook platform makes it possible to use textbooks at any time or place, even when there is no Wi-Fi, as it is downloaded to the device and is backed-up every day. The digital platform provides added features like

highlighting, making and exporting of notes, as well as printing options. The platform allows for educators to add multimedia, such as videos, animations and online assessments to the books. The platform can also be loaded on more than one device, so students are not restricted to only use it on one device.

The first two questions of the survey were categorical questions which are descriptive and have no relevance to number order (Saunders & Lewis, 2012). These questions were used to determine if the survey was equally completed by male and female students and also if the different grades were represented equally to ensure that all ages were represented.

The results of the questionnaire showed that more females (52.7%) participated in the survey than males (42.8%), but this can be justified by the fact that more females are enrolled in the school than males.

From the results of the questionnaire, it can be deduced that there is a fair distribution of male and female students who participated in the study when measured against the enrolled numbers of students from the school. A fair distribution of responses was retrieved when this data was compared. The comparisons between students participating in the study can be observed in Figure 1, compared with the number of students enrolled in the school, which is depicted in Figure 2. The percentage of enrolled students and those who participated was 55% and 54% for females and 45% and 44% for males respectively, which indicates a fair distribution of responses as per school enrolment.

Figure 3: Students who participated in the study grouped according to gender

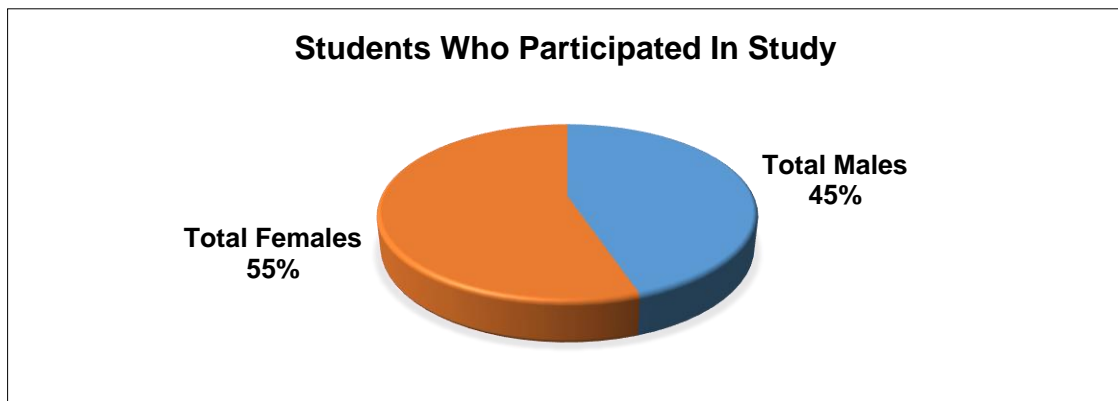
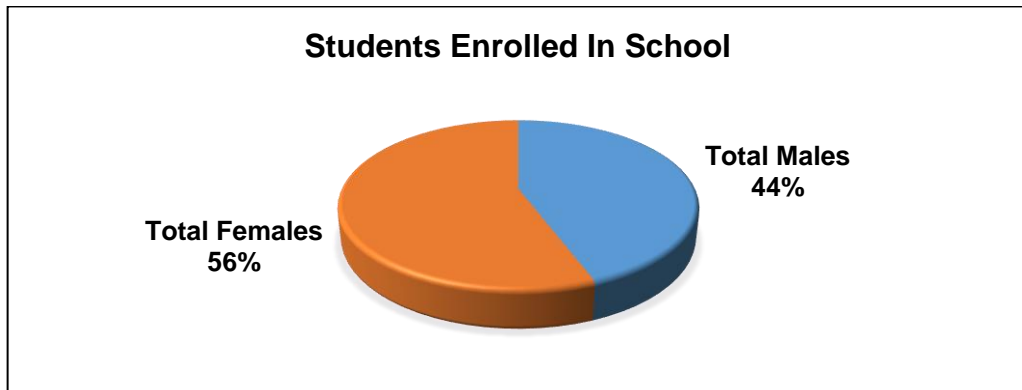


Figure 4: Students currently enrolled in the school grouped according to gender



To determine if the different grades were represented equally, the number of students who responded to the survey per grade was compared to the number of students enrolled per grade. Figure 3 shows the responses in percentage of the grades who participated in the study, compared to Figure 4, which represents the enrolled number of students in the school. An accurate analysis was obtained from the responses, as all grades were represented.

Figure 5: Students who participated in the study grouped according to grade

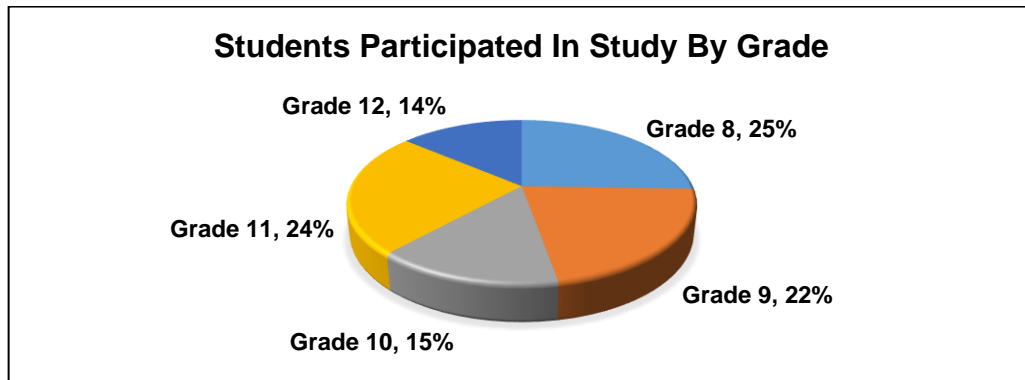
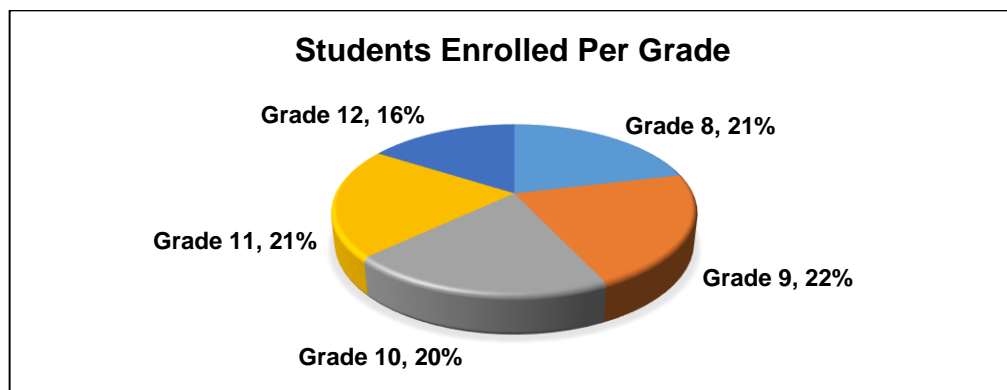


Figure 6: Students currently enrolled in the school grouped according to grade



4.2.3 Processing of Data

The data collected from the survey was prepared for analysis by first editing and then coding the data (Kohtari, 2004). The dataset was edited by inspecting the responses to examine whether there were any omissions or errors that needed correction. All results were found to be usable. The results were coded by being labelled with numbers for measurement.

After the data was edited and coded, a statistical analysis was conducted using SPSS 24. The first step was to obtain descriptive statistics as shown in Table 2. The mean and standard deviation were calculated. The Z-score indicates the number of standard deviations a data point is away from the mean, for example, if the mean score is one, it is one standard deviation above the mean (Hair et al., 2010; Kothari, 2004). The Z-score should range from -3 to +3 (Hair et al., 2010; Kothari, 2004). All the results measured showed that all the data ranged between -3 and +3. There were no responses with characteristics that were distinctively different from others, which meant that there were no outliers (Hair et al., 2010).

