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Exploring Student Perceptions on the Benefits and Drawbacks of Print and Digital Reading Materials

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ABSTRACT

With the advancement of technology, the shift from printed to digital reading materials has sparked concerns regarding their effects on students' engagement and comprehension. While previous studies have looked into these issues, there's still a gap in understanding how students personally experience both formats, particularly in literature courses. This study investigates third-year Literature students' perspectives on printed and digital reading materials in literature courses. A qualitative approach was employed through in-depth interviews to explore their preferences and experiences of both reading formats. The findings revealed that while digital materials offer convenience, printed materials support deeper engagement and comprehension. These findings explain the benefits of printed materials while identifying areas of improvement in digital materials. This study, therefore, recommends instructors to identify suitable reading materials that contribute to student engagement and effective learning. Moreover, future research should focus on specific strategies to enhance student engagement with digital texts.

Keywords: Literature, printed materials, digital materials, benefits, drawbacks.

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Ethical Statement

This study was conducted by following the ethical guidelines. Before the data collection, ethical approval was obtained from Cebu Technological University-Argao Campus and all participants were informed about the nature and purpose of the study.

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Conflict of Interest

No conflict of interest is present in the conduction or the reporting of this study.

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INTRODUCTION

The face of education has changed with the increasing integration of technology, affecting how students interact with texts (Tomar et al., 2024). The shift from traditional print materials to digital formats has introduced new features such as hypertext, multimedia elements, and collaborative tools, which shape students' reading experiences in distinct ways (Peng, 2022; Habók et al., 2024). Research indicates that digital formats can increase engagement, yet some students report that digital reading encourages superficial information extraction rather than deep comprehension (Šņitņikovs & Svitaja, 2023; Hare et al., 2024).

Students generally describe digital texts as more engaging and interactive, often perceiving them as helpful for academic performance (Akbarov & Alimova, 2024). However, printed materials are frequently associated with better focus, reduced eye fatigue, and more effective comprehension for some learners (Kareva, 2024; Sage et al., 2019). Many students report developing strategies to navigate digital reading effectively, and some perceive both formats as equally important for learning (Hargreaves et al., 2022; Anggraini, 2023).

The increasing prevalence of digital reading has influenced students' reading habits and preferences, with implications for engagement and critical reading practices. Students describe benefits and challenges associated with digital materials, such as distractions, access inequities, and potential superficial reading patterns, while still acknowledging their role in supporting skills like information retrieval and critical thinking (Aivaz & Teodorescu, 2023; Costa et al., 2024; Li, 2024).

Given these perceptions, this study aims to explore literature students' experiences with digital and printed reading materials, focusing on how these formats shape learner engagement and critical reading abilities. Specifically, it investigates the following questions:

How do students perceive the use of digital and printed materials in enhancing engagement with literary texts?
What experiences do students report regarding the impact of each format on their critical reading practices?
How do students navigate the benefits and challenges of digital and printed reading materials in their learning?

To address these questions, the study employed semi-structured interviews, which allow participants to share open-ended insights about their experiences with both reading formats (Wethington et al., 2015; Walter et al., 2019). Data were analyzed using Braun and Clarke's Thematic Analysis framework to identify patterns in students' perceived benefits and drawbacks of digital and printed materials (Pisani et al., 2019).

METHODOLOGY

Research Design

The study employed semi-structured interviews as the primary data-gathering method to explore students' perceptions of printed and digital reading materials. According to (Anggraini, 2023) qualitative interviews especially semi-structured interview forms, are very important in getting data from informants as they help to weigh the view of the participants, deepening the possibility of allowing further examination of their preferences and experiences (Lee, 2023).

The qualitative research method embedded in-depth interviews with selected participants so that we could capture detailed insights into their preferences, challenges, and engagement with both reading formats (Osborne et al., 2021). This would, therefore, enable an understanding of the subtlety of experience and how the students would interact with printed and digital materials in terms of their effects on learning outcomes.

Participants

Participants of this study were eight third-year literature students and were selected using a purposive sampling technique, given that there are students whose academic performances vary. This is intended to ensure that participants are able to provide diverse insights on the effectiveness of both printed and digital formats of reading.

Table 1 presents the profile of the participants who took part in this qualitative study. A total of eight (8) third-year literature students from Cebu Technological University–Argao Campus were purposively selected based on their prior experience in using both printed and digital reading materials in academic settings. The participants were aged 21 to 23 years old, consisting of seven females and one male. To maintain confidentiality, aliases were used in place of actual names. All participants were enrolled in the Bachelor of Arts in Literature program, ensuring that their insights reflect relevant exposure to reading tasks and course-related reading demands.

