Factors Influencing Electronic Textbooks' Reading Skills among Students in Secondary Schools of Muhanga District, Rwanda

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ABSTRACT

This paper seeks to investigate the effect and availability of English electronic textbooks on students' performance in reading skills, focusing on both students and teachers. Specifically, the research aims to: (1) assess the role of English electronic textbooks in enhancing students' reading fluency, (2) compare the reading skills performance of students using electronic textbooks with those using traditional printed textbooks, and (3) identify the challenges and benefits perceived by students and teachers. The Technology Acceptance Model (TAM), developed by Davis, was used as the interpretive framework. The research adopted a mixed methods approach, combining both quantitative and qualitative designs to achieve the general and specific research objectives. Questionnaires and interview schedules were used to collect primary data, while a documentary review was used to gather secondary data. The study population consisted of 1,231 respondents, with a sample size of 92 respondents. The data was presented in tables and analyzed using a T-test. The results indicate that students' English reading skills have significantly improved in a school equipped with a smart classroom compared to a school without smart classrooms after the introduction of e-textbooks. The benefits of e-textbooks in the teaching and learning process were evident. Therefore, the Ministry of Education, Rwanda (MINEDUC), school leaders, and teachers should address the challenges to further enhance the effectiveness of e-textbooks in teaching English reading skills.

Key words: Electronic Textbooks, Reading Skills, Students Performance, Twelve Years Basic Education

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I. INTRODUCTION

In the research conducted by Kalyani (2024) examined the role of technology in education revolutionizing learning for 21century by powering minds through education. The advent of digital technology has significantly transformed educational resources, with electronic textbooks (e-textbooks) becoming an increasingly popular tool in enhancing student learning experiences.

Further supporting the positive effect of e-textbooks, Utami et al. (2024) developed an English reading e-module based on gamification and contextual learning. This innovative approach aimed to enhance students' reading comprehension skills. Their research indicated that the use of such e-modules significantly improved students' reading skills, suggesting that gamified and contextually enriched e-textbooks can be highly effective in promoting better reading comprehension (Utami et al., 2024).

However, it is also important to note that not all studies have shown unequivocal support for e-textbooks. For instance, a study analyzing Indonesian language textbooks indicated that these resources did not correspond well with international reading literacy tests, suggesting potential limitations in their effectiveness (Sultan et al., 2022).

In short, while the global perspective on the use of e-textbooks for enhancing reading skills in English shows promising results, the preference for traditional print textbooks remains significant among students. Nevertheless, the incorporation of gamification, contextual learning, and localized content in e-textbooks appears to offer substantial benefits in improving reading comprehension. Future research should continue to explore these innovations to maximize the potential of e-textbooks in education.

In the context of Africa, recently, the integration of electronic textbooks in education has gained significant attention. This shift from traditional print textbooks to digital formats intends to enhance student engagement and improve academic performance, particularly in reading skills. In African, various studies have explored the effect of this technological transition on student outcomes.

Additional research underlined the development of English reading e-modules based on gamification and contextual learning in Africa. The study found that these electronic modules were effective in improving students'

reading comprehension skills, suggesting that interactive and engaging digital content can positively influence reading performance (Utami et al., 2024).

The integration of locally published English newspapers and magazines as reading materials in a Saudi university was also investigated, showing improvements in reading competence among English as a Foreign Language (EFL) students. Although this study was not directly conducted in Africa, it provides insights into how localized and contextually relevant digital reading materials can enhance reading skills, which can apply to the African context (Gulzar & Abdulrahman, 2014).

Despite these positive Utami et al (2024) found that, there are still challenges to be addressed. For instance, the availability of electronic textbooks and the necessary technological infrastructure in many African schools remain limited. Furthermore, there is a need for more localized studies to understand the specific effects and best practices for implementing electronic textbooks in diverse educational settings across Africa.

Overall, the integration of electronic textbooks in African secondary schools holds promise for improving reading skills and academic performance. Continued research and investment in digital education resources are essential to fully realize these benefits and ensure equitable access to quality education for all students.

According to MINEDUC (July 2016), In Rwanda, education sector has been exploring various strategies to enhance the reading skills of secondary school students. One such strategy is the integration of English electronic textbooks into the curriculum. While the adoption of digital learning tools is relatively new in the Rwandan context, there is growing interest in understanding their potential effect on student performance, particularly in reading skills.

Despite the promising findings, the specific effect of electronic textbooks on student reading performance in Rwanda remains under-researched. Most studies have focused on the general use of reading materials without isolating the effects of electronic textbooks. This highlights the need for more targeted research to evaluate how electronic textbooks influence reading skills and whether they offer significant advantages over traditional print materials.