Table 2: Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
What is your gender?	369	0	1	.43	.495
What grade are you in?	369	8	12	9.79	1.413
Perceived Usefulness (PU)	369	1.00	5.00	2.8157	.92954
Perceived ease of use (PEOU)	369	1.00	5.00	3.3487	.94508
Behavioural intentions (BI)	369	1.00	5.00	3.3171	.99593
Self-Efficacy (SE)	369	1.00	5.00	3.8482	.92168
Perceived Enjoyment (PE)	369	1.00	5.00	2.9575	1.01781
Perceived Convenience (PC)	369	1.00	5.00	3.3604	.98870
Valid N (listwise)	369				

4.3 Validity and Reliability Measurements

4.3.1 Validity

To determine the degree to which an instrument measured what it is supposed to measure, validity should be investigated (Kothari, 2004). Questions from previous studies were used, with sub-questions which related to each other, forming a construct. The formulated questions, constructs and sources of the studies used have been represented in Table 1. The statistical means of the sub-questions were calculated to create a composite score for each construct. Bivariate Pearson's correlation was run on SPSS 24 to test the correlations between composite scores. The reason for using Pearson's correlation was to test whether a statistically significant linear relationship between the formulated constructs exists and to determine the strength and direction of each (Hair et al., 2010; Kothari, 2004). From the results of the test in Table 3, it can be established that the constructs are bivariate normally distributed at all levels of the other constructs (Hair et al., 2010; Kothari, 2004). This confirms that all constructs are linearly related at $p < 0.01$, and that all the questions were valid.

Table 3: Pearson's Correlation

		Correlations					
		PU	PEOU	BI	SE	PE	PC
PU	Pearson Correlation	1	.605**	.734**	.457**	.694**	.614**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	369	369	369	369	369	369
PEOU	Pearson Correlation	.605**	1	.620**	.560**	.531**	.469**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	369	369	369	369	369	369
BI	Pearson Correlation	.734**	.620**	1	.554**	.707**	.598**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	369	369	369	369	369	369
SE	Pearson Correlation	.457**	.560**	.554**	1	.460**	.561**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	369	369	369	369	369	369
PE	Pearson Correlation	.694**	.531**	.707**	.460**	1	.639**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	369	369	369	369	369	369
PC	Pearson Correlation	.614**	.469**	.598**	.561**	.639**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	369	369	369	369	369	369

** . Correlation is significant at the 0.01 level (2-tailed).

4.3.2 Factor Analysis

Factor analysis is a variable reduction technique (Hair et al., 2010). It reduces a larger set of variables into smaller sets that account for the greatest variance in the original variables (Hair et al., 2010). An exploratory factor analysis was conducted with the use of principal components analysis (PCA) as the means of extraction, and Varimax was used as the method of orthogonal rotation (Hair et al., 2010). The correlation matrix, as seen in Appendix 1, showed that all variables had at least one correlation above 0.30 (Williams, Onsmann, & Brown, 2010). Considering the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), represented in Table 4, a score of 0.941 showed that the factor analysis was appropriate. Bartlett's test of sphericity showed $p < 0.001$, which indicated that PCA was suitable to run (Williams et al., 2010).

Table 4: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.941
Bartlett's Test of Sphericity	Approx. Chi-Square	4776.857
	df	171
	Sig.	.000

To test the construct validity of items in the instrument, PCA was run and six constructs were extracted representing 77.7% of the variance explained. The rotated component matrix showed which variables loaded to constructs, as is represented in Table 5.

The results obtained from conducting a factor analysis indicated that the scales were reliable and valid for the variables being studied.

4.3.3 Reliability

Reliability was tested to determine whether the different items that were measured were reliable and could be included together into one scale. To determine if a measuring instrument is reliable, it must be tested to establish if it provides consistent results (Kohatri, 2004). To test for reliability, Cronbach's Alpha was used to determine the internal consistency of the measuring instrument. Reliability shows how many questions are measuring the same underlying dimension and was included because the survey had multiple Likert-scale questions. The reliability of these scales and how well a set of questions grouped together was investigated. There were no reverse coded questions. A cut-off of $\alpha > 0.70$, as suggested by Nunnally (1978), was adopted as evidence of

adequate scale reliability. The results obtained from running Cronbach's Alpha are represented in Table 6. Following the results, Cronbach's Alpha measured at $\alpha = 0.895$, thereby exceeding the reliability estimate of $\alpha = 0.70$ (Nunnally, 1978). All of the questions showed good internal consistency, evident in Table 7.

Table 5: Rotated Component Matrix

	Rotated Component Matrix					
	Component					
	1	2	3	4	5	6
PU1	.741	.275	.158	.128	.130	.225
PU2	.767	.162	.179	.238	.130	.161
PU3	.726	.306	.130	.163	.238	.153
PU4	.654	.226	.024	.280	.203	.231
PEOU1	.166	.230	.094	.758	.168	.236
PEOU2	.228	.047	.305	.783	.046	.084
PEOU3	.321	.231	.300	.643	.061	.129
BI1	.295	.261	.163	.166	.159	.786
BI2	.305	.266	.293	.231	.180	.694
BI3	.474	.336	.221	.270	.092	.509
SE1	.212	.247	.752	.102	.196	.239
SE2	.121	.125	.834	.239	.197	.160
SE3	.081	.047	.810	.234	.194	.062
PE1	.321	.788	.127	.162	.224	.234
PE2	.369	.740	.234	.174	.178	.204
PE3	.236	.834	.109	.166	.187	.193
PC1	.230	.144	.253	.029	.805	.088
PC2	.140	.220	.250	.141	.817	.131
PC3	.353	.415	.130	.230	.516	.283
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 7 iterations.						

Table 6: Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.895	.895	6

Table 7: Item-Total Statistics

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PU	16.8320	15.589	.769	.641	.869
PEOU	16.2990	16.102	.673	.494	.884
BI	16.3306	14.953	.799	.662	.864
SE	15.7995	16.587	.621	.451	.891
PE	16.6902	15.146	.747	.607	.872
PC	16.2873	15.630	.702	.532	.879

4.3.4 Test for differences

An independent samples t-test was conducted to compare the means of two independent groups, male students and female students (Hair et al., 2010). This test was used to determine if the means of these two groups, male and female, were significantly different. Levene's test of differences was used to test the equality of variables (Hair et al., 2010).

By considering the results of Levene's test for differences, as can be seen in Appendix 1, it could be ascertained that all variables measured at $p > 0.05$, which showed that the null hypothesis was not rejected and suggested that the variances of male students and female students are equal. For the t-test of equalities of means, the row of assumed equal variances was used. These results illustrated that there was a significant difference, with $p < 0.05$, between the constructs perceived usefulness (PU), behavioural intentions (BI), perceived enjoyment (PE) and perceived convenience (PC), which indicated that the means between male students and female students are significantly different for these constructs.

4.3.5 Analysis of Variance

To test for differences between two or more groups, an analysis of variance was conducted with the use of one-way ANOVA, which is a parametric test (Hair et al., 2010). ANOVA was conducted to determine if the categorical variable, grade, differed across perceived usefulness (PU), perceived ease of use (PEOU), behavioural intentions (BI), perceived enjoyment (PE), perceived convenience (PC) and self-efficacy (SE). Students that form part of different grades answered the survey, ranging from Grade 8 to Grade 12, and this was coded accordingly. One-way ANOVA was conducted to determine if there was statistical evidence that the students, who form part of different grades and

who responded to the survey, have means that were significantly different. The one-way ANOVA showed that students who form part of a grade differed significantly across the constructs of perceived usefulness (PU), perceived ease of use (PEOU) and perceived enjoyment (PE) as $p < 0.05$ for these constructs, which can be observed in Appendix 2.

4.4 Structural Equation Modelling

Structural equation modelling (SEM) was used to test the hypothesised model derived, as is evident in Figure 2. This model was tested using AMOS 24. SEM allows for the constructs of a model to be hypothetically linked, to show statistically significant relationships, and also calculates the directionality of these significant relationships (Hair et al., 2010; Schreiber, Nora, Stage, Barlow, King, Nora, & Barlow, 2006). The purpose of using SEM was to compare the hypothesised model derived from literature, with the Likert-scale survey data collected from secondary school students, in order to assess the degree of model fit by determining how similar the covariance implied by the model are to those found in the dataset. All variables from the dataset were observed variables. From the dataset, behavioural intentions (BI), perceived ease of use (PEOU) and perceived usefulness (PU) were used as endogenous variables (Schreiber et al., 2006). These variables' variation is aimed to be an outcome of other variables in the structural model, and can serve as independent and dependent variables in the model. The exogenous variables were perceived convenience (PC), perceived enjoyment (PE) and self-efficacy (SE). Exogenous variables represent those constructs that exert an influence on other constructs under observation and are not themselves influenced by other factors in the model (Schreiber et al., 2006). Path analysis is used to analyse several regression equations simultaneously. It focusses on relationships of multiple observed variables (McDonald & Ho, 2002).

4.4.1 Model fit measures

The goodness of fit illustrates how the theoretical model fits with the variables in the dataset. To measure the goodness of fit between the data set and the model, the chi-square statistic was considered, as this is an intuitive index (McDonald & Ho, 2002; Schreiber et al., 2006). The chi-square statistic equalled 75.2 and the degree of freedom was 5, with $p < 0.001$. The model was found to be valid, as minimum requirements were achieved, as is represented in Table 8.

