

Understanding the Barriers in Adopting the E-Textbooks Among Public School Students in Oman

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Abstract – Advances in digital technology have been changing the way educators approach education in terms of resources and delivery of instruction through technology. Technology integration in the classroom is thought to be a successful way to motivate students. Due to benefits including portability, ease of use, and storage capacity, e-textbooks are displacing printed books as a preferred method of instruction in many nations. Research has shown that despite its many benefits, students find it challenging to adopt. This study's goal is to discover what obstacles ninth- and tenth-grade public school students in the Sultanate of Oman faced when using electronic textbooks during the COVID-19 pandemic. In total, 429 students completed the survey. The data were analysed statistically, and the research revealed that students' attitudes toward e-textbooks were poor. Addressing barriers to the adoption of e-textbooks among school students requires a holistic approach that considers ergonomic design, technological infrastructure, and user experience.

By prioritizing these aspects, among educators, publishers, and developers is crucial for creating an engaging and effective digital learning environment with e-textbooks.

Keywords– E-textbooks, ebook issues, e-book challenges, ebook obstacles.

1. Introduction

Education is critical to societal growth and is evolving in tandem with technology and science. Information technology, on the other hand, has been reported by authors such as [1], [2] that it brings productivity and efficiency to learners (students) and teachers; and also provides a better learning experience if successfully implemented. It is important in education because it provides students with access to countless online resources, encouraging them to carry out research and therefore become more independent. It also simplifies learning by making concepts more digestible, for example through an instructional video. Technology also provides students with easy-to-access information, accelerated learning, and fun opportunities to practice what they learn. One of the examples is learning using e-textbooks. E-textbooks are electronic reproductions of traditional books that can be read on computers, tablets, and cellphones. They come in a variety of file forms, including plain text, PDF, and HTML/XML.

Both physical and electronic textbooks provide educational content for students and educators. E-textbooks, however, have various advantages over printed books, such as being lighter to carry, making it easy to discover a specific passage or piece of text, being portable, having good navigational capabilities, being simple to use, and having greater storage space [3].

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The COVID-19 pandemic has pushed schools to close and transition to online instruction. The authorities in Oman have closed schools and colleges to prevent the spread of the virus. In response to the Supreme Committee's directives, the Ministry of Education (MoE) switched from a traditional classroom to a virtual or online class during the subsequent academic year. To meet the quality criteria, the MoE emphasized the need to develop an e-learning technical infrastructure and change internal policies to include semesters for all courses [4]. The pandemic has had an impact on the printing business, which is why MoE's official website now provides electronic textbooks. E-textbooks are replacing printed books as a standard educational strategy around the world, yet Arab nations have not adopted them as widely as other nations [5]. In this sense, the pandemic presented an opportunity to adopt e-textbooks.

A review of prior research [6] featured college students, but there have been very few investigations into how school students use e-textbooks. The purpose of this study was to investigate the obstacles that Omani school students have in embracing e-textbooks.

Research on the impact of e-books on learning should help the stakeholders with the potential advantages of e-books and promote their increased use in the Arab world [5]. Additionally, more work needs to be done to increase students' enjoyment of e-books and to teach them about their benefits [7]. More research is required to further understand how e-books can be used to satisfy students' expectations and improve learning.

Because the Omani government wants to establish a top-notch, internationally standardized educational system by 2040, this study is crucial for the country's future. To digitize the curriculum for grades one through twelve, the Ministry of Education (MoE) entered a contract with the Bahwan Information Technology Company. This initiative should be supported by e-textbook design guidelines that help the development of e-textbooks that can be adapted by school students in Oman. For that purpose, this study aims to pinpoint obstacles to Oman's school children's adoption of e-textbooks.

2. Printed Textbook and Electronic Textbook

Textbooks are an essential component of education and are available in two formats: printed and electronic. Both formats aim to convey knowledge and facilitate student learning, although they differ significantly in terms of presentation, functionality, and impact on the learning experience.

2.1. Printed Textbooks

A printed book is a physical book that is printed on paper. It is conventional reading material provided in the form of paper books, newspapers, magazines, and handouts. Traditional paper books are probably the best option for the eyes if the reader wants to avoid computer vision syndrome. A review conducted in 2008 concluded that reading from paper was superior to reading from screens, but the authors noted that technological advances could change this pattern [8]. The use of textbooks is one of the resources available to teachers to help them achieve their educational objectives [9]. Many students prefer using printed texts because they allow them to highlight pages easily and write side notes within the text [10].