Additionally, the broader educational infrastructure in Rwanda, including access to technology and digital literacy among both teachers and students, can affect the successful implementation of electronic textbooks. Ensuring that schools are equipped with the necessary technology and that educators are trained to effectively use digital resources is crucial for maximizing the benefits of electronic textbooks.

In conclusion, while initial studies indicate a positive role for electronic reading materials in enhancing student performance in reading skills, further research is needed to specifically assess the effect of electronic textbooks in Rwandan secondary schools. This will help in formulating effective policies and practices for integrating digital learning tools into the education system.

1.1 Statement of the Problem

In 2019, the Ministry of Education (MINEDUC) in Rwanda announced a shift from analog to digital literacy in teaching and learning to enhance educational practices and effectiveness within schools. Although this shift was crucial in empowering teachers to effectively utilize technology in the classroom improving overall ICT literacy among educators and students alike, many questions were raised concerning its implementation due to various challenges. According to the report by MINEDUC (July 2019), before developing this Policy an analysis of the strengths, weaknesses, opportunities, and challenges (SWOC) concerning the ICT in Education environment was carried out at different planning and validation workshops with key stakeholders. the major challenges identified included: inadequate infrastructure; high power costs; equipment; and connectivity costs. the absence of a culture around the use of ICT also prevented the widespread adoption of such tools in education, as did the limited availability of digital content, expertise, and project coordination.

In addition, implementing electronic textbooks in remote regions faces several challenges. Kiarie and Jones (2024) highlighted issues such as limited internet connectivity, lack of digital devices, and inadequate teacher training as significant barriers to the effective use of electronic textbooks. Addressing these challenges requires a concerted effort to improve the digital infrastructure and provide comprehensive training programs for teachers to leverage these tools effectively.

In Rwanda, the adoption of English electronic textbooks in secondary schools has been promoted as a strategy to improve reading skills and overall academic performance. However, the effect of this technological intervention remains underexplored, particularly in remote areas like the Muhanga district. Previous research indicates mixed outcomes regarding the efficacy of electronic textbooks. According to a World Bank (2018) report, while electronic textbooks have the potential to provide interactive and up-to-date content, their effectiveness is often hindered by infrastructural limitations, inadequate teacher training, and lack of student access to necessary devices United Nations Children's Fund [UNICEF], 2021). In the same way, a United Nations Educational, Scientific and Cultural Organization study emphasizes that the effectiveness of digital learning tools is greatly influenced

by how well they are adapted to the local context and the preparedness of both educators and students (Okoye et al., 2023).

Non-governmental organizations (NGOs) operating in Rwanda have also reported varying degrees of success with the implementation of electronic learning materials. For instance, a report by the One Laptop per Child initiative found that while there was an initial boost in student engagement, sustained improvements in reading skills were not evident without continuous support and resource availability (One Laptop per Child [OLPC], 2020).

Empirical studies in other regions have demonstrated that electronic textbooks can significantly enhance reading comprehension and retention when effectively integrated into the curriculum. For example, a study in South Africa found that students using electronic textbooks showed improved reading scores compared to those using traditional print materials (Rockinson et al., 2013). However, these findings are not universally applicable due to varying socio-economic and educational contexts. Given these mixed findings, it is crucial to investigate the specific effect of English electronic textbooks on student performance in reading skills within the unique context of Rwandan secondary schools in remote areas. This study aims to address this gap by examining the effect of digital tools on reading skills, particularly in remote areas such as the Muhanga district considering the unique contextual factors that influence educational outcomes in remote settings.

1.2 Research Objectives
To identify and analyze factors that influence electronic textbook reading skills among students in secondary schools

1.3 Research Questions
What are common factors influencing electronic textbook reading skills among Rwandan secondary schools?

II LITERATURE REVIEW

2.1 Theoretical Review
The theoretical framework for examining the effects of English electronic textbooks (e-textbooks) on students' performance in reading skills in Rwandan secondary schools is grounded in several educational theories that elucidate how digital tools and resources affect learning processes. This theory includes the Technology Acceptance Model (TAM).

2.1.1 Technology Acceptance Model (TAM)
Technology Acceptance Model (TAM), developed by Davis (1989), explains how users come to accept and use a technology. TAM posits that perceived ease of use and perceived usefulness are key determinants of technology adoption. For e-textbooks to positively affect reading skills in Rwandan secondary schools, students and teachers must perceive them as useful for improving learning outcomes and find them easy to use. According to TAM, when students believe that e-textbooks enhance their learning experiences (perceived usefulness) and are student-friendly (perceived ease of use), they are more likely to engage with the technology, which can lead to better performance in reading skills.