Table 8: Computation of degrees of freedom from AMOS output

Minimum was achieved

Chi-square = 75.209

Degrees of freedom = 5

Probability level = .000

To determine a good fit, other fit indices were also examined. According to Gefen, Straub, & Boudreau (2000), Hair et al. (2010), McDonald & Ho (2002) and Schreiber et al. (2006), the following measures can indicate a good fit of the model: goodness of fit index (GFI), comparative fit index (CFI) and normed fit index (NFI). These are most accurate if above 0.90 and demonstrate the marginal acceptance if above 0.80. The adjusted goodness of fit index (AGFI) is suitable as it illustrates that, when the result is 0, there is no fit, and that a result of 1 indicates a perfect fit, with the ideal being >0.95 to have good model fit and > 0.80 to be acceptable. Root mean square residual (RMR) indicates that the closer RMR is to 0, the better the model fit, and root mean square error of approximation (RMSEA) should be < 0.05 to have good model fit. These fit indices will indicate that the proposed measurement model exhibited a good fit with the data collected (Hair, Ringle, & Sarstedt, 2011; McDonald & Ho, 2002). The model fit results from AMOS, as can be seen in Table 9, showed that this study was close enough to suggest that the model fit was reasonably adequate to assess the results for the structural model, and therefore, the structural model was examined.

Table 9: Goodness of fit measures from AMOS output

Fit measures	Values	Recommended
RMR	0.054	< 0.05
RMSEA	0.195	< 0.05
GFI	0.941	> 0.90
CFI	0.944	> 0.90
AGFI	0.752	> 0.80
NFI	0.940	> 0.90

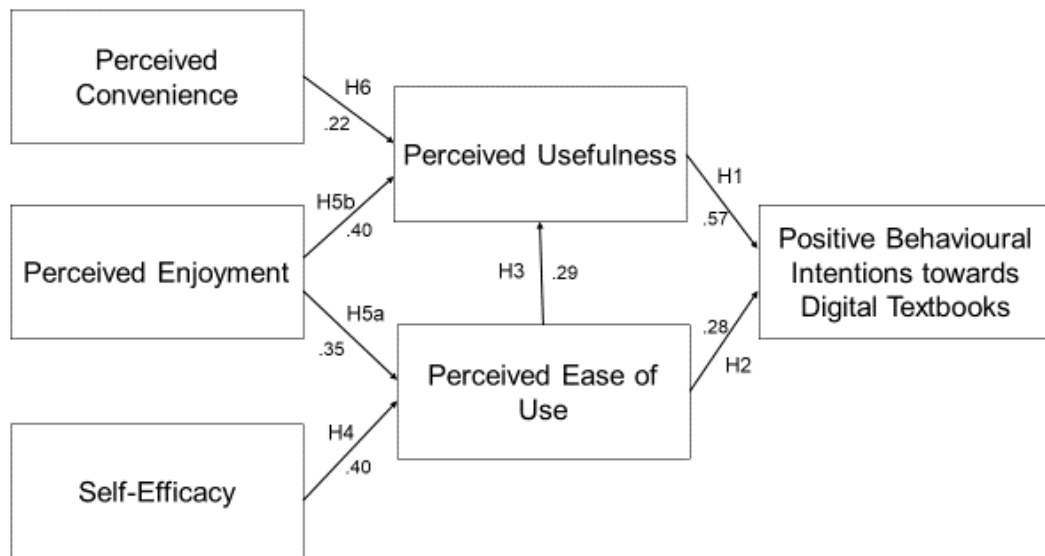
4.4.2 Hypotheses testing

The hypothesised model, as seen in Figure 2, was tested using AMOS 24, and the relationship between the variables was determined with path analysis (McDonald & Ho, 2002). The structural model was tested by examining the path coefficients and their significance. The direct effect between the dependent variables, perceived usefulness (PU) and behavioural intentions (BI) and perceived ease of use (PEOU) and behavioural intentions (BI), was measured. The indirect effect of the independent variables, perceived convenience (PC), perceived enjoyment (PE) and self-efficacy (SE), was also measured. The output from AMOS, as depicted in Table 10, shows the results of the hypotheses tested. Consistent with the hypotheses, PEOU demonstrated a significant influence on BI (path=0.29). Similarly, PU demonstrated a significant influence on BI (path=0.57), and PEOU significantly influenced PU (path=0.29). The independent variable PC influenced PU significantly (path=0.22). Finally, PE influenced PEOU significantly (path=0.35) and SE influenced PEOU significantly (path=0.40). The following table, Table 10, represents how all the hypotheses were supported and were statistically significant at $p < 0.001$. The path coefficients are presented in Figure 5.

Table 10: Hypotheses Summary

Hypotheses	Path Coefficient	Sig	Supported
H ₁ Perceived usefulness will positively influence behavioural intentions toward using digital textbooks.	0.57	0.001	YES
H ₂ Perceived ease of use will positively influence behavioural intentions toward using digital textbooks.	0.28	0.001	YES
H ₃ Perceived ease of use will positively influence perceived usefulness.	0.29	0.001	YES
H ₄ Perceived self-efficacy will positively influence perceived ease of use	0.40	0.001	YES
H _{5a} Perceived enjoyment will positively influence perceived ease of use	0.35	0.001	YES
H _{5b} Perceived enjoyment will positively influence perceived usefulness	0.40	0.001	YES
H ₆ Perceived convenience will positively influence perceived usefulness	0.22	0.001	YES

Figure 7: Path Coefficient Results of Conceptual Model



CHAPTER 5: DISCUSSION OF RESULTS

5.1 Introduction

The primary aim of this study was to determine the factors which may influence secondary school students' behavioural intentions towards the use of digital textbooks. The purpose of the research was to examine the relationship between students' behavioural intentions to use digital textbooks and the factors derived from studies conducted in e-learning, using TAM and extensions to TAM. The original TAM constructs tested were the relationship between perceived ease of use and perceived usefulness with behavioural intentions, and perceived ease of use with perceived usefulness. This was tested in hypothesis one, two and three. TAM as theoretical model suggests that the effect of external variables, for example, perceived convenience, perceived enjoyment and self-efficacy, is mediated by perceived ease of use and perceived usefulness (Venkatesh & Davis, 2000). These external variables were added to the original TAM, and tested in hypothesis four, five and six. Each hypothesis is discussed in this chapter and is presented in numerical order.

5.2 Discussion per Hypothesis

5.2.1 Hypothesis One

H₁: Perceived usefulness will positively influence the behavioural intentions toward using digital textbooks.

From the results portrayed in Table 10, it can be deduced that perceived usefulness has a significant positive effect on behavioural intentions. The path coefficient between perceived usefulness and behavioural intentions is positive at 0.57, as seen in Figure 7. The result is in accordance with previous studies which measured the main TAM constructs in an educational setting, where this construct was also found as being statistically significant (Al-Gahtani, 2016; Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Davis, 1989; Johnston et al., 2015; Lee & Lehto, 2013; Mohammadi, 2015; Nikou & Economides, 2017).

Johnston et al. (2015) has found the relationship between perceived usefulness and behavioural intentions to be statistically significant, but did mention that only half of the students who participated in the study made use of the features provided on a digital textbook platform, for example, note taking, highlighting, the search function and embedded links. Those who used these features found it to be very useful (Johnston et

al., 2015). Developers of digital textbooks and platforms should investigate why not all students use these functions, as this should be one of the main features encouraging students to use digital textbooks and not printed textbooks. Using digital textbooks, or any other technology to enhance learning, should be advantageous to the user (Davis, 1989). Students' behavioural intentions will be more positive if they perceive that digital textbooks will enhance their learning experience. Digital textbooks should be useful to a student, and his or her learning productivity and academic performance should not be hindered, but rather improved, when using this technology.

Terpend et al. (2014) did not find a statistical significance between perceived usefulness and behavioural intentions in using electronic textbooks. The justification provided by the study for this finding was that users tend to be more driven by price of the books and their convenience, rather than usefulness.

The results collected from this study and the implication of these results can be summarised into the point that publishers of digital textbooks and developers of digital platforms should ensure that the features that are provided with the digital textbooks compensate for the ease of using printed textbooks. Digital textbook features should be more advantageous to learning and academic performance than printed textbooks, otherwise students will not use them. Developers should also ensure that they develop favourable perceptions concerning task related features. On the other hand, schools should also offer training on the usefulness and features of digital textbooks, and should demonstrate how this technology can improve a student's study efficiency and effectiveness in achieving a favourable learning experience. If students are not aware of these features, it may negatively affect their behavioural intentions, as they may not see using a digital textbook as any different from printed textbooks.