2.2. Electronic Textbook

An e-book can be defined as any piece of electronic text regardless of size or composition, excluding journal publications, made available electronically or optically, for any device, handheld or deskbound that includes a screen [11]. The terms "digital textbooks" and "e-textbooks" were used to refer to e-textbooks. An electronic textbook is a book that was either created entirely digitally or transformed from a printed book format to a digital format so that it can be seen and read on e-textbook reading devices. It can also be an electronic format that digitizes one or more printed books or content entirely produced in an electronic environment that can be viewed, accessed, or published on a desktop computer, handheld device with a screen, or other electronic device specifically designed for reading such materials [12]. Digital versions of textbooks provide numerous advantages and features that make them appealing alternatives for students. Some of these benefits include the ability to bookmark, highlight, and take notes, which enhance students' overall learning experience. E-textbooks are available in various formats, including ePub, HTML, and PDF [13], [14].

Numerous countries, including Australia, Canada, China, Finland, France, Malaysia, the Netherlands, Singapore, Sweden, the United Kingdom, the United States, and Vietnam, have implemented the use of digital textbooks, e-books, and online learning content in K-12 schools [15].

3. Method

The survey is the process of collecting data from a predefined group (in this study, the students) with the goal of uncovering insights about the adoption of e-textbooks among school children in Oman.

This is a widely used approach for gathering information from various academic and marketing research areas [16]. The survey was selected to enable the researcher to collect data from a large number of respondents. In addition, this method allows researchers to remotely administer the entire process online through mobile devices and social media. The questionnaire consisted of four constructs, which were as follows: ergonomic challenges, comprising six items; technology challenges, comprising four items; user experience (UX) challenges, comprising nine items; and financial challenges, comprising one item.

3.1. Data Collection

This research is concerned with barriers to adopting e-textbooks among school students. In total, 429 students from public schools in Oman (2021-2022 academic year) participated in this survey. The students were in grade tenth and ninth. Students in these grades were chosen because they had experience in using e-textbooks (during the pandemic COVID-19). The questionnaire was developed using Google Forms and posted on social media after it was approved by the Ministry of Education (MoE) and the National Centre for Statistical Information (NCSI).

Figure 1 displays the demographic data of the study participants by gender. There were 353 (82.3%) female and 76 (17.7 %) male respondents. Most respondents were female, which is not surprising considering that females are more inclined than males to participate in surveys, as reported in previous studies [17], [18].

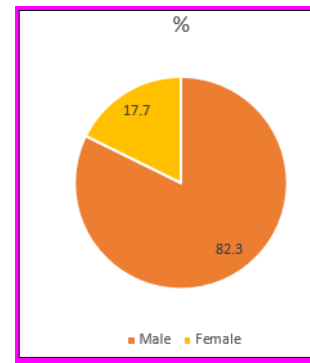


Figure 1. Demographic of the respondents

3.2. Analysis of Data

The Statistical Package for the Social Sciences (SPSS) is a powerful software program widely used for statistical analysis in various fields, particularly in the information sciences. In this study, the data were analyzed using SPSS, which provides tools for creating various types of charts and graphs to visually represent data. SPSS enables researchers to assess the reliability and validity of measurement scales. This is crucial for ensuring that research instruments accurately measure the constructs they are intended to assess.

4. Challenges of Using E-textbook

The widespread integration of technology in education has led to the emergence of electronic textbooks (e-textbooks) as alternatives to traditional printed textbooks. While e-textbooks offer numerous advantages, their adoption among school students is not without challenges. This section discusses four key barriers that hinder the widespread use of e-textbooks, as depicted in Figure 2.

- a. Ergonomics barriers
- b. Technology barriers
- c. User experience (UX) barriers
- d. Finance barriers