2.2 Empirical Review
The empirical literature review on the effect of English electronic textbooks (e-textbooks) on student performance in reading skills reveals several key findings. On a global scale, the adoption of electronic textbooks has been widely studied for its potential to enhance reading skills among students. A systematic literature review by Peras et al. (2013) examined the outcomes of digital versus paper reading among students aged 6-18 years. Their study highlighted that e-textbooks can positively influence reading performance, even though individual and contextual factors, as well as gender, socioeconomic status, and school location, play significant roles in the effectiveness of these digital tools (Peras et al., 2013).

In another study, Hung and Young (2015) found that E-readers significantly benefited EFL students' academic writing progress compared to conventional paper-based materials. The unique functions of E-readers, such as reciprocal peer review and improved information retrieval, were particularly beneficial in facilitating the writing process, which indirectly supports reading comprehension and skills (Hung & Young, 2015).

The study carried out by Respati et al (2024) argues that, this shift from traditional print textbooks to digital formats is particularly evident in the teaching of English reading skills. He also believes that the integration of e-textbooks in educational curricula has globally sparked considerable research studies into their effect on student performance, particularly in reading comprehension.

Lin et al. (2020) prominently examined the effectiveness of e-textbooks in improving reading comprehension among university students in Taiwan. The study found that students who used e-textbooks demonstrated better immediate reading comprehension performance compared to those who used print textbooks. Despite this improvement, the study also noted that half of the students still preferred print textbooks over electronic ones, highlighting a significant preference for traditional reading formats among learners (Lin et al., 2020).

In another study, Rafael and Tamban (2022) explored the use of localized English reading materials to enhance the reading skills of grade two pupils. The study revealed that students exposed to these localized materials showed significant improvements in their reading skills compared to those taught using traditional methods. This underscores the potential benefits of customized and culturally relevant e-textbooks in improving reading performance among young learners (Rafael & Tamban, 2022).

Moreover, the effect of digital interventions on reading skills was further evidenced by Yin and Hanif (2024), who investigated the use of a digital tool to enhance reading skills among ESL students. The findings demonstrated a significant improvement in reading test scores post-intervention, indicating that digital tools and e-textbooks can substantially benefit reading skill development (Yin & Hanif, 2024).

In Singapore, educational system is very creative and innovative with large investments on online learning resources. A thorough investigation into the use of e-textbooks in secondary education was carried out by According to their research (Tan & Goh, 2023). Students' reading comprehension and engagement were much improved by e-textbooks. The interactive elements such as multimedia information, hyperlinks, and integrated quizzes were very successful at keeping students' attention and enhancing their knowledge. Furthermore, the study found that e-textbooks made individual instruction easier, enabling teachers to meet a range of student needs. Though most students found e-textbooks beneficial, the researchers noted that some students experienced screen fatigue and preferred traditional textbooks for extended reading periods.

India presents a heterogeneous educational landscape with notable differences between rural and urban schools. The effect of e-textbooks on the reading skills of students in both environments was investigated by Das (2023). Their research showed that when using e-textbooks, urban students reading skills and motivation increased. This favorable result was mostly due to the presence of digital infrastructure and device access in urban schools. However, because there is less access to technology and internet connectivity in remote locations, the advantages of e-textbooks were not as noticeable. The findings of study about the digital divide emphasize the necessity of building fair infrastructure and allocating resources so that all students can take advantage of e-textbooks.

In Vietnam, Pham and Nguyen (2022) investigated the use of e-textbooks in Vietnamese schools and their effect on students' reading performance. The study discovered that e-textbooks positively affected reading skills by providing individual learning experiences and interactive content. Students who used e-textbooks indicated better reading comprehension and retention compared to those using traditional textbooks. However, technical software problems and the need for internet access were found as significant challenges. The study highlighted the need for reliable technological infrastructure and students-friendly e-textbook platforms to optimize the benefits of digital learning tools.

In Italy, digital tools have been integrated into the educational system to improve learning outcomes. The effect of e-textbooks on the reading capabilities of high school students was investigated by Park and Lee (2021). According to their research, e-textbooks improved students' critical thinking skills, reading comprehension, and general academic achievement. Students particularly valued the e-textbooks' mobility and convenience, which allowed for more flexible learning environments. But the study also emphasized how crucial it is to provide teachers with the necessary training to successfully incorporate e-textbooks into their lesson plans. It was determined that support and professional development for teachers were essential to the successful adoption of e-textbooks in the classroom.