5.2.2 Hypothesis Two

H₂: Perceived ease of use will positively influence behavioural intentions toward using digital textbooks.

From the results portrayed in Table 10, it can be deduced that perceived ease of use has a significant positive effect on behavioural intentions. The path coefficient between perceived ease of use and behavioural intentions is positive at 0.28, as is represented in Figure 7. This is in alignment with studies which were also conducted on perceived ease of use and its effect on behavioural intentions as a main construct of TAM, that similarly found this construct to be statistically significant (Al-Gahtani, 2016; Cheung &

Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Davis, 1989; Johnston et al., 2015; Nikou & Economides, 2017; Terpend et al., 2014; Yoon & Kim, 2007).

This result indicates that developers of digital textbooks and platforms should create features which evoke curiosity in students, in order for them to want to use digital textbooks over printed textbooks. This can be achieved by making digital textbooks easy to use. If the digital textbook is easy to use, students can focus on the added features, for example, obtaining extra resources. However, if they struggle to use these extra resources, perhaps because they are unable to click on a link, students may become frustrated and despondent. Developers of digital textbooks should ensure that the interface is user-friendly and that the content provided is presented in such a way that it is easily accessible and intriguing for students to choose to use digital textbooks over printed textbooks. The one major drawback still hindering the use of digital textbooks, is that students find it difficult to read off of a screen for long periods of time (Foasberg, 2014; Mulholland & Bates, 2014; Stone & Baker-Eveleth, 2013). Developers of digital textbooks should work closely with developers of devices, to ensure that reading from the screen does not tire users' eyes and that it has the same effect as reading from a printed textbook, because this factor remains to be a major downside to using digital textbooks (Johnston et al., 2015).

However, in contrast to these findings, the following studies found no statistical significance between perceived ease of use and behavioural intentions. Chang et al., (2012), in a study on mobile technology and English learning, have found that, even though perceived ease of use did not directly influence behavioural intentions, it did influence perceived usefulness indirectly. The same result was found by Mohammadi (2015) and Yoon & Kim (2007), where perceived ease of use influenced perceived usefulness indirectly. The justification for this was that, if students find it easy to use digital textbooks, it becomes more useful to them (Venkatesh & Davis, 2000). Lee & Lehto (2013), in their research on the acceptance of using YouTube in procedural learning, did not find any statistical significance between perceived ease of use and behavioural intentions. The explanation for not finding significance was due to the fact that most of the respondents already used YouTube for over a year, hence, the construct was not a predictor to behavioural intentions in their study (Lee & Lehto, 2013). These studies' results correlate with the next hypothesis, where the relationship between perceived ease of use and perceived usefulness was tested.

5.2.3 Hypothesis Three

H₃: Perceived ease of use will positively influence perceived usefulness.

Following the results portrayed in Table 10, it can be deduced that perceived ease of use has a significant positive effect on perceived usefulness. The path coefficient between perceived usefulness and behavioural intentions is positive at 0.29, as seen in Figure 7. This is in agreement with other TAM studies conducted in the educational field which examined behavioural intentions towards technology usage (Al-Gahtani, 2016; Chang et al., 2012; Cheung & Vogel, 2013; Davis, 1989; Mohammadi, 2015; Nikou & Economides, 2017; Venkatesh & Davis, 2000). In contrast, Yoon & Kim (2007) have found that perceived ease of use had an indirect impact on perceived usefulness, and that perceived convenience was the mediator in this regard.

According to the results of this study, the easier students find using digital textbooks, the more useful they will perceive them to be. For this reason, it is important for digital textbook developers to focus not only on making these books useful by providing extra embedded links to more resources, but, in the end, also to ensure that students find them easy to use. Firstly, developers should make downloading these books, getting access, navigating and connectivity to the internet easy. Students should be able to use a digital textbook to find information or study faster and more efficiently than a printed book. Additionally, it is important that the electronic notes that students make are easy to create and can be saved and printed. Secondly, schools must consider these aspects carefully before implementation, as using digital textbooks should not hinder students' productivity, but rather enhance their capacities to achieve the academic results for which they strive. If students feel that their academic performance will be disadvantaged by using digital textbooks, their behavioural intentions will be negatively impacted.

From Lee & Lehto's (2013) study, it was observed that if students have prior knowledge on how to use a technology, in their case YouTube, then perceived ease of use will not have a statistically significant effect on perceived usefulness or behavioural intentions. This indicates that the more students work on digital devices and use digital textbooks, the easier it will become for them to use, and consequently, ease of use will no longer be a predictor of behavioural intentions.

5.2.4 Hypothesis Four

H₄: Perceived self-efficacy will positively influence perceived ease of use

Following the results portrayed in Table 10, it can be deduced that self-efficacy has a significant positive effect on perceived ease of use. The path coefficient between perceived usefulness and behavioural intentions is positive at 0.40, as is evident in Figure 7. Self-efficacy denotes the belief a student has in his or her own ability to use digital textbooks successfully. The results from this study correlates with studies conducted by researchers measuring the same construct, who also found statistical significance (Abdullah & Ward, 2016; Al-Gahtani, 2016; Cheung & Vogel, 2013; Venkatesh, 2000). Cheung & Vogel (2013) have found a direct link between self-efficacy and behavioural intentions. On the contrary, Terpend et al. (2014) have found no statistical significance between self-efficacy and behavioural intentions, but did find statistical significance between perceived ease of use and behavioural intentions, which is odd as the two are linked. The justification provided for the finding was that, when a student decides to buy or use digital textbooks, their decision is not made by considering how good they will be at using the technology, but rather, that it will be easy for them to use.

Self-efficacy testing positively towards behavioural intentions indicates that schools should allocate time and resources on training students to use digital textbooks, so that they believe that they are able to use the technology. They need to have confidence in their own ability to use these books easily, and believe that the technology will not impede their learning and academic performance or results. Developers of digital textbook platforms should ensure that the features installed are easy to use and that students can grasp quickly how to use them. This can boost students' self-confidence and make them more positive towards using digital textbooks.

5.2.5 Hypothesis Five

H_{5a}: Perceived enjoyment will positively influence perceived ease of use

H_{5b}: Perceived enjoyment will positively influence perceived usefulness

From the results portrayed in Table 10, it can be deduced that perceived enjoyment has a significant positive effect on perceived ease of use, with the path coefficient between perceived enjoyment and perceived ease of use being positive at 0.35 as seen in Figure 7. Perceived enjoyment also has a significant positive effect on perceived usefulness, with the path coefficient at 0.40 between perceived enjoyment and perceived usefulness.

This is consistent with previous studies conducted on the effect of perceived enjoyment as an external factor and the indirect influence it has on behavioural intentions through perceived ease of use and perceived usefulness (Abdullah & Ward, 2016; Al-Gahtani, 2016; Park et al., 2012; Venkatesh, 2000).

Park et al. (2012) tested perceived enjoyment as an external factor to TAM and found a significant relationship between perceived enjoyment and perceived usefulness, but did not find a significant relationship between perceived enjoyment and perceived ease of use. The significant relationship between perceived enjoyment and perceived ease of use was attributed to the fact that, when users perceive a system to be enjoyable, they will also perceive it as useful, and thus, in return, will cause them to have positive intentions towards using the system. Therefore, they will not concentrate on the potential difficulties involved, but will be motivated to learn to use technology without considering the cognitive effort they will need to learn to use the system (Park & Park, 2016). Alternatively, Al-Gahtani (2016) did find a positive relationship between perceived enjoyment and perceived ease of use.

The results from testing the influence of perceived enjoyment on perceived usefulness illustrates that developers of digital textbooks should design these books in a manner that ensures that students find them enjoyable to use, which will lead them to perceive it as useful. The positive relationship between perceived enjoyment and perceived ease of use indicates that students need to find technology easy to use and this can be accomplished by the enjoyment factors being built in. Furthermore, schools should offer training to students and demonstrate the enjoyment they will experience from using digital textbooks opposed to printed textbooks.

5.2.6 Hypothesis Six

H₆: Perceived convenience will positively influence perceived usefulness

From the results portrayed in Table 10, it can be deduced that perceived convenience has a significant positive effect on perceived usefulness. The path coefficient between perceived convenience and perceived usefulness is positive at 0.22, as seen in Figure 7. This is consistent with the findings of Chang et al. (2012) and Yoon & Kim (2007), who also found perceived convenience to be statistically significant to perceived usefulness. This suggests that the more convenient digital textbooks are to a student, the more useful students will perceived them to be. In concurrence with this finding, a study by Terpend

et al. (2014) found that price and convenience are very important factors when it comes to predicting behavioural intentions towards using digital textbooks.