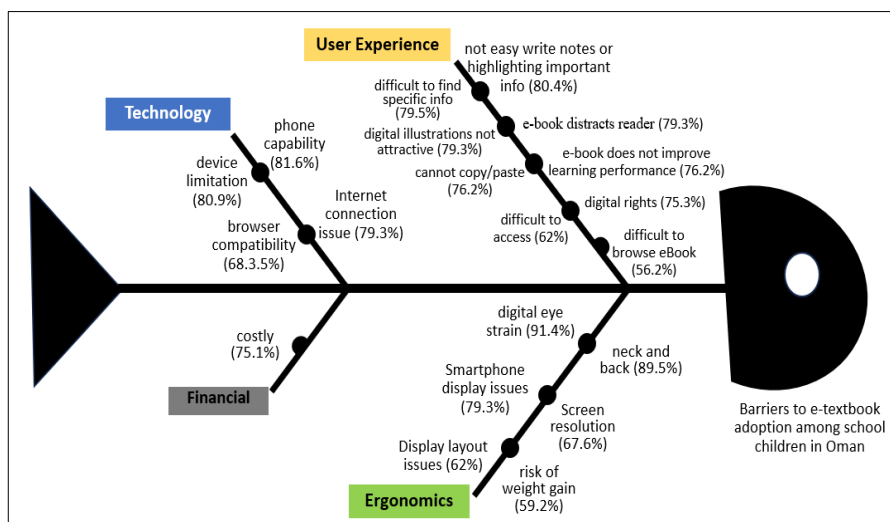


Figure 2. Barriers to e-textbook adoption among school children in Oman

4.1. Ergonomics Barriers

Ergonomics refers to the difficulties and discomfort that can arise while reading from electronic devices such as smartphones, tablets, or e-readers. Ergonomics refers to the design of tools and devices that enhance human well-being and performance. In the context of e-textbooks, poor ergonomic design can be a significant barrier to adoption by students. Some common ergonomic challenges include issues related to eye strain, screen size and resolution, font size and spacing, navigation, and physical discomfort.

Overall, the ergonomic challenges of using e-textbooks highlight the importance of considering students' needs and abilities when designing e-textbooks to optimize the fit between the student, task, and environment. Prolonged screen time can lead to health issues such as eye strain, causing discomfort, fatigue, and headaches among students. Exposure to blue light emitted by screens is a contributing factor that affects sleep patterns (difficulty falling asleep) and overall wellbeing. Small screens such as those on tablets or laptops may not provide an optimal reading experience. Students may find it challenging to navigate the content, leading to decreased comprehension and retention.

Many students annotated their textbooks as a part of their learning process. E-textbooks that offer limited or cumbersome annotation features can effectively hinder students' ability to engage with material. These challenges can make it difficult for students to read e-textbooks comfortably and efficiently and may also negatively impact reading comprehension and retention.

The results show that more than 91% of the respondents to this survey stated that reading e-books for an extended period caused digital eye strain (Figure 3). This could be due to the contrast of the display and correctness of the e-book [12]. Furthermore, 89.5% of those polled reported neck and back pain as well as wrist, arm, shoulder, and hand problems. Consequently, it is critical to avoid reading for extended durations without adequate rest [19]. Some descriptive feedback from the survey stated that the government needs to be mindful of students' well-being and consider measures to reduce potential negative impacts on health. Some commented that prolonged use of digital devices, especially when not ergonomically positioned, contributed to poor posture that causes musculoskeletal problems.