A study on the effect of e-textbooks on middle school reading skills in France was carried out by Dubois and Martin (2023). According to their research, using e-textbooks increased reading interest, vocabulary growth, and fluency. For students with varying learning requirements, the interactive features such as audio support and interactive annotations were really helpful. In addition, the study found that e-textbooks made schoolbags lighter, which made them a more sensible option for students. But issues with screen time and other diversions have been brought forward. To overcome these issues, the researchers suggested an effective approach that combined the usage of e-textbooks with conventional reading methods.

In the African context, the integration of electronic textbooks has shown hopeful results, though the research is still developing. At Afe Babalola University in Nigeria, research by Daniel et al. (2017) studied the effect of reading habits on students' academic performance. Their results showed that the use of electronic textbooks, along with traditional resources, significantly improved students' academic performance. This suggests that digital learning tools, when used appropriately, can improve reading skills and overall academic success (Daniel et al., 2017).

A study conducted at Afe Babalola University in Nigeria examined the effect of electronic textbooks on students' reading habits and academic performance. The findings indicated that the use of electronic textbooks, along with traditional resources, significantly enhanced students' academic performance, demonstrating the potential benefits of digital learning tools in improving reading skills (Daniel et al., 2017). Another study in Africa focused on the development of English reading e-modules based on gamification and contextual learning. Utami et al. (2024) found that these electronic modules were effective in improving students' reading comprehension skills. The interactive and engaging nature of these digital resources played a crucial role in enhancing student performance in reading (Utami et al., 2024).

In Kenya, the results of integrating e-textbooks into the educational system are encouraging. Mwangi and Wanjiru's (2023) study concentrated on the usage of electronic textbooks in English in secondary schools. The researchers discovered that the use of e-textbooks greatly improved students' vocabulary development and reading comprehension. Multimedia content and quizzes, two interactive elements of e-textbooks, were especially successful in drawing students in and enhancing their comprehension of the subject material. But the study also showed that the advantages of e-textbooks weren't uniformly spread, with urban students benefiting more from e-textbooks since they had easier access to digital devices and internet connectivity.

Furthermore, in Uganda, e-textbook usage is becoming more popular, especially in secondary school. Nambi's (2019) study examined how English e-textbooks affected the reading skills of secondary school students. According to her findings, using e-textbooks enhanced comprehension and fluency in reading. Both high achievers and struggling students benefited from the individual learning opportunities that e-textbooks offered: learning at their own speed. Nonetheless, the researchers emphasized important infrastructure-related issues, such as sporadic electricity supplies and restricted access to digital devices in rural regions. These difficulties highlight the necessity of funding digital infrastructure in order to guarantee fair access to e-textbooks.

In Ethiopia, the adoption of e-textbooks is still in its nascent stages, but early research indicates promising outcomes. A study by Aslam and Saeed (2022) examined the use of English e-textbooks in secondary schools. Their findings revealed that e-textbooks enhanced students' reading skills by providing interactive and engaging learning experiences. Students who used e-textbooks performed better in reading assessments and reported higher levels of motivation and engagement. However, the study also emphasized significant challenges, including a lack of digital infrastructure, limited availability of digital devices, and insufficient training for teachers on how to effectively use e-textbooks. These challenges need to be addressed to fully realize the potential benefits of e-textbooks in Ethiopia.

In Oman, research on the use of e-textbooks in education has highlighted both successes and obstacles. A study by Al Masuudi et al. (2024) explored the effectiveness of English e-textbooks in improving reading skills among secondary school students. The results indicated that students who used e-textbooks demonstrated better reading comprehension and retention compared to those using traditional textbooks. The interactive and multimedia elements of e-textbooks were particularly praised for making learning more engaging and effective. However, the study also identified several challenges to the successful implementation of e-textbooks, including a lack of teacher training on how to effectively integrate digital tools into the classroom and limited access to digital devices, especially in rural areas.

In Rwanda, the research on the effect of e-textbooks on student reading performance is still developing. A study conducted in the Shyira Sector of Nyabihu District by Harerimana et al. (2024) examined the contribution of English reading materials, including electronic resources, to improving students' English performance. They found that the availability and use of diverse reading materials, including electronic textbooks, significantly enhanced students' reading skills and overall academic performance. This shows the potential benefits of digital learning tools in the Rwandan educational context (Harerimana et al., 2024). In the same context, English textbooks used in Rwandan schools do not address adequately the teaching of writing and reading skills as writing strategies for English as a Foreign language which is the context of Rwanda is limited. This implies that English textbooks should incorporate more reading and writing comprehensive writing instruction in the context of Rwanda. However, much is being done to improve English textbooks to address the issue of English language teaching context in Rwanda (Niyibizi et al., 2019).