Developers of digital textbooks should ensure that digital textbooks can be used at any time and place, but also, that these digital textbooks will allow students to finish their work without having struggles or complications, for example, not being able to access the books whenever or wherever they need to use them. A problem for developers may be that, even if devices have all these useful functions in place, they can cause inconveniences for students, such as a battery which dies quickly or the inability to recharge the battery at any time or place. Other issues developers may face are that students may find it difficult to read from the screen, or they may experience connectivity issues which disables them from downloading extra resources when needed. These factors should all be considered when deciding to use digital textbooks in the place of printed textbooks.

5.3 Conclusion

Through testing the various TAM constructs and extensions to TAM, all hypotheses were found to be statistically significant to positive behavioural intentions. This will provide developers of digital textbooks and schools guidance around which factors to focus on when developing digital textbooks and implementing them into schools. The external variables chosen in this study were also proved to be influential in the study by Abdullah & Ward (2016), who investigated numerous studies on TAM and external factors to TAM, and found self-efficacy, perceived enjoyment and perceived convenience as the most important external factors in predicting behavioural intentions in an educational e-learning setting.

CHAPTER 6: CONCLUSION

6.1 Introduction

The aim of this study was to determine which factors will influence the behavioural intentions of secondary school students toward using digital textbooks. Digital textbooks offer many advantages for schools and students, but also, many potential disadvantages. Developers and schools need to be aware of the factors that may influence students' behavioural intentions to use digital textbooks, in order to design systems and platforms where all parties can reap the benefits and where digital textbooks can be used successfully.

This chapter will consider the main findings of the study. Recommendations will be made to managers of schools, developers and students, as the main stakeholders. Then, the limitations of the study will be discussed, and lastly, suggestions for future research are proposed.

6.2 Summary of Main Findings

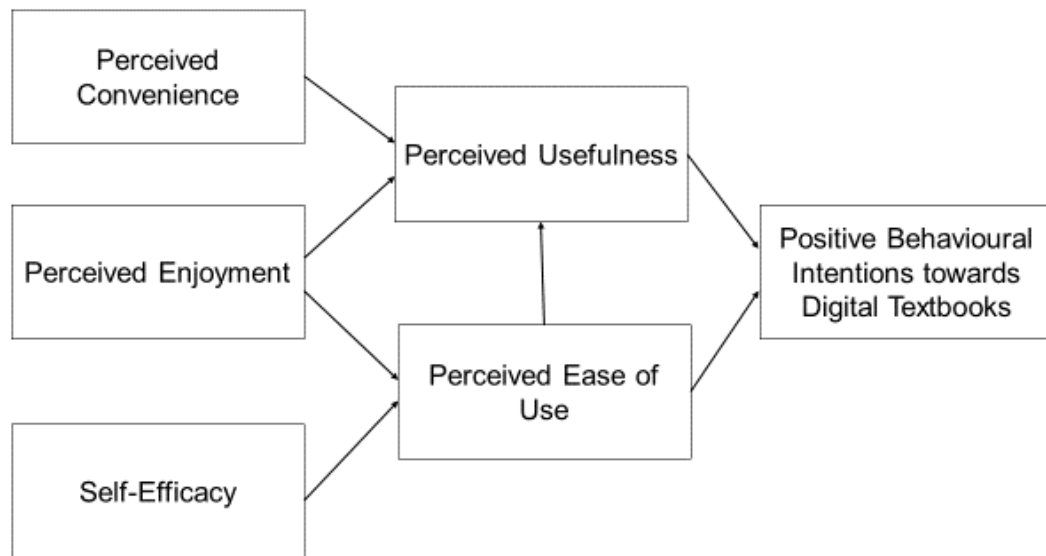
From reviewed literature, a conceptual model was proposed and tested in this study. Each hypothesis was derived from the literature discussed in Chapter 2. The studies that were analysed in Chapter 2, used the original TAM constructs and added extensions, to test the acceptance of e-learning tools and methods in educational settings (Chang et al., 2012; Cheung & Vogel, 2013; Chun-Hua & Kai-Yu, 2014; Edmunds et al., 2012; Johnston et al., 2015; Yoon & Kim, 2007).

A study by Abdullah & Ward (2016), which analysed different research papers to determine the predictors of e-learning acceptance, found that the best predictors for behavioural intentions towards e-learning were self-efficacy and perceived enjoyment. An extra variable, perceived convenience, was added to this study, because this variable has not been tested as a regular external factor in previous studies (Chang et al., 2012; Yoon & Kim, 2007). Convenience is an important aspect for school students, as they have busy schedules and need to be able to use their digital textbooks effectively at any time or place.

The variables tested in this study were the original TAM constructs, namely perceived ease of use and perceived usefulness, and their impact on behavioural intentions, and perceived ease of use influence on perceived usefulness (Davis, 1989). The external variables tested were perceived convenience, perceived enjoyment and self-efficacy

(Abdullah & Ward, 2016; Venkatesh & Davis, 2000; Venkatesh, 2000). The results of the proposed conceptual model was found to be statistically significant and all path coefficients were positive. The conceptual model emerged from the data are represented in Figure 8.

Figure 8: Conceptual Model of Factors that Influence Positive Behavioural Intentions towards Digital Textbooks



6.2.1 Digital textbooks should be perceived as useful

Students should perceive the use of digital textbooks as an enhancement to their learning experience and academic performance, in order for their behavioural intentions towards using digital textbooks to be influenced positively (Davis, 1989). If students find digital textbooks to be useful, for example, because of the availability of additional resources on online links, or the ability to connect to the internet, they will respond more positively towards them. The enhancement that digital textbooks add towards students' academic performance is of utmost importance. By having access to added content and features, like multi-media, which are not available on printed textbooks, and if these functions assist students in understand learning material better, then students will tend to find digital textbooks useful and have positive intentions towards using them.

Perceived ease of use, perceived enjoyment and perceived convenience had a positive relationship with perceived usefulness. The easier and more convenient it is for students to use digital textbooks at any time and place, the more positive their perceptions toward digital textbooks will be. Moreover, consistent with this thinking, using digital textbooks

should also be enjoyable and intriguing to capture students' attention and to keep them interested in using them, so that they do not revert back to printed books. All these factors need to receive equal attention, as one may strengthen the other to enforce positive behavioural towards using digital textbooks.

6.2.2 Digital textbooks should be easy to use

Using digital textbooks should require minimal effort from students (Davis, 1989). Students are under pressure every day to perform academically and have very busy schedules, which limits their time to learn how to use a new system like a digital textbook platform. Thus, it should be easy for them to use and should not hinder their academic performance or consume too much of their time. Furthermore, if students find it easy to read off the screen for lengthy periods, find the interface accessible, connect easily to the internet, make notes and print from their digital textbooks, it will encourage them to respond positively towards digital textbook usage. On the contrary, if digital textbooks are difficult to use and students are unable to master using them quickly, they will revert back to what they know, which is the printed textbook.

Perceived enjoyment and self-efficacy showed a positive relationship with perceived ease of use. Self-efficacy refers to the notion that students need to believe in their own ability to grasp the skill of using digital textbooks. However, the skill should also be made relatively easy to master. Alongside the need for students' self-confidence in using digital textbooks and their added features, perceived enjoyment also plays a key role in intriguing students to start using digital textbooks. Out of their own curiosity and enjoyment, students may gain the sense of self-efficacy they need to continue using this technology, until they have mastered the skill and have developed a preference for digital textbooks.

6.3 Recommendations to Stakeholders

The key stakeholders addressed in this study were the developers of digital textbooks, educational institutions, such as schools, and, lastly, the students who use and will be using digital textbooks. The following section will provide recommendations to each of these stakeholders, as means of obtaining positive behavioural intentions towards the use of digital textbooks.

6.3.1 Developers of digital textbooks and platforms

Firstly, developers of digital textbooks should design their books and the platforms on which they are provided, to enhance a student's learning process and to make the technology useful to the student. They should not develop features and add-ons that only they consider to be useful, but should rather gain insight from students' perspectives, to determine what would make the system useful to students. The features they include should be easy to use, which over the long run, will cause students to be more willing to use them for longer periods of time.

Secondly, digital textbooks should be available to use at any time and place, hence why the platform should be designed to work on a device, even without internet connection, so that students still have access to their books. This is due to the fact that convenience plays a very important role with regard to usefulness and behavioural intentions.

Thirdly, when designing a digital textbook platform, developers should ensure it works in the same way as other applications used on digital devices, so that students can adapt to using it more easily, as they are familiar with working on smart devices.