Table 1. Participant Profile of Literature Students (N = 8)

Participant ID	Name (Alias)	Age	Gender	Course/Context
P1	"Student A"	22	Female	Literature student (CTU-Argao)
P2	"Student B"	22	Female	Literature student (CTU-Argao)
P3	"Student C"	21	Female	Literature student (CTU-Argao)
P4	"Student D"	23	Female	Literature student (CTU-Argao)
P5	"Student E"	22	Female	Literature student (CTU-Argao)
P6	"Student F"	22	Female	Literature student (CTU-Argao)
P7	"Student G"	22	Male	Literature student (CTU-Argao)
P8	"Student H"	23	Female	Literature student (CTU-Argao)

Recruitment and Inclusion Criteria

Purposive sampling was used to recruit eight third-year literature students enrolled at Cebu Technological University –Argao Campus. Participants were required to have prior experience engaging with both printed and digital reading materials in their coursework to ensure relevant reflections.

Interview Logistics

Semi-structured interviews were conducted in April 2024 in a quiet classroom within the CTU -Argao Science and Technology building. Each interview lasted approximately 10–15 minutes, was audio-recorded with consent, and conducted in both English and Cebuano. Transcriptions were translated into English for analysis. Translations from Cebuano to English were performed while maintaining original meaning and intent.

Researcher Reflexivity

The researcher is also a pre-service literature teacher within the same institution. To minimize potential bias, a structured interview guide was followed, and personal assumptions were bracketed during data interpretation. Peer debriefing with an advisory faculty member supported credibility.

Instruments

The main tool used was the semi-structured interview (Leira-Castiñeira, 2023). The interview guide was validated with three experts: two content experts and one method expert, to ensure that these are appropriately captured experiences, preferences, and challenges from the participants. Semi-structured interviews were preferred, as they do find a balance between structure and flexibility, and the researcher can specifically address specific questions in a research study with the overall freedom to explore how participants want to share experiences in their own words (Andalib, 2023). The interview guide included questions on how effective were the printed and digital reading material for learning, on whether each format was easy or difficult to use, and on any personal challenges that the students themselves encountered.

Data Collection

The method used in gathering the data for this study was "semi-structured interviews" (Leira-Castiñeira, 2023), which provided comprehensive insights into the participants' thoughts and experiences regarding printed and digital reading materials. This qualitative approach allows for an in-depth understanding of individuals' experiences and perspectives while fostering students' engagement with each format. It involves the gathering of in-depth data collected through interviews, observations, and focus groups. (Devi et al., 2024). The data collection process involved the following stages:

Stage 1: *Participant Selection*

Purposive sampling was done to (8) eight third-year literature students enrolled in literature courses. Participants were chosen based on their experience with both printed and digital reading formats to provide diverse perspectives.

Stage 2: *Development of Interview Guide*

An interview guide was created to conduct the semi-structured interviews by focusing on key themes such as engagement, comprehension, and preferences regarding reading formats. The guide was submitted for review by content experts, who confirmed its content as relevant and that it would yield rich qualitative information.

Stage 3: *Conducting Interviews*

Semi-structured interviews were conducted with selected participants allowing them to share their experiences of printed and digital materials in a conversational manner. Each interview was recorded and transcribed verbatim to ensure accuracy in data collection.

Data Analysis

The qualitative data were analyzed using thematic analysis, a systematic method for identifying and interpreting patterns of meaning within qualitative datasets (Clarke, 2017). This approach offers a flexible yet structured framework for examining participants' experiences with various materials, including printed and digital texts (Michelle, 2020). The analysis followed Braun and Clarke's (2006) six-phase procedure.

The analysis was conducted using an inductive and semantic approach, meaning that codes were developed directly from the data and focused on participants' explicit statements. The researcher read and reread the interview transcripts to gain familiarity with the dataset and carried out initial open coding to capture recurring ideas, descriptions, and experiences related to printed and digital reading materials (Tomar et al., 2024; Habók et al., 2024).

To enhance rigor, the preliminary codes were reviewed with a peer researcher who acted as a secondary coder. The second coder examined a subset of the coded transcripts, and any differences in coding interpretations were resolved through discussion until a shared understanding was reached. This process ensured consistency and clarity in how the data were represented.