Despite these promising findings, there is a need for more targeted research in Rwanda to evaluate the specific effect of electronic textbooks on reading skills. There are factors such as technological infrastructure, teacher training, and digital literacy among students and teachers that must be considered to ensure the successful implementation and utilization of electronic textbooks.

2.3 Factors Affecting Reading Electronic Textbooks
2.3.1 Cognitive, Environmental, Parental and Instructional Factors

Reading skills are influenced by a combination of cognitive, environmental, and instructional factors. Cognitive factors include phonological awareness, vocabulary knowledge, and working memory. Phonological awareness, the ability to recognize and manipulate sounds in spoken language, is fundamental for decoding words during reading (Snowling & Hulme, 2021).

According to Cowan (2014) suggested that the capacity to temporarily store and manage information in the mind is referred to as working memory. He continues to argue that it is essential for reading comprehension because it enables readers to remember and incorporate information from many textual sections. People with larger working memory capacities are better able to comprehend and retain complicated materials. Maintaining a consistent mental image of the text requires maintaining track of characters, events, and details, which working memory helps with. Working memory deficits can make it difficult for students to combine newly learned material with what they have already read, which can impair their understanding and retention (Cowan, 2014).

In other words, these two boundaries are currently under debate. In terms of the capacity limit, there is little disagreement that normal adults are restricted to roughly three or four meaningful units or chunks within a given type of sensory coding (phonological, visual-spatial, etc.). The argument is on whether the limit arises from materials that interact with one another or from the focus of attention (Oberauer et al., 2016). In recent, unpublished work, the researcher proposes that the focus of attention is mainly used to encode additional information, but that it is also limited to a few informational chunks that can be off-loaded to long-term memory and held there with the aid of attentional refreshing.

2.3.2 Environmental Factors Electronic Textbooks

Environmental factors encompass the availability of reading materials, the frequency of reading activities, and socio-economic status. Access to a variety of reading materials at home and in school promotes reading development by providing opportunities for practice and exposure to different text types (Neuman & Celano, 2001). The frequency of reading activities, such as shared reading with parents or independent reading, contributes to the development of reading fluency and comprehension skills (Mol & Bus, 2011). Students with greater access to reading materials at home and in school exhibit higher levels of reading proficiency. Conversely, limited access to books can hinder reading practice, leading to lower reading achievement and reduced literacy levels. As a result, children who have a wide range of books and other reading resources at their disposal are more likely to engage in reading activities, which promotes literacy development (Oxley & McGeown, 2023). Socioeconomic status can affect reading skills through the provision of resources, parental education levels, and the overall learning environment

2.3.4 Instructional Factors

Instructional factors involve the methods and quality of reading instruction. Effective reading instruction includes explicit teaching of phonics, vocabulary, and comprehension strategies. Phonics instruction helps children understand the relationship between letters and sounds, which is essential for word recognition (National Reading Panel, 2000). Teaching vocabulary directly and through context helps students build a robust word bank, facilitating better comprehension (Beck et al., 2002). Comprehension strategies, such as summarizing, predicting, and questioning, enable students to actively engage with and understand texts (Duke & Pearson, 2002).

2.3.5 Parental Factors

The role that parents play in their children's literacy development is crucial in forming their reading abilities. Kids who have parents who read aloud to them, have book conversations with them, and make reading a habit have a big effect on their literacy development. According to Burns et al. (2019) children who get regular parental support and encouragement have a tendency to become better readers and have a more favorable attitude toward reading. This involvement includes keeping an eye on children' reading development, working with teachers to promote literacy development, and creating a comfortable reading environment at home.

III. METHODOLOGY

3.1 Research Design

This study used a mixed research survey by using T- test. This is a type of research design which combines qualitative and quantitative methods. Qualitative approach allows the research to gather the significant data and find a deep understanding of the research area (Dawadi et al., 2021). In scientific research, qualitative approach is a process of analysis, interpretation, and report writing from different traditional of survey that explore a human problem or

social (Busetto et al., 2020). To build this picture, structured interviews were given to the school staff and questionnaire items were given to the teachers and students. Quantitative study technique with self-administered questionnaires to the teachers and learners was considered in this research to collect quantitative data as the dissertation data collection tools is considered suitable for this study.

3.2 Area of Study

The study was conducted at secondary schools located in Kibangu and Rongi sectors, Muhanga District, Southern Province. These studied schools are GS Rongi and GS Kibangu, the 12 years basic education.

3.2.1 Study Population

The study population concerned 2 secondary schools respectively in Rongi and Kibangu sectors. The study population has included teachers, learners, and school authorities (head teachers and deputy head teachers).