Lastly, a prominent component for developers to consider, as seen from the results of this study, is the enjoyment factor. To focus the attention of students towards using digital textbooks, developers need to design these books and platforms in such a way which interests students, as this will encourage them to use the technology. Additionally, when students enjoy using these textbooks, their self-confidence will increase, thus they will be more motivated to learn how to use them.

6.3.2 Educational institutions: Schools

Firstly, schools, may consider digital textbooks to be very beneficial to learning, due to the fact that it makes administration much easier, for example, assigning books to students, payment and distribution are much easier than with printed textbooks. It eases the burden of having to order the right number of books without wasting, to have the books available on time, and to find shelving space for all the books. Furthermore, students will not lose their books, because they are kept on cloud storage. Additionally, digital textbooks are cost-effective for schools.

However, in order to be able to take advantage of these functions, schools should ensure that such a system will work effectively. This can be accomplished by regularly offering

training sessions for students, to teach them about all the different functions available and to build their confidence in using digital textbooks. Schools should make sure students know about all the features provided on digital textbooks so that they can take advantage of all the added functions, such as the availability of extra resources, multi-media, online quizzes and more, for students to develop a preference for digital textbooks.

6.3.3 Students

Students, as the main stakeholders of digital textbooks, hold the key to successful utilisation of this technology. If their behavioural intentions towards digital textbooks is not positive, such a system will not work, no matter how many extra features are available for them to use. From a student's perspective, if they find using digital textbooks difficult and that it hampers their academic performance, they will opt for the option they know, printed textbooks. But students need to consider that they now have the opportunity to not learn the static way of just having one source of information, but can now have a variety of resources available through the use of digital textbooks. They must learn to not revert back to what they know, but must take up the challenge and discover all the features and added benefits they could have from using digital textbooks.

6.4 Research Limitations

The research methodology limitations were previously discussed in Section 3.9. Other limitations to the study will be discussed further in the following section:

- The study was conducted at a single private school, which may only be limited to a single perspective when not compared to students attending public schools or universities. Private schools often have more facilities available, for example, internet connection, which can be important for digital textbook usage, whereas public schools may not have such facilities, thus having a negative effect on usefulness.
- The use of a five-point Likert-scale survey with pre-formed statements made it difficult to identify the underlying issues of students' behavioural intentions towards using digital textbooks, because other aspects may have been greater predictors than the ones included in the study. Factors, such as possible theft of these devices, costs, and the activity of reading off of a screen, could also potentially be significant to behavioural intentions.
- This study only researched students' perceptions, whereas educators or even parents perceptions could have given a broader understanding of usage intention (Abdullah & Ward, 2016).

- TAM only focuses on predictors of accepting a new technology, but another theory, which could give better insight into students continued usage of digital textbooks, is the expectation-confirmation model (ECM), which determines continuous intention to use a system (Stone & Baker-Eveleth, 2013). At the start, digital textbooks can seem to be a fun new way of studying and students may want to explore and experiment with them. However, the question to be considered is whether they will maintain using this technology, even after the 'new' factor fades away.

6.5 Recommendations of Future Research

The study revealed numerous opportunities for future studies, some, to address the limitations of this study, and others, to expand the results from this study:

- This study used quantitative research, but a suggestion may be to broaden the results by conducting qualitative research, in order to get a deeper understanding of how students, who use digital textbooks under mandatory conditions, think. This could also lead to the identification of other variables which can be tested, and then for mixed research to be conducted.
- Research could be conducted to investigate if digital textbooks could work in poorer communities, who oftentimes do not have a variety of textbooks available in their schools, and if such a system could work there.
- A contrasting study could be done to examine the difference between the usage in a private school, which usually has more facilities available, opposed to in a public school.
- Research is also needed to determine if reading from the screen of a device is still a disadvantage or if the improvements made to devices have resolved this problem.
- A longitudinal study could be conducted to determine if the adoption of digital textbooks is different for students who have never used printed textbooks, but only has the option of digital textbooks, compared to those who initially used printed textbooks, and then switched to digital textbooks. Moreover, it should be tested whether the same variables will be predictors in such a situation.
- A study is needed on teachers' perceptions on the use of digital textbooks in their teaching pedagogy and can even go as far as investigating parents' perceptions on the use of digital textbooks.
- A study should be conducted to investigate whether or not students' academic performance is in any way actually influenced by the use of digital textbooks.

6.6 Conclusion

The education sector has seen many technological changes over the last decade, and digital textbooks have been considered to be such a change, which can improve the way in which textbooks are made accessible to students, and how a diverse range of resources can be made available, to enhance their learning and academic performance. Even if a system like a digital textbook platform seems to be a beneficial change, without students' intention to use such a system, the advantages will be ineffective and no improvement will be achieved. Thus, developers of digital textbooks and schools should acknowledge the factors that will influence the use of a new system like digital textbooks. As observed in this study, such a new technological e-learning system should be easy to use and useful for students, students should possess the self-confidence to utilise such a system, and such a system should be convenient and enjoyable for students to use.

7. REFERENCES

- Abdullah, F., & Ward, R. (2016). Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors. *Computers in Human Behavior*, *56*, 238–256.
<https://doi.org/10.1016/j.chb.2015.11.036>
- Al-Gahtani, S. S. (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. *Applied Computing and Informatics*, *12*(1), 27–50. <https://doi.org/10.1016/j.aci.2014.09.001>
- Bando, R., Gallego, F., Gertler, P., & Fonseca, D. R. (2017). Books or laptops? The effect of shifting from printed to digital delivery of educational content on learning. *Economics of Education Review*, *0*, 1–12.
<https://doi.org/10.1016/j.econedurev.2017.07.005>
- Chang, C., Yan, C., & Tseng, J. (2012). Perceived convenience in an extended technology acceptance model : Mobile technology and English learning for college students. *Australasian Journal of Educational Technology*, *28*(5), 809–826.
<https://doi.org/https://doi.org/10.14742/ajet.818>
- Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning. *Computers and Education*, *63*(April), 160–175.
<https://doi.org/10.1016/j.compedu.2012.12.003>
- Chun-Hua, H., & Kai-Yu, T. (2014). Explaining undergraduates' behavior intention of e-textbook adoption. *Library Hi Tech*, *32*(1), 139–163.
<https://doi.org/http://dx.doi.org/10.1108/LHT-09-2013-0126>
- Chuttur M.Y. (2009). "Overview of the Technology Acceptance Model: Origins, Developments and Future Directions ," Indiana University, USA . *Sprouts: Working Papers on Information Systems*, *9*(37). <http://sprouts.aisnet.org/9-37>
- D'Ambra, J., Wilson, C. S., & Akter, S. (2013). Application of the task-technology fit model to structure and evaluate the adoption of E-books by academics. *Journal of the American Society for Information Science and Technology*, *64*(1), 48–64.
<https://doi.org/10.1002/asi.22757>
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319.
<https://doi.org/10.2307/249008>

- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology : A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982–1003. Retrieved from <http://www.jstor.org/stable/2632151>
- Edmunds, R., Thorpe, M., & Conole, G. (2012). Student attitudes towards and use of ICT in course study , work and social activity : a technology acceptance model approach. *British Journal of Educational Technology*, 43(1), 71–84. <https://doi.org/10.1111/j.1467-8535.2010.01142.x>
- Embong, A. M., Noor, A. M., Hashim, H. M., Ali, R. M., & Shaari, Z. H. (2012). E-Books as Textbooks in the Classroom. *Procedia - Social and Behavioral Sciences*, 47, 1802–1809. <https://doi.org/10.1016/j.sbspro.2012.06.903>
- Foasberg, N. M. (2014). Student Reading Practices in Print and Electronic Media. *College & Research Libraries*, 75(5), 705–723. <https://doi.org/10.5860/crl.75.5.705>
- Gefen, D., Straub, D., & Boudreau, M. C. (2000). Communications of the Association for Information Systems Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*, 4(October). Retrieved from <http://aisel.aisnet.org/cais%5Cnhttp://aisel.aisnet.org/cais/vol4/iss1/7>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. *Vectors*. <https://doi.org/10.1016/j.ijpharm.2011.02.019>
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *The Journal of Marketing Theory and Practice*, 19(2), 139–152. <https://doi.org/10.2753/MTP1069-6679190202>
- Hao, Y., & Jackson, K. (2014). Student satisfaction toward e-textbooks in higher education. *Journal of Science and Technology Policy Management*, 5(3), 231–246. <https://doi.org/10.1108/JSTPM-04-2014-0016>
- Hinkin, T. R. (1998). A Brief Tutorial on the Development of Measures for Use in Survey Questionnaires. *Organizational Research Methods*, 1(1), 104–121. <https://doi.org/10.1177/109442819800100106>
- Hong, J. C., Hwang, M. Y., Hsu, H. F., Wong, W. T., & Chen, M. Y. (2011). Applying the technology acceptance model in a study of the factors affecting usage of the Taiwan digital archives system. *Computers and Education*, 57(3), 2086–2094. <https://doi.org/10.1016/j.compedu.2011.04.011>