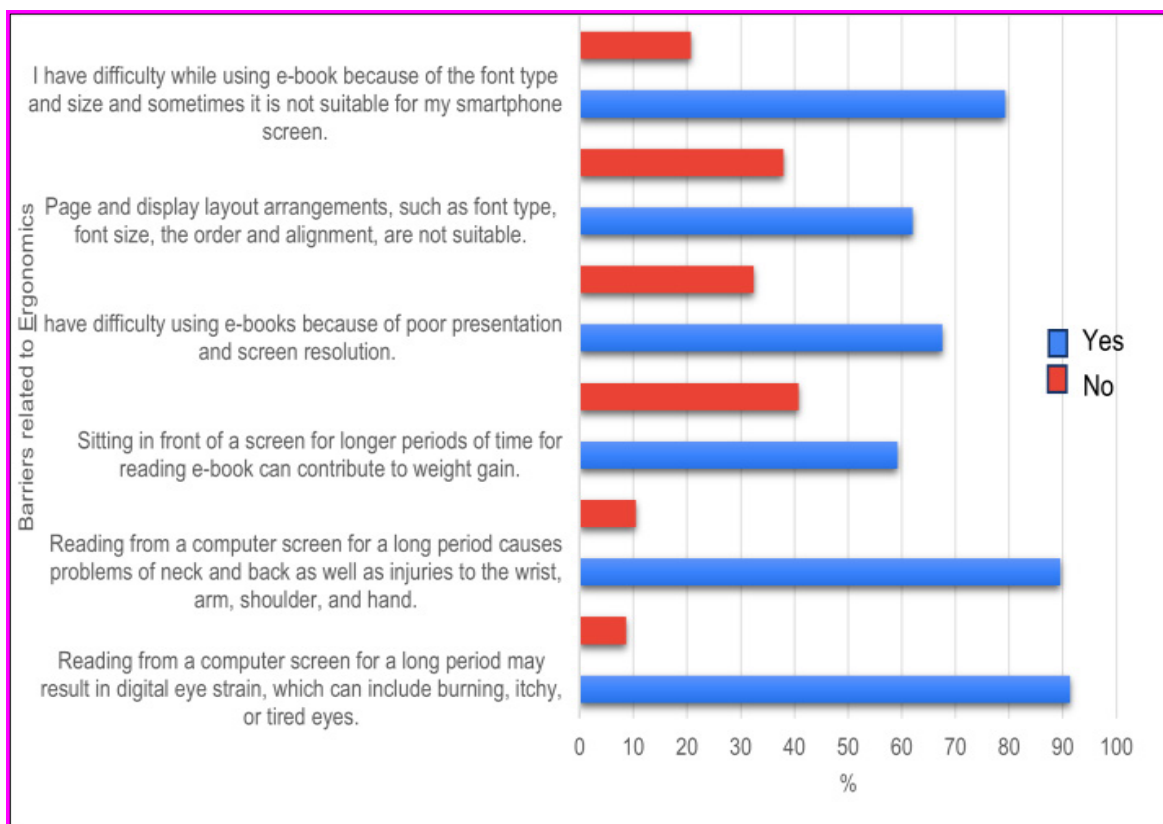


Figure 3. Barriers related to ergonomics

4.2. Technology Barriers

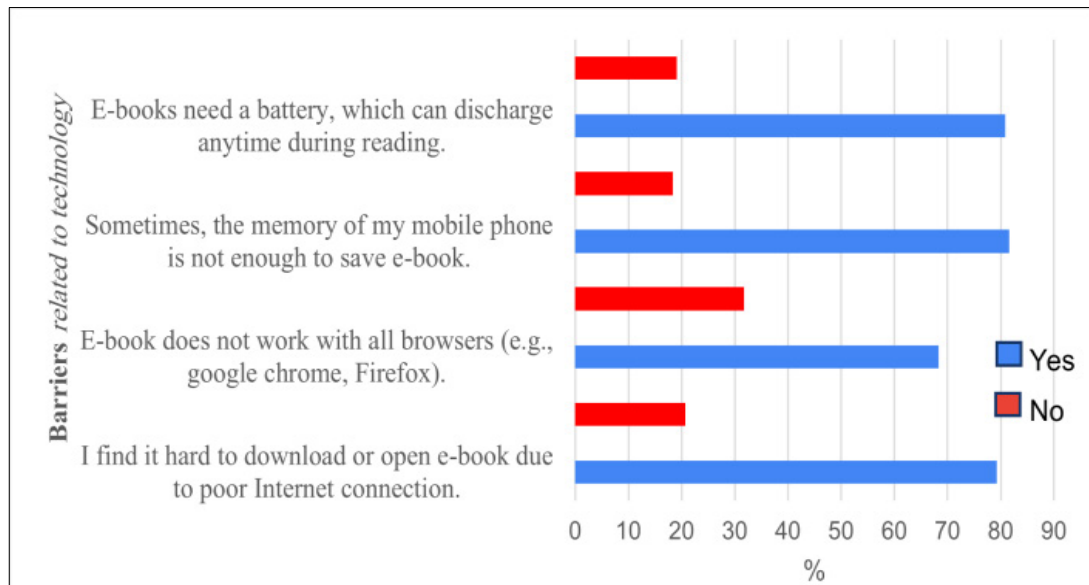


Figure 4. Barriers related to technology

Technology barrier refers to the difficulties and limitations that can arise while using e-textbooks due to technological factors such as software and hardware limitations, internet connectivity, and compatibility issues. Figure 4 shows the findings regarding the technology barriers. Due to a slow Internet connection, more than two-thirds of the respondents (79.3%) had trouble downloading or opening an e-textbook. This finding was supported by another study [7]. In addition, more than half of the respondents (68.3%) pointed out that they did not work with all browsers (e.g., Google Chrome and Firefox). More than 80% of the respondents reported that the memory of their mobile phones was not sufficient to save e-books and that they needed a battery that could discharge anytime during reading.