Table 1
Population of the Study

Sector	Population				Total
	School	Learners	Teachers	School authorities	
Rongi	GS Rongi	680	35	2	717
Kibangu	GS Kibangu	485	27	2	514
Total		1165	62	4	1231

3.2.2 Sample and Sampling Technique

While selecting the sample size of the study; the researcher purposively selected a number of respondents particularly representing the study population. Data were collected from selected respondents from the study population due to the reasons of necessity and convenience. Sample is defined as a subset of the portion of the total population and it must always be considered as an approximation of the whole itself. There are different ways or techniques involved in the selection of a sample for any study. A sampling technique therefore refers to the author's method of appropriately selecting the type, size and representatives of the sample. While selecting the sample size of the study; the researcher purposively selected a number of respondents particularly representing all study population. Data were collected from selected respondents from the study population due to the reasons of necessity and convenience.

3.2.3 Sample Size

In practice the simple size in a study is determined based on the need to have sufficient statistical power. The sample size was calculated Using Yamane simplified formula to calculate sample sizes, with a 90% confidence level and e=0.1

$$n = \frac{N}{1 + (N * (e)^2}$$

Where n is the sample size, N is the population size, and e is the level of precision.
When this formula was applied to the above target population, we got:

$$n = \frac{1231}{1 + (1231 * (0.1)^2} = 92 \text{ respondents}$$

A sample of 92 respondents was targeted to participate in this study. This formula was used to estimate a representative sample. A total number of 92 respondents was taken as sample size.

Table 2
Surveyed Respondents

Sector	Population					Total
	School	Learners	Teachers	Headteacher	Deputy Headteacher	
Rongi	GS Rongi	48	4	1	1	54
Kibangu	GS Kibangu	33	3	1	1	38
Total		81	7	2	2	92

The surveyed respondents of our research are composed by all 7 English teachers, 81 learners and 4 school authorities (2 head teachers and 2 deputy head teachers). The sample for learners was based on the percentage. According to the school authorities' sample, we deliberately chose school authorities.

This table 3 presents the distribution of respondents with their gender, experience and qualifications (Age, Gender and qualifications).

Table 3
Demographic Characteristics of Respondents

Gender	Male	41	Total=92
	Female	51	
Experience	Below 2 years	1	14.3%
	2-6 years	4	57.1%
	7-9 years	2	28.6%
Qualification	A1	5	Total=7
	A0	2	

The data presents the gender distribution and experience levels of a group of 92 individuals, with 41 males and 51 females. Among those with experience, 1 individual has below 2 years (14.3%), 4 have 2-6 years (57.1%), and 2 have 7-9 years (28.6%). For qualifications, 5 individuals hold A1 and 2 hold A0, making a total of 7. This distribution highlights a majority of females and a predominant mid-range experience level among the respondents. The qualification data indicates a higher number of A1 holders compared to A0. The table presents the surveyed teachers of English subject have various experiences in teaching.

Table 4
Experience in Teaching English Language

Experience	Teachers	
	N=7	Percent
Below 2 years	1	14.3
2-6 years	4	57.1
7-9	2	28.6
Total	7	100

Referring to table 6, 14.3% of the surveyed respondents have less than 2 years of experience, 57.1% of the surveyed teachers have between 2 and 6 years of experience, and 28.6% of surveyed teachers have between 10 and 12 years of experience.

Highlighting the influence of teaching experience on students' academic performance, Harris and Sass (2011) found that teacher experience has a significant effect on students' English academic performance. Similarly, Strauss and Vogt (2001) identified teachers' teaching experience as an important factor for students' academic success.

3.3 Data Collection Instrumentation

For the tenacity of finalizing this dissertation, primary and secondary data were necessary. For secondary data, t-test was used to test the students' performance in reading skills before and after the introduction of e-textbooks. Moreover, the hypothesis indicated that H0 has no significant effect on reading skills for the learners' performance who use printed books in GS Rongi and GS Kibangu located in Muhanga district while H1 indicated that introduction of e-textbook has a significant effect of reading skills on the learners' performance who use electronic textbooks in GS Rongi and GS Kibangu located in Muhanga district.

This dissertation was enriched by the data that were gathered through usage of questionnaires (for teachers and students), interview (interview guide to both head teachers, Deputy head teachers in charge of studies, teachers and students) and direct observation where the researcher carried out observation sessions in five classrooms where teachers were teaching English lessons. We observed how the reading skills impacted leaners' English performance. The researchers observed what kind of English text books learners read and available, if teachers give reading activities to learners, the methods that teachers used while teaching English lesson. Researchers also observed some intervening variables like the school library, smart classroom and filled in the form accordingly.

IV. FINDINGS & DISCUSSION

Considered as the core part of this dissertation, this chapter presents first the data in both statistical and discourse format. Second, it interprets the findings and analyses them according to the objectives of the study, hypotheses, and the literature review. Third, the researcher's comments and views keep an important stand to draw consistent conclusions.