Themes were then refined and organized to capture patterns of meaning that reflected participants' shared perceptions and experiences. Thematic sufficiency was established when repeated coding and theme review produced no new insights, and when the themes remained stable across the dataset. This indicated that the analysis had adequately captured the depth and breadth of the participants' accounts.

The final themes were clearly defined and supported with representative participant quotations to ensure transparency and strengthen the credibility of the analysis.

RESULTS AND DISCUSSION

Qualitative Results of In-depth Interviews

This part presents the results and findings of the study which include the thematic analysis of the transcript of the interviews utilizing the six steps of Braun and Clarke Framework (Alina et al., 2023) This discussion therefore led to the analysis of findings about the students' perceived benefits, and drawbacks both of the digital and printed reading materials.

Table 1 presents the themes extracted from the transcript of the interview about the perceived benefits of the digital and printed reading materials used in instruction among Bachelor of Arts in Literature students.

Table 2. Perceived Benefits of Digital and Printed Reading Material

Type of Material	Categories	Themes
Printed Reading Material	• understand and remember better when reading through direct printed text. • gives more time and opportunity to understand and analyze the text.	Fostering Comprehension and Analysis
	• learns better by holding and directly seeing the text. • values clear understanding of what is read. • easy to annotate and highlight	Enhanced Learning Style and Compatibility
Digital Reading Material	• easily accessed with strong internet connectivity • portable and transferable anytime and anywhere • simple and less hassle • can be accessed even with a phone	Appropriate Convenience and Accessibility

Printed Reading Materials

Printed reading materials offer several benefits for enhancing student engagement and comprehension, as evidenced by the themes extracted from the transcript, particularly in terms of the following:

Fostering comprehension and analysis. Respondents consistently reported that printed texts allowed them to understand and analyze content more thoroughly. The tactile experience of holding a book, turning pages, and visually engaging with the text was described as pivotal on aiding memory retention and fostering a deeper connection with the material. Research supports this finding, suggesting that the physical interaction with books aids memory retention and facilitates deeper comprehension (Lauterman, 2012). Further, print appears to be more effective processing medium, especially for longer texts or when reading for depth of understanding, as it allows for better comprehension and analysis compared to digital formats, which can hinder these processes (Singer et al., 2017).

Printed texts were perceived as more effective for comprehension and in-depth analysis because they help students focus without distraction.

"I feel more satisfied with printed because we can analyze and understand the text." (P2, Female, 22)

This statement highlights that printed materials facilitate deeper engagement, allowing students to process literary concepts more thoroughly compared to digital texts.

Enhanced learning style compatibility. The tangible nature of printed materials appears to cater to diverse learning preferences. Students claimed reading written materials helped them process and recall information more effectively. Reading written materials can help in processing and recalling information more effectively (Zhang et al., 2021). This preference toward physical texts implies that printed materials complement some learning styles, particularly those who benefit from those immediately apparent and tangible engagement with the text. Recognizing and accommodating different learning patterns may significantly enhance educational achievements. Although, students generally prefer print

readings as they feel it enhances their learning experience by allowing them to physically hold the material and directly see the text, which contributes to a clearer understanding of the content compared to digital formats (Waterman et al, 2024).

Students prefer printed materials because it support hands-on learning and better retention for tactile learners.

> *"I'm the type of learner that can easily instill what I have read if I can hold the material physically."* (P6, Female, 22)

The ability to physically engage with printed texts promotes memory retention, aligning with multimodal learning principles and kinesthetic reading practices.

Furthermore, students reported that it is easy to interact more thoroughly with the material when they can annotate and highlight printed items. The interactive feature of printed materials encourages students to organize and reinforce their knowledge of the subject matter while supporting active learning. According to (Mercieca, 2004), the reasons that make people print, came out with three main factors: easiness of the paper, highlighting the text, and carrying the paper easily. Such statements constitute the implications and inspirations for further research to improve screen readability. Although, printed reading materials allow students to easily annotate and highlight, facilitating quick engagement and interaction. This tactile experience enhances comprehension and retention, making it a preferred choice for many students despite the growing popularity of e-books (Torun, 2023).