Not all students have equal access to personal electronic devices, leading to disparities in their ability to use e-textbooks. Economic factors can contribute to the digital divide, hindering educational opportunities for students with limited access to technology. Reliable Internet access is essential for accessing and updating e-textbooks. Students in areas with poor Internet connectivity may face difficulties in downloading, streaming, or updating their digital textbooks regularly. E-textbooks may not be universally compatible with all devices and platforms. Students using different operating systems or devices may encounter compatibility issues, limiting their flexibility in choosing how to access the content.

Even with the convenience of using smartphones or tablets for e-textbooks, students face the challenge of battery dependency.

The extended use of these devices to study drain battery life requires frequent recharging, which may not always be feasible in classroom settings or study sessions. Another hurdle is the limited storage capacity of the smartphones and tablets. Memory constraints may result in students running out of space to save e-textbooks, forcing them to make difficult choices regarding which materials to keep and delete. This limitation poses a significant barrier, especially when dealing with large textbooks or multimedia-rich content. Students may find themselves in situations where they cannot access essential e-textbooks because of drained batteries or a lack of storage space. This hampers their ability to study effectively and efficiently.

5. User Experience (UX) Barriers

The overall experience of using e-textbooks significantly influences student's adoption. Poor user experience can discourage students from embracing digital learning materials. User experience (UX) refers to the difficulties students face in terms of their overall satisfaction and experience when using electronic textbooks. These challenges include a complex navigation system, which makes it difficult for students to find the information they need. E-textbooks with complex navigation interfaces can impede students' ability to efficiently find and access information. A user-friendly interface is crucial to a positive overall experience. Additionally, students have different learning preferences and styles. E-textbooks that do not allow for customization of fonts, colors, and other display options may fail to cater to individual needs, thus impacting the overall learning experience.

Traditional textbooks often include interactive elements such as quizzes or multimedia content. E-textbooks that lack these features may be perceived as less engaging, potentially diminishing students' motivation and interest. Furthermore, interactive features such as videos, animations, and quizzes may not be designed to be engaging or useful, and in some cases, they can cause technical difficulties. Poor design elements, such as small font sizes or poor layouts, make them difficult to read.

Figure 5 demonstrates the respondents' barriers related to user experience (UX) during e-textbooks. More than two-thirds of the respondents (76.2%) agreed that e-books did not improve their learning processes. Many researchers believe that reading paper textbooks enhances students' ability to absorb information [20]. However, some studies [21], [22], have found that the use of e-books increases students' academic achievement.

Additionally, 80% discovered that flipping pages, taking notes, and highlighting information was difficult. According to Van, e-textbooks typically provide facilities that allow students to highlight and take notes, but students are frequently unaware of or do not use these tools [23]. Due to the unattractive digital illustrations utilized in e-books, items 5 and 8 caused more than 79% of respondents to indicate that they felt bored. In addition, reading an e-book on the screen is challenging. Additionally, 75% of respondents said that they were distracted while reading an electronic book, where they felt that they could easily access games, social media, or other non-educational content. Maintaining a focus on educational content is challenging for these students. This issue was addressed in research by [7], although the study participants were college students.