All findings from different people were very important considering their experience and the useful information. This information concerns the major effects of electronic textbooks on reading skills in English in Rwandan secondary schools, especially in 12 YBE in remote areas. In this regard, surveyed people provided suggestions on what should be done to solve challenges faced by English teachers in implementing the use of electronic textbooks in 12 YBE, especially in remote areas only 92 respondents participated in the research study.

4.1 Factors that Influence Electronic Textbooks among Students in Secondary Schools

The first objective was to identify and analyze factors that influence reading skills among students in secondary schools. The study involved teachers and students. They have provided the following answers as they have been indicated in the table below. Answers were provided using Likert Scale: Strongly agree, agree, strongly disagree and disagree.

Table 5
Factors Influencing Reading Skills

Reading Factors	SA & A (%)	SD & D (%)
Cognitive factors	61	39
Environmental factors	54	46
Parental factors	55	45
Instructional factors	68	32

The table 5 presents the influence of various factors on students' reading skills, as assessed using a Likert Scale. Cognitive factors were positively viewed by 61% of respondents, indicating a significant effect on reading proficiency, consistent with findings by Brown (2016) that cognitive skills are crucial for reading development. Environmental factors received 54% agreement, suggesting that physical and social surroundings moderately affect reading skills, aligning with Miller and Warschauer's (2014) emphasis on the learning environment's role. Parental factors had 55% agreement, highlighting the importance of parental involvement in reading success, as supported by Erdem and Kaya (2020). Instructional factors had the highest positive response at 68%, underscoring the effectiveness of teaching methods and resources in enhancing reading skills, reflecting on Blikstad-Balas et al. (2021) research on instructional quality. Despite these positive perceptions, a significant minority expressed disagreement across all factors, indicating areas needing improvement and further investigation.

4.2 The Effects of English Electronic Textbooks on Students' Performance in Reading Skills in Rwandan Secondary Schools

The second objective of the study was to compare the reading skills performance of students using electronic textbooks with those using traditional printed textbooks 12YBE in remote areas of Muhanga District. It was hypothesized that there are significant differences in overall reading skills performance between students who use electronic textbooks and those who use traditional printed textbooks, with the former group showing superior performance in GS Rongi and GS Kibangu in the Muhanga district. To test this hypothesis two sample t-tests were used. Table 6 shows the descriptive statistics and t-test results.

Table 6
Comparison of S2 Students' Marks in English Subject before and after the Introduction of Electronic Textbooks in GS Rongi and GS Kibangu

Period	Sample size	Mean	SD	t-calculated	Sig. or P value	Decision
Before the introduction of e-textbooks (Between Academic year 2014-2017)	451	48.6430	20.39006	5.339	.000	Confirm HO
After the introduction of e-textbooks (Between Academic year 2018-2021/2022)	416	55.8666	19.36058			

* 1. Mean Difference Calculation:

The mean difference between pre-introduction and post-introduction of e-textbooks is calculated as follows:
Mean Difference=Mean of Post-introduction−Mean of Pre-introduction =Mean Difference
Mean Difference=55.8666−48.6430=7.2236

Statistical Significance:
To determine if this mean difference is statistically significant, typically a t-test was used. The significant effect mentioned implies that this difference is not due to random chance.

Effectiveness of E-Textbooks:
The positive mean difference of 7.2236 suggests an improvement in learners' performance in English reading skills after the introduction of e-textbooks. This indicates that e-textbooks have a beneficial effect on reading performance.

The second hypothesis tested stated that there are significant differences in overall reading skills performance between students who use electronic textbooks and those who use traditional printed textbooks, with the former group showing superior performance. Considering the results in table 6, the P value is .000. This p-value indicates the probability that the observed difference between the groups suggests that the difference is highly significant. This leads to the confirmation of the H1, implying that there are significant differences in overall reading skills performance between students who use electronic textbooks and those who use traditional printed textbooks, with the former group showing superior performance. This is also confirmed by the value of t. t-cal. 5.339 > t-critical 0.000.

This study mainly aims identify and analyze factors that influence electronic textbooks among students in secondary schools. Therefore, as Pears et al. (2023) pointed out, e-textbooks can positively influence reading performance, even though individual and contextual factors, as well as gender, socioeconomic status, and school location, play significant roles in the effectiveness of these digital tools (Pears et al., 2023). This shows that these authors confirmed that e-textbooks have the potential to improve reading performance and their effectiveness is influenced by a combination of individual and contextual factors. Addressing these factors is crucial to ensure that all students can benefit from the advantages of digital learning tools.