Digital Reading Material

Digital reading materials emerge as a key factor in enhancing student engagement and comprehension, as evidenced by the theme extracted from the transcript. The benefits of digital reading materials was particularly notable, including:

Appropriate convenience and accessibility. Students appreciated the portability and ease of access offered by digital materials. With internet connectivity, resources can be accessed anytime and anywhere, which is particularly beneficial for students managing busy schedules. Additionally, the adaptability of digital platforms enables broader inclusivity, supporting individuals with varying physical or learning needs (O'Bannon et al., 2017). Digital materials also reduce logistical challenges, such as carrying heavy books or waiting for deliveries, further enhancing their practicality in academic settings. Although, digital reading materials offer convenience and accessibility as they are easily accessible with strong internet connectivity, portable for use anytime and anywhere, simple to navigate, and can be accessed on phones, enhancing the overall reading experience for students (Pae, 2020).

> Students prefer digital materials because it valued for their portability and ease of access.
> *"For me, digital is more convenient because I can bring it anytime."* (P1, Female, 22)
> *"Digital is accessible… I can read it anytime."* (P5, Female, 22)

The statement underscores how digital reading enables flexible learning, allowing students to access materials anytime and anywhere, especially in technology-oriented environments.

Table 2 presents the themes extracted from the transcript of the interview about the perceived drawbacks of

the digital and printed reading materials used in instruction among Bachelor of Arts in Literature students.

Table 3. Perceived Drawbacks of Digital and Printed Reading Materials

Type of Material	Categories	Themes
Printed Reading Material	• costly to print and buy • limited availability, often requiring online orders • not accessible to everyone	Higher Cost and Limited Accessibility
	• too bulky and heavy • occupies much space • easily misplaced without proper storage	Constrained Physical Attributes
	• small fonts strain eyesight • text is not clear and concise • ensure readability and error-free instructions	Poor Readability and Quality
Digital Reading Material	• frequent use of digital materials causes eye irritation. • screen brightness can harm the eyes. • text is too small	Heightened Eye Strain and Physical Discomfort
	• zooming causes paragraphs to switch unexpectedly • frequent 'No signal' and access issues • full storage and space limitations • unstable internet connection disrupts access	Highly Reliant to Strong Internet Connectivity
	• requires strong Wi-Fi or data for large file downloads • files should be in DOC format, not PDF • avoid large file sizes to save space • digital files should be editable • minimize storage size for convenience	Limited Content and Format Storage
	• temptation to copy answers • scrolling through text leads to AI reliance • lacks interactive elements, reducing engagement	Reduced Critical Thinking and Opportunities

Printed Reading Materials

Printed reading materials were holding a traditional place in education, contains of numerous drawbacks for enhancing students' engagement and comprehension, as evidenced by the themes extracted from the transcript, particularly in terms of the following:

Higher cost and accessibility. Students prefer print, they acknowledge the convenience and cheaper costs of e-

texts. Students who were e-preferring were influenced by issues such as cost, environment, and convenience (Salaz et al., 2019). The availability of printed materials also poses a challenge, as students might need to order them online, leading to delays and increased costs. This lack of immediate access can hinder the use of required reading materials (Lim et al., 2019). Rising textbook costs are a significant barrier for students, particularly in higher education, with many students unable to afford essential materials (Costello et al., 2018).

Students don't prefer in utilizing printed materials because texts are expensive and harder to obtain.

> *"If printed… it is more expensive… although it is nice to read but I can't afford to buy."*
> (P8, Female, 23)
> *"You have to spend money to print… costly."* (P7, Male, 22)

Economic barriers discourage students from purchasing printed materials, reinforcing their reliance on free digital alternatives provided online or by instructors.

Constrained physical attributes. Using printed materials presents additional issues due to the requirement for proper storage to prevent loss or damage. These physical limits may hinder the practicality and portability of printed texts, making them less appealing to students who must carry their materials regularly (Megan et al., 2021). According to (Salaz, 2018), it is much easier in terms of portability to use my iPad (electronic device) than a book, especially if the book is bulky. I also find it difficult to 'word search' through hardcopy when compared to electronic copy.

Some students pointed out the physical inconvenience of printed materials.

> *"It occupies a lot of space… and it is heavy."* (P5, Female, 22)
> *"When it is easily be lost… which one of the drawbacks of printed."* (P7, Male, 22)

This reflects how portability affects usability; heavy printed books may limit mobility and discourage frequent reading outside of class.

Poor readability and quality. Small fonts and ambiguous writing can make it harder to read and comprehend the content. According to (Crossley et al., 2023), providing students with texts that are accessible and well-matched to their abilities helps to ensure that students better understand the text and, over time, can help readers improve their reading skills. To increase the readability and general quality of printed products, they stressed the need for content that is precise, succinct, and devoid of errors. The success of printed materials for students depends on maintaining good standards in these areas (Nur, 2017).