- Huang, Y.-M., Liang, T.-H., Su, Y.-N., & Chen, N. S. (2012). Empowering personalized learning with an interactive e-book learning system for elementary school students. *Educational Technology Research and Development*, 60(4), 703–722. <https://doi.org/10.1007/s11423-012-9237-6>
- Jeong, H. (2012). A comparison of the influence of electronic books and paper books on reading comprehension, eye fatigue, and perception. *The Electronic Library*, 30, 390–408. <https://doi.org/10.1108/02640471211241663>
- Ji, S. W., Michaels, S., & Waterman, D. (2014). Print vs. electronic readings in college courses: Cost-efficiency and perceived learning. *Internet and Higher Education*, 21, 17–24. <https://doi.org/10.1016/j.iheduc.2013.10.004>
- Johnston, D. J., Berg, S. A., Pillon, K., & Williams, M. (2015). Ease of use and usefulness as measures of student experience in a multi-platform e-textbook pilot. *Library Hi Tech*, 33(1), 65–82. <https://doi.org/10.1108/LHT-11-2014-0107>
- Joo, Y. J., Park, S., & Shin, E. K. (2017). Students' expectation, satisfaction, and continuance intention to use digital textbooks. *Computers in Human Behavior*, 69, 83–90. <https://doi.org/10.1016/j.chb.2016.12.025>
- Kothari, C. R. (2004). *Research Methodology: Methods & Techniques*. New Age International (P) Ltd. <https://doi.org/10.1017/CBO9781107415324.004>
- Lee, D. Y., & Lehto, M. R. (2013). User acceptance of YouTube for procedural learning: An extension of the Technology Acceptance Model. *Computers and Education*, 61(1), 193–208. <https://doi.org/10.1016/j.compedu.2012.10.001>
- Martinez-Estrada, P. D., & Conaway, R. N. (2012). EBooks: The next step in educational innovation. *Business Communication Quarterly*, 75(2), 125-135.
- McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, 7(1), 64–82. <https://doi.org/10.1037//1082-989X.7.1.64>
- Mohammadi, H. (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers in Human Behavior*, 45, 359–374. <https://doi.org/10.1016/j.chb.2014.07.044>
- Mulholland, E., & Bates, J. (2014). Use and Perceptions of E-books by Academic Staff in Further Education. *Journal of Academic Librarianship*, 40(5), 492–499. <https://doi.org/10.1016/j.acalib.2014.05.018>

- Nicholas, A. J., & Lewis, J. K. (2013). Learning Enhancement or Headache: Faculty and E-Textbooks. *International Journal of Information Systems in the Service Sector*, 5(4), 63–71. <https://doi.org/http://dx.doi.org/10.4018/ijss.2013100105>
- Nikou, S. A., & Economides, A. A. (2017). Mobile-Based Assessment: Integrating acceptance and motivational factors into a combined model of Self-Determination Theory and Technology Acceptance. *Computers in Human Behavior*, 68, 83–95. <https://doi.org/10.1016/j.chb.2016.11.020>
- Nunnally, J. C. (1978). *Psychometric theory*. New York, NY: McGraw-Hill.
- Oliveira, S. M. De. (2012). E-textbooks usage by students at Andrews University: A study of attitudes, perceptions, and behaviors. *Library Management*, 33, 536–560. <https://doi.org/10.1108/01435121211279894>
- Park, J., & Park, M. (2016). Qualitative versus quantitative research methods: Discovery or justification? *Journal of Marketing Thought*, 3(10), 1–7. <https://doi.org/10.15577/jmt.2016.03.01.1>
- Park, Y., Son, H., & Kim, C. (2012). Investigating the determinants of construction professionals' acceptance of web-based training: An extension of the technology acceptance model. *Automation in Construction*, 22, 377–386. <https://doi.org/10.1016/j.autcon.2011.09.016>
- Raynard, M. (2017). Understanding Academic E-books Through the Diffusion of Innovations Theory as a Basis for Developing Effective Marketing and Educational Strategies. *Journal of Academic Librarianship*, 43(1), 82–86. <https://doi.org/10.1016/j.acalib.2016.08.011>
- Rockinson-Szapkiw, A. J., Courduff, J., Carter, K., & Bennett, D. (2013). Electronic versus traditional print textbooks: A comparison study on the influence of university students' learning. *Computers and Education*, 63, 259–266. <https://doi.org/10.1016/j.compedu.2012.11.022>
- Sánchez-Prieto, J. C., Olmos-Migueláñez, S., & García-Peñalvo, F. J. (2016). Informal tools in formal contexts: Development of a model to assess the acceptance of mobile technologies among teachers. *Computers in Human Behavior*, 55, 519–528. <https://doi.org/10.1016/j.chb.2015.07.002>
- Sánchez, R. A., & Hueros, A. D. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computers in Human Behavior*, 26(6), 1632–1640. <https://doi.org/10.1016/j.chb.2010.06.011>

- Saunders, M., & Lewis, P. (2012). *Doing research in business & management*.
England: Pearson
- Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., King, J., Nora, A., & Barlow, E. A. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results : A Review. *The Journal of Educational Research*, 99(6), 232–338.
<https://doi.org/10.3200/JOER.99.6.323-338>
- Stone, R. W., & Baker-Eveleth, L. (2013). Students' expectation, confirmation, and continuance intention to use electronic textbooks. *Computers in Human Behavior*, 29(3), 984–990. <https://doi.org/10.1016/j.chb.2012.12.007>
- Sun, J., Flores, J., & Tanguma. (2012). E-Textbooks and Students' Learning Experiences. *Decision Sciences Journal of Innovative Education*, 10(1), 63–77.
<https://doi.org/10.1111/j.1540-4609.2011.00329.x>
- Terpend, R., Gattiker, T. F., & Lowe, S. E. (2014). Electronic textbooks: Antecedents of students' adoption and learning outcomes. *Decision Sciences Journal of Innovative Education*, 12(2), 149–173. <https://doi.org/10.1111/dsji.12031>
- Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, 11(4), 342–365.
<https://doi.org/10.1287/isre.11.4.342.11872>
- Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test A Model of the Antecedents of Perceived Ease of Use: Development and Test* Model of Antecedents of Perceived Ease of Use. *Summer*, 27(3). <https://doi.org/10.1111/j.1540-5915.1996.tb00860.x>
- Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186–204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- Wentzel, J. P., Diatha, K. S., & Yadavalli, V. (2013). An application of the extended Technology Acceptance Model in understanding technology-enabled financial service adoption in South Africa. *Development Southern Africa*, 30(4–05), 659–673. <https://doi.org/10.1080/0376835X.2013.830963>
- Williams, B., Onsmann, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8(3).

- Ye, C. (2015). Feasibility Analysis of E-Textbook and E-Reader Adoption At a Business School: Perspective From Information Systems Students. *Academy of Educational Leadership Journal*, 19(3), 345–357. Retrieved from http://search.proquest.com/docview/1768629604?accountid=12217%5Cnhttp://link.periodicos.capes.gov.br/sfxlcl41?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aaibiglobal&atitle=FEASIBILITY+ANALYSIS+OF+E-TEXTBOOK+AN
- Yoon, C., & Kim, S. (2007). Convenience and TAM in a ubiquitous computing environment: The case of wireless LAN. *Electronic Commerce Research and Applications*, 6(1), 102–112. <https://doi.org/10.1016/j.elerap.2006.06.009>

8. APPENDICES

Appendix 1: Test for Differences

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
PU	Equal variances assumed	.969	.326	-2.929	367	.004	-.28354	.09680	-.47389	-.09318
	Equal variances not assumed			-2.898	324.313	.004	-.28354	.09783	-.47599	-.09108
PE OU	Equal variances assumed	2.105	.148	-1.776	367	.077	-.17607	.09914	-.37102	.01889
	Equal variances not assumed			-1.786	345.176	.075	-.17607	.09857	-.36994	.01781
BI	Equal variances assumed	.036	.850	-2.256	367	.025	-.23505	.10420	-.43995	-.03014
	Equal variances not assumed			-2.241	329.880	.026	-.23505	.10488	-.44137	-.02873
SE	Equal variances assumed	.019	.889	-1.292	367	.197	-.12520	.09688	-.31571	.06530
	Equal variances not assumed			-1.301	346.487	.194	-.12520	.09621	-.31444	.06403
PE	Equal variances assumed	.228	.633	-2.221	367	.027	-.23659	.10651	-.44604	-.02714
	Equal variances not assumed			-2.217	336.200	.027	-.23659	.10669	-.44646	-.02672
PC	Equal variances assumed	.040	.843	-2.108	367	.036	-.21825	.10353	-.42184	-.01465
	Equal variances not assumed			-2.106	337.321	.036	-.21825	.10362	-.42207	-.01443