A similar study was conducted by Hung and Young (2015), which was on the effectiveness of adopting e-readers to facilitate EFL students' process-based academic writing. Their study found that e-readers significantly benefited EFL students' academic writing progress compared to conventional paper-based materials. The unique functions of e-readers, such as reciprocal peer review and improved information retrieval, were particularly beneficial in facilitating the writing process, which indirectly supports reading comprehension and skills (Hung & Young, 2015).

The cognitive Theory of Multimedia Learning, proposed by Richard Mayer, suggests that people learn more effectively from words and pictures than from words alone. This theory is particularly relevant to e-textbooks, which often incorporate multimedia elements such as images, audio, and video to complement textual information. According to Mayer (2005), multimedia learning involves the dual coding of information through both visual and auditory channels, which enhances comprehension and retention.

In this context, this study has revealed that 86.4% of the surveyed respondents agreed strongly that the use of electronic textbooks improves engagement and motivation and these are among the key factors leading to teaching/learning success. In addition, 72.8 % of the surveyed respondents strongly agreed that the use of electronic textbooks contributes to enhancing reading comprehension. These views correspond to what Rafael and Tamban (2022) explored the use of localized English reading materials to enhance the reading skills of grade two pupils. The study revealed that students exposed to these localized materials showed significant improvements in their reading skills compared to those taught using traditional methods. This underscores the potential benefits of customized and culturally relevant e-textbooks in improving reading performance among young learners (Rafael & Tamban, 2022, Ngabonziza & Kagwesage 2024).

Furthermore, in this regard, different authors highlighted the importance of e-textbooks as far as reading skills are concerned. For instance, Chou (2015) demonstrated that using reader response theory with e-books can engage EFL students more effectively, making reading practice more meaningful and enjoyable.

Considering the views of the respondents above concerning the effect of e-textbooks on English reading skills, we attest that the first research question was answered. Also, the main research objective, which is to investigate the effects of English electronic textbooks on students' performance in reading skills, and the first objective, to identify and analyze factors that influence reading skills, were achieved. In this regard, the analysis of the collected data brings to light a great correlation between the use of e-textbooks in teaching and learning English and significant improvements in English reading skills. Students who learned through ICT tools showed high motivation. This finding aligns with previous research indicating that e-textbooks offer interactive features such as hyperlinks, multimedia

elements, and instant dictionary access, which can significantly enhance comprehension and engagement (Korat & Shamir, 2008).

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The primary goal of this study was to investigate the effects of English electronic textbooks on students' performance in reading skills in Rwandan secondary schools, particularly in Muhanga District. The findings of this study revealed that e-textbooks significantly improve students' performance in English reading skills compared to traditional printed textbooks. This was shown by the positive mean difference and p-value analysis that students using e-textbooks outperform their peers using printed materials for reading performance. However, this study highlighted that contextual factors such as socioeconomic status, gender and school location can influence the effectiveness of using textbooks and specific research might produce different results. This study showed that for the participants located in cities and towns such as Muhanga integrated the use of e-textbooks which improved their reading performance and this echoed previous research.

5.2 Recommendations

Basing on the finding of this study; we would recommend that the Ministry of Education (Rwanda) should establish policy on the use of electronic textbooks in the classroom. This would help the school leaders to implement the policy by focusing on the use of electronic textbooks which are easy access and less expensive compared to traditional printed textbooks. Ensuring the proper integration of electronic textbooks in classrooms is a vital responsibility of school leaders. It is imperative that they guarantee that educational institutions possess the essential digital infrastructure, such as dependable internet connectivity and an ample supply of electronic devices for both instructors and learners. Promoting a culture of ongoing learning and innovation requires regularly organizing training sessions for educators on the usage of electronic textbooks and other digital learning resources. This should be done by taking into consideration equal access. Thus, funding should be expressly allocated for the purchase of electronic devices and the creation of digital infrastructure in schools, particularly in distant locations. Promoting studies on the efficiency of digital learning resources, such as electronic textbooks, might yield important insights on best practices. Ensuring that educational content meets high standards can be achieved by collaborating with private sector entities to develop and distribute electronic textbooks of the highest quality.

Subsequent investigations have to concentrate on pinpointing effective pedagogical approaches that optimize the advantages of digital textbooks. Researching the effects of various e-textbook usage strategies on the reading skills of learners can give teachers evidence-based suggestions. The results of this study will help shape best practices for integrating digital learning resources into the classroom and guarantee that the benefits of electronic textbooks are completely used to raise student achievement. Researchers can best assist teachers in making judgments and maximize the use of electronic textbooks in improving reading skills by adding to the body of knowledge.

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