Students don't prefer in utilizing printed materials because of its low-quality printing and small font sizes were viewed as obstacles to effective reading.

> *"Those small letters… are painful to the eye."* (P4, Female, 23)
> *"It should be visible; fonts must not be too small… they should not be thrifty about it."*
> (P3, Female, 21)

This indicates that readability and presentation quality significantly affect motivation and concentration during reading.

Digital Reading Materials

Digital reading materials provide substantial benefits in terms of convenience and accessibility. However, there are numerous drawbacks related with the usage of digital reading materials for enhancing student engagement and comprehension, as evidenced by the themes extracted from the transcript, particularly in terms of the following:

Heightened eye strain and physical discomfort. Respondents have significant concerns with the continuous use of digital reading materials. According to (Antona et al., 2018), prolonged reading from digital materials, such as smartphones, can cause significant eye irritations compared to reading from hardcopy. Symptoms include blurred vision while viewing text, blurred distance vision after the task, difficulty in refocusing, irritated or burning eyes, dry eyes, eyestrain, tired eyes, sensitivity to bright lights, and general eye discomfort. Addressing these problems is critical to provide students with a comfortable and effective reading experience (Daniela et al., 2021).

Students don't prefer in utilizing digital materials because they often experienced visual fatigue from prolonged digital reading.

> *"Not in printed because it is painful to the eyes when staring on the phone at a long period of time."* (P3, Female, 21)
> *"My eyes get irritated when I keep on reading at a digital text."* (P8, Female, 23)

Such discomfort highlights a physical limitation of digital reading, emphasizing the need for balanced screen time and ergonomic reading practices.

Highly reliant to strong internet connectivity. Respondents may encounter difficulties such as software faults, device malfunctions, or connectivity issues when accessing digital reading materials. These challenges can disturb the learning process, resulting in dissatisfaction and a waste of critical study time. According to (De Guzman, 2022), the use of digital materials faces several obstacles. These challenges include technical issues such as poor internet connection at residences, it is also quite alarming that even the students living in the rural areas, those far from the town proper experienced poor and unstable internet connection speed, while the remaining can get sufficient speed for wired connection but at a high price. According to (Akmad & Abatayo, 2023), poor internet connectivity significantly impacts the accessibility and quality of digital reading materials, affecting students' academic performance and engagement. The erratic nature of internet connections can lead to delays in task submissions and hinder collaborative learning experiences, ultimately diminishing students' enthusiasm and ability to participate in educational activities.

Students don't prefer in utilizing digital materials because access to digital materials depends heavily on stable internet connections.

> *"Limited access to the internet… hard to access."* (P1, Female, 22)
> *"Sometimes I experience 'No signal' or hard to access."* (P4, Female, 23)

This finding reveals persistent digital inequities; poor connectivity hinders consistent learning and reduces engagement with online texts.

Limited content format and storage. Digital materials must provide flexible content formats, including multimedia components such as films, interactive images, and hyperlinks, which improve the learning experience. Besides, digital storage solutions allow for the storing of large amounts of content on a single device, making it easier to organize and retrieve. According to (Alsadoon, 2020), that integrating multimedia, hyperlinks, and other features of using technology in reading should be considered. Furthermore, (Johnston, 2020), digital materials can cause storage issues due to their large size of files and the need for multiple copies to ensure preservation. Many web services, servers, and browsers limit the amount of bandwidth that can be used and the size of files that can be transferred, often restricting file sizes to a few gigabytes.

Students don't prefer in utilizing digital materials because they noted that large digital files discourage downloading and storage.

> *"If necessary, I don't download large files to save space… to minimize phone storage. "* (P1, Female, 22)
> *"Full storage…I can't download files if it has bigger storage."* (P8, Female, 23)

This illustrates how device storage and data limitations influence students' engagement with digital resources.

Reduce critical thinking opportunities. Respondents' ability to focus on and retain interest in the subject, which can be influenced by the medium's interaction and presentation. While, they have also stated some concern about the way they can comprehend using digital materials. According to (Ningsih et al., (2023), revealed that digital textbooks can impact students' focus ability, as they can be easily distracted by social media, notifications, and web browsing. This could explain why paper-based media appears to favor reading comprehension in unsupervised settings where learners are less exposed to such distractions. Furthermore, (Sagabala et al., 2023), students reported being easily distracted by social media notifications and web browsing, which interrupted their focus during online classes. Flash notifications and engaging content led to a loss of eagerness and behavioral interruptions, significantly affecting their academic performance.

