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Digital Reading in Higher Education: Trends, Behaviours, and Evidence-Based Strategies—A Systematic Review

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Abstract. The rapid growth of digital technologies and blended learning has made digital reading a central component of higher education. Despite the increasing volume of research on digital reading, the literature remains fragmented. To address this gap, a systematic literature review was conducted, synthesising findings from 69 empirical studies published between 2010 and 2025, representing over 17,000 participants from 27 countries and involving undergraduate and postgraduate students, instructors, and librarians across multiple disciplines. The studies were identified through the Web of Science database and analysed using a thematic analysis approach. Five major themes emerged: digital reading comprehension and comparisons with print reading, digital reading behaviour and perceptions, digital reading competency, strategies for effective digital reading, and digital reading in special education and language learning contexts. The review indicates that digital reading outcomes are shaped by the interaction of learner competencies, cognitive demands, technological design, and institutional support rather than by the reading medium alone. The findings further suggest that print and digital reading serve complementary functions, with students often selecting each format according to the reading task, learning goals, and contextual demands. To enhance digital reading outcomes, the literature highlights the importance of digital literacy development, cognitive load management, effective interface design, and instructional and institutional support. By synthesising diverse strands of research, this review provides a comprehensive understanding of digital reading in higher education and offers practical implications for educators, instructional designers, and institutions seeking to improve their students' reading comprehension, engagement, and learning outcomes in increasingly digital learning environments.

Keywords: digital reading; reading behaviour; reading comprehension; digital reading strategies; hybrid reading approach.

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1. Introduction

Technology and the Internet have become integral to modern society, influencing nearly every aspect of daily life, including education. As a result, higher education institutions have increasingly adopted technology-enhanced and blended learning approaches to improve learning outcomes through supporting learning strategies, research, assessment, communication, and student support services (Thelma et al., 2024). Thus, education has become more accessible, flexible, and personalised. The widespread use of digital devices, combined with affordable Internet access and the vast amount of information available online, has made digital resources a central component of learning environments. Consequently, digital reading has become an increasingly important aspect of learning experiences, especially in higher education (Benoit, 2018).

Digital reading in literature is usually associated with reading behaviour, comprehension and hybrid reading. To make it clear, in this study, digital reading refers to the process of reading texts presented through digital devices such as computers, tablets, smartphones, and e-readers. Digital reading behaviour and practice refer to how individuals interact with texts, including their reading habits, navigation patterns, engagement, and reading strategies (Khatri, 2020). Reading comprehension refers to the ability to understand, interpret, and construct meaning from texts (Latini et al., 2020; Jian, 2022). Hybrid reading has also emerged as a common practice. Hybrid reading refers to the use of both digital and print texts as complementary reading formats, with students selecting and switching between media according to their reading purposes, preferences, and learning needs (Soroya & Ameen, 2020; Ramos et al., 2023).

Although digital reading is increasingly adopted in higher education, there is considerable debate regarding its impact on students' learning outcomes. Some studies have reported the benefits of digital reading, such as its accessibility, flexibility, engagement, and cost-effectiveness (Mizrachi, 2015; Hargreaves et al., 2022). Additionally, hypertext, which links a digital text to other similar texts, offers readers a non-linear approach by providing them with multiple directional choices based on their interests, meaning that a single text can offer several access paths and reading options. By providing these options, a hypertextual structure encourages a flexible and exploratory reading experience that supports learning (Pardede, 2019).

Conversely, other studies suggest that digital reading may contribute to reduced reading comprehension and increased distraction, and could lead to shallow learning (Jian, 2022; Taky-eddine & Madaoui, 2024). Some scholars argue that digital environments have altered traditional reading patterns by encouraging browsing, scanning, and non-linear navigation rather than sustained, intensive reading (Liu, 2022). Birkerts (1996) states that "In our culture, access is not a problem, but proliferation is" (p. 212). The abundance of digital content and competing attentional demands may discourage deep reading and make it more difficult for learners to maintain focus on the texts.