Appendix 2: ANOVA results from SPSS

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
PU	Between Groups	15.977	4	3.994	4.814	.001
	Within Groups	301.992	364	.830		
	Total	317.969	368			
PEOU	Between Groups	10.277	4	2.569	2.937	.021
	Within Groups	318.413	364	.875		
	Total	328.691	368			
BI	Between Groups	6.628	4	1.657	1.683	.153
	Within Groups	358.385	364	.985		
	Total	365.014	368			
SE	Between Groups	4.468	4	1.117	1.319	.262
	Within Groups	308.144	364	.847		
	Total	312.612	368			
PE	Between Groups	25.933	4	6.483	6.642	.000
	Within Groups	355.290	364	.976		
	Total	381.224	368			
PC	Between Groups	6.702	4	1.675	1.728	.143
	Within Groups	353.027	364	.970		
	Total	359.729	368			

Appendix 3: AMOS output

Notes for Model

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 21
 Number of distinct parameters to be estimated: 16
 Degrees of freedom (21 - 16): 5

Result (Default model)

Minimum was achieved

Chi-square = 75.209

Degrees of freedom = 5

Probability level = .000

Assessment for normality

Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
PC	1.000	5.000	-.450	-3.526	-.232	-.910
SE	1.000	5.000	-1.033	-8.102	1.173	4.599
PE	1.000	5.000	-.174	-1.368	-.666	-2.610
PEOU	1.000	5.000	-.540	-4.238	-.187	-.732
PU	1.000	5.000	-.019	-.146	-.640	-2.509
BI	1.000	5.000	-.457	-3.585	-.420	-1.645
Multivariate					13.965	13.690

Model fit summary

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	16	75.209	5	.000	15.042
Saturated model	21	.000	0		
Independence model	6	1262.109	15	.000	84.141

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.054	.941	.752	.224
Saturated model	.000	1.000		
Independence model	.470	.363	.108	.259

Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.940	.821	.944	.831	.944
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.313	.315
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	70.209	45.784	102.076
Saturated model	.000	.000	.000
Independence model	1247.109	1134.232	1367.361

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.204	.191	.124	.277
Saturated model	.000	.000	.000	.000
Independence model	3.430	3.389	3.082	3.716

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.195	.158	.236	.000
Independence model	.475	.453	.498	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	107.209	107.830	169.782	185.782
Saturated model	42.000	42.814	124.127	145.127
Independence model	1274.109	1274.342	1297.574	1303.574

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.291	.225	.378	.293
Saturated model	.114	.114	.114	.116
Independence model	3.462	3.156	3.789	3.463

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	55	74
Independence model	8	9

Estimates

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
PEOU <--- PE	.321	.042	7.659	***	
PEOU <--- SE	.411	.046	8.885	***	
PU <--- PC	.211	.041	5.090	***	
PU <--- PE	.363	.042	8.547	***	
PU <--- PEOU	.285	.039	7.237	***	
BI <--- PU	.606	.045	13.470	***	
BI <--- PEOU	.292	.044	6.612	***	

Standardized Regression Weights: (Group number 1 - Default model)

	Estimate
PEOU <--- PE	.346
PEOU <--- SE	.401
PU <--- PC	.225
PU <--- PE	.398
PU <--- PEOU	.290
BI <--- PU	.566
BI <--- PEOU	.278

Covariances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
PE <--> SE	.430	.054	8.019	***	
PE <--> PC	.641	.062	10.326	***	
SE <--> PC	.510	.054	9.388	***	

Correlations: (Group number 1 - Default model)

	Estimate
PE <--> SE	.460
PE <--> PC	.639
SE <--> PC	.561

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
PE	1.033	.076	13.565	***	
SE	.847	.062	13.565	***	
PC	.975	.072	13.565	***	
e2	.527	.039	13.565	***	
e1	.354	.026	13.565	***	
e3	.409	.030	13.565	***	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
PEOU	.408
PU	.587
BI	.586

Appendix 4: Consent Form Example

Gordon Institute of Business Science

University of Pretoria

INFORMED CONSENT TO PARTICIPATE IN RESEARCH PROJECT TO BE CONDUCTED AT CORNWALL HILL COLLEGE

Title of the project: Factors that Influence Secondary School Students' Acceptance of using Digital Textbooks

Purpose of the study: With the introduction of digital textbooks being replaced by printed books, the acceptance of using digital textbooks by secondary school students, will be investigated. The aim of this research is to understand the structural relationships amongst students' perceived usefulness, perceived ease of use, and other external factors on the use and acceptance of digital textbooks, in the school environment.

What the study entails: Students will be asked to complete an online survey with questions relating to their experiences of using digital textbooks. This survey will be sent out via a link to your child's school email address. The survey will be conducted during tutor group meeting and no school time will be lost due to the completion of the survey. The survey will take approximately five minutes to complete. Survey responses will be anonymous and only used for this study.

Please take note of the following:

- Your child may withdraw at any time during the study and this will have no negative consequences for him/her.
- Your child's name will not be used in any report based on the study, and will not be identifiable from the survey results.
- You may request a copy of the questionnaire if you so desire.

If you need further information, you are welcome to contact us on:

Contact person: Sumari Spies, Head of Subject Business Studies and ICT Integrator, Cornwall Hill College. Email address: s.spies@cornwall.co.za Phone number: (012) 667 1360

Contact Person: Hayley Pearson, Supervisor to the study, Gordon Institute of Business Sciences. Email address: pearsonh@gibs.co.za Phone number (011) 777 4180

Agreement:

I have read the project description above and voluntarily give permission for my child
_____ (full name of child)
to participate in the study.

Parent Name and Surname:	
Contact Phone or Email:	
Parent Signature:	
Date:	



S SPIES - RESEARCHER



PEARSON – RESEARCH SUPERVISOR

Appendix 5: Example of Questionnaire

Strongly Agree (5); Agree (4); Uncertain (3); Disagree (2) and Strongly Disagree (1).

Are you male or female? Male Female

What grade are you in? 12 11 10 9 8

Construct	Code	Measuring item	Scale
Perceived Usefulness (PU)	PU1	Using digital textbooks increase my performance at school	5 4 3 2 1
	PU2	I am able to get more work done when I use my digital textbooks	5 4 3 2 1
	PU3	Using my digital textbooks makes learning easier for me	5 4 3 2 1
	PU4	Using my digital textbooks makes my learning quicker	5 4 3 2 1
Perceived Ease of Use (PEOU)	PEOU1	Using my digital textbooks is clear and understandable	5 4 3 2 1
	PEOU2	Using my digital textbooks does not require me to think a lot on how to use the system	5 4 3 2 1
	PEOU3	I find my digital textbooks easy to use	5 4 3 2 1
Behavioural Intentions (BI)	BI1	I intend to use my digital textbooks as much as possible	5 4 3 2 1
	BI2	I will continue to use my digital textbooks in my school career	5 4 3 2 1
	BI3	I intent to use my digital textbooks frequently for my school work	5 4 3 2 1
Self-Efficacy (SE)	SE1	I feel comfortable using digital textbooks on my own	5 4 3 2 1
	SE2	It is easy for me to use my digital textbooks on my own	5 4 3 2 1
	SE3	I would be able to use digital textbooks even if there is no one around to show me how to use it	5 4 3 2 1
Perceived Enjoyment (PE)	PE1	I find using digital textbooks to be enjoyable	5 4 3 2 1
	PE2	The actual process of using digital textbooks is pleasant	5 4 3 2 1
	PE3	I have fun using digital textbooks	5 4 3 2 1
Perceived Convenience (PC)	PC1	I am able to study at any time with my digital textbooks	5 4 3 2 1
	PC2	I am able to study at any place using my digital textbooks	5 4 3 2 1
	PC3	I feel using digital textbooks is convenient for me in my learning	5 4 3 2 1

Appendix 6: Ethical Clearance Letter

Gordon Institute of Business Science

University
of Pretoria

14 June 2017

Sumari Spies

Dear Sumari Spies,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

Appendix 7: Turnitin Report

See attached