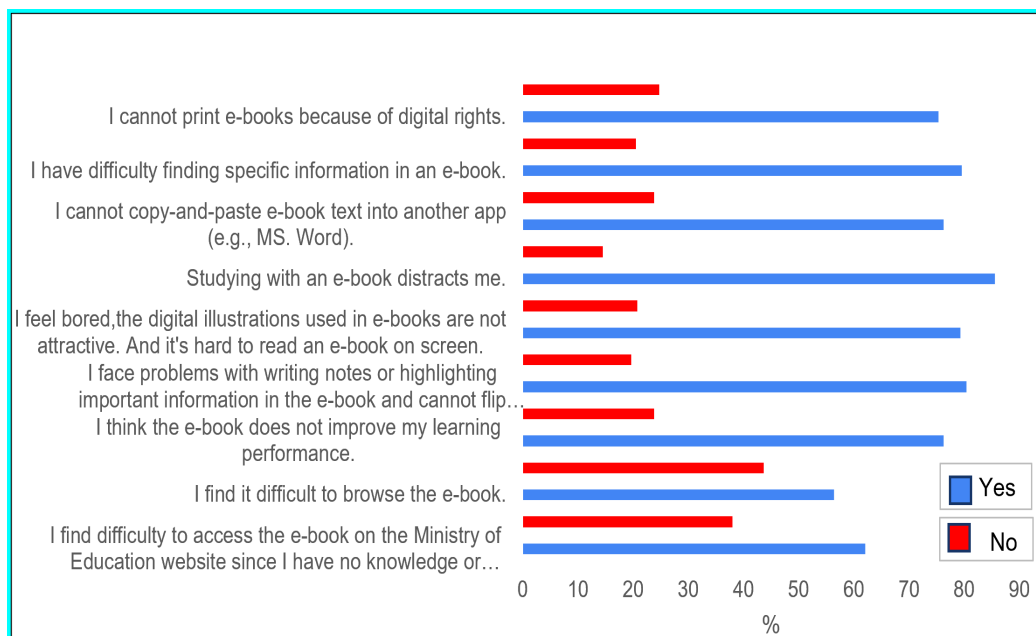


Figure 5. Barriers related to user experience (UX)

6. Finance Barriers

More than half of the respondents (75.1 %) agreed that one significant financial barrier to adopting e-textbooks is the upfront cost of acquiring devices, such as laptops, tablets, and software licenses. Many students may not have access to these devices or find it challenging to afford them, hindering their ability to transition seamlessly to digital learning. Among the respondents' concerns, some e-textbooks have subscription fees, adding an ongoing cost to students' education expenses. The cumulative expense of purchasing multiple e-textbooks can strain the budgets of students, particularly those facing financial constraints.

In addition, accessing e-textbooks often requires stable Internet connection. Students facing financial constraints may struggle to afford reliable Internet services, limiting their ability to download or access e-textbooks online.

Financial constraints can lead to disparities in access to educational resources. Students from lower-income backgrounds may face challenges in obtaining the necessary devices, paying for e-textbook subscriptions, and maintaining consistent Internet connectivity, potentially affecting their academic performance.

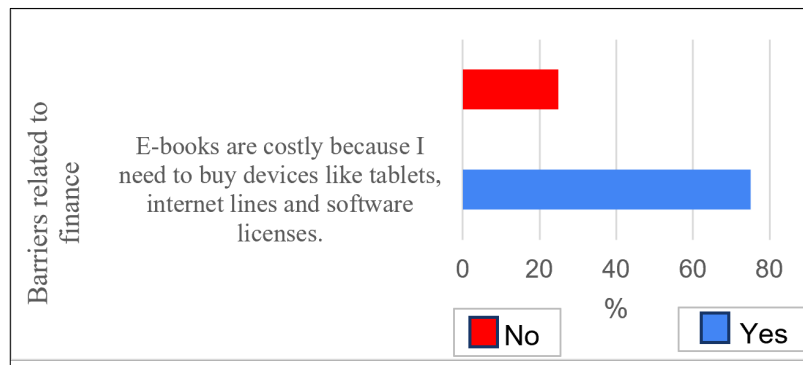


Figure 6. Barriers related to finance

7. Conclusion

The questionnaire designed for this study was used to identify barriers to adopting e-textbooks among school students in the Sultanate of Oman. In total, 429 students were surveyed. Most students preferred printed books, whereas a small minority (4%) preferred e-textbook. It can be inferred from the above findings and discussions that the participants had a negative perception of reading e-textbooks. The preference for printed textbooks positively influences students' ability to focus on the material and enhances their capacity to remember key information. In turn, this may contribute to improved academic performance. Students preferred the ability to annotate, underline, and highlight directly the pages of a physical book. This interactive process of engaging with the material helps reinforce learning and serves as personalized study aid. Moreover, the respondents hold the view that the use of electronic reading devices may result in headaches, eye strain, and other adverse effects for them. They believe that reading from printed pages is often considered less strenuous than prolonged screen time. This can contribute to a more comfortable reading experience, allowing students to sustain their focus for a longer period.

Addressing barriers to the adoption of e-textbooks among school students requires a holistic approach that considers ergonomic design, technological infrastructure, and user experience. By prioritizing these aspects, educators, publishers, and technology developers can contribute to a more seamless integration of e-textbooks into the educational landscape, providing students with a digital learning experience that is accessible, engaging, and conducive to effective learning. In the future, eye tracking technology will be employed to gain a deeper understanding of students' visual engagement with e-textbooks. This information will be utilized to offer instructional designers insights and recommendations for designing e-textbooks that are not only enjoyable, but also appealing to students.

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