Students don't prefer in utilizing digital materials because easy online access sometimes encourages superficial reading and dependency on copy-paste functions.

> *"The temptation of copy-paste… AI reliance."* (P2, Female, 22)
> *"Scrolling through digital text… found hard time to read then got tempted with copy and paste."* (P2, Female, 22)

This suggests that while digital platforms promote efficiency, they can also hinder analytical depth and original thought if students depend excessively on automated tools.

Digital reading materials provide substantial benefits in terms of convenience and accessibility. However, there are numerous obstacles related with the usage of digital reading materials, particularly in terms of eye strain and technological issues. Prolonged screen usage can cause physical discomfort, reducing students' ability to concentrate and prolong their study sessions. Furthermore, technical concerns such as software bugs and connectivity challenges can

disrupt the learning process, emphasizing the importance of dependable and user-friendly digital platforms. Thus, the learning process is improved by the capacity to offer knowledge in a variety of ways, including multimedia. To increase student retention and academic achievement overall, digital materials must be interesting and simple to understand. These perceptions underscore the need for balanced instructional strategies that combine the strengths of both formats to optimize students' learning experiences.

The findings align with Rosenblatt's (1978) Transactional Theory of Reading, which posits that meaning emerges through the dynamic interaction between the reader and the text. Students' preference for printed materials reflects an aesthetic transaction, in which physical interaction with text supports deeper emotional and cognitive engagement. Conversely, digital reading behaviors correspond to Dual Coding Theory (Paivio, 1986), where information is processed through both visual and verbal channels. This explains why students found digital formats efficient for quick comprehension and multitasking but also experienced cognitive overload when faced with screen fatigue or poor connectivity. Together, these frameworks illuminate how students' reading preferences are shaped by the medium's influence on focus, engagement, and comprehension strategies.

Based on students' reported experiences, the findings highlight several actionable strategies for improving reading support across formats. For digital reading, scaffolding should prioritize shorter, chunked text segments, guided on-screen annotation routines (e.g., highlight–comment–summarize cycles), and distraction-management strategies such as disabling notifications or using reader-mode features. Teaching metacognitive monitoring—such as pausing to restate key points—may also help compensate for the tendency to skim on screens. For printed texts, students emphasized the value of clear layout, sufficient font size, and lightweight, portable materials, suggesting that improvements in legibility and physical usability can enhance sustained engagement. Together, these implications provide concrete starting points for designing reading instruction that aligns with learners' actual preferences and challenges.

CONCLUSION AND RECOMMENDATIONS

The results of the study show the benefits and drawbacks of print and digital reading materials from the perspective of literature students. Indeed, print was an effective learning material to use in fostering comprehension and critical engagement. Among the benefits that the students mentioned, it supported faster comprehension and analysis with the appropriate learning styles. The benefits mentioned by the students included: support for faster comprehension and analysis; enhanced learning style compatibility; and quick engagement and interaction. The drawbacks, though, were high cost and accessibility, constrained physical attributes, and poor readability and quality in some instances. On the other hand, digital resources turned out very convenient and accessible; students could access content anytime and anywhere. Despite all these benefits, digital materials have resulted in increased eye strain and physical discomfort due to prolonged use of the screen, and students highly rely on internet connectivity. Additionally, the interactivity associated with digital materials often hindered critical thinking and deep understanding.

This study supports Rosenblatt's Transactional Theory by confirming that meaningful interactions between the reader and the text are more emphasized in printed formats, which encourage focused reading and active engagement. Additionally, Paivio's Dual Coding Theory is reflected in the findings, as digital formats leverage multimedia to activate

both verbal and nonverbal cognitive processes. However, the overuse of multimedia and poor digital design can disrupt comprehension and engagement, emphasizing the importance of balanced implementation.

For instance, the study recommends that printed resources be enhanced to include clearer fonts, error-free content, and more portable designs. Digital materials, on the other hand, need to be optimized in reducing the file size of materials, ensure user-friendly interfaces, and fully avoid technical barriers, such as unstable internet connectivity, in accessing learning materials. Future studies should investigate strategies that integrate the benefits of both formats while addressing the identified limitations.

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