These challenges can be understood through the lens of Cognitive Load Theory (CLT), which suggests that learning is constrained by the limited capacity of working memory (Sweller, 1988; Sweller et al., 2019). According to CLT, instructional materials and learning environments should minimise inessential cognitive load while supporting the processing of information relevant to learning. In digital reading environments, features such as hyperlinks, multimedia elements, notifications, and non-linear navigation may increase the level of cognitive demand and affect learners' attention, potentially reducing reading comprehension and learning outcomes. Well-designed digital reading environments can help manage the cognitive load and facilitate deeper engagement with the texts. Consequently, Cognitive Load Theory provides a useful framework for understanding both the opportunities and challenges associated with digital reading in higher education.

Despite the growing body of research that has examined digital reading from various perspectives, including reading comprehension, reading behaviour, preferences, competencies, and instructional strategies, the literature remains fragmented across multiple areas of investigation. Research on digital reading has been conducted across diverse geographical contexts, including North America, Europe, Asia, and Africa. Findings from these studies vary across the contexts due to the differences in the educational system, technological infrastructure, and students' digital competencies.

The mixed findings create uncertainty for educators and institutions seeking to integrate digital reading effectively into teaching and learning. To date, limited research has synthesised these diverse strands of evidence to provide a comprehensive overview of the current state of digital reading in higher education. As a result, important questions remain regarding emerging research trends, current practices, and identifying effective approaches and strategies for enhancing students' digital reading experiences.

2. Purpose of Research

The rapid expansion of the digital environment and the rise of blended learning have significantly shaped teaching and learning practices in higher education. As Internet use and digital technologies have become widespread, digital reading has increasingly become a standard component of academic learning (Mizrachi, 2015; Lin & Yu, 2023; Tabullo & Pulifiato-Hamann, 2024; and others). Existing studies have investigated several aspects of digital reading: some have compared print-based and digital reading experiences (Singer et al., 2019; Delgado & Salmerón, 2021), while others have examined students' reading behaviours, perceptions, preferences, competencies, and pedagogical aspects as part of integrating digital reading (Liu, 2022; Welsen et al., 2023; Kirbas & Bulut, 2024).

Despite the increased interest in investigating and studying digital reading, it remains unclear what the literature collectively reveals about the current state of digital reading in higher education. Unlike previous studies that have focused on specific aspects of digital reading, the present review adopts a broader perspective by synthesising evidence across multiple dimensions of digital reading in higher

education. By integrating findings related to research trends, current practices, student experiences, and evidence-based strategies, this review provides a comprehensive overview of the field, examines strategies that may support effective comprehension and engagement in digitally mediated learning contexts, and identifies directions for future research and practice.

Therefore, this study seeks to answer the following research questions:
1. What does the literature reveal about the current state and key trends of digital reading in higher education?
2. How can digital reading be optimised to enhance students' reading comprehension and engagement in higher education?

3. Materials and Methods

This study employed a systematic search and review methodology to examine the application and current state of digital reading in higher education. The systematic review process is a "well-recognised and rigorous methodology for identifying, selecting, evaluating, and synthesising existing research, and providing a comprehensive overview of both established knowledge and gaps in the field" (Denyer & Tranfield, 2009, p. 671). This approach was selected for its numerous advantages, including its ability to offer an extensive and structured examination of the literature, its cost-effectiveness compared to primary empirical studies, and its capacity to produce more reliable and generalisable insights by integrating findings from multiple studies and providing evidence-based results and recommendations for researchers and practitioners (Aromataris & Pearson, 2014).

The review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al, 2021). Consistent with PRISMA recommendations, the review followed a structured process for the identification, screening, eligibility assessment, and inclusion of studies. The search strategy, eligibility criteria, study selection procedures, and flow of records through the review process are reported transparently and summarised in the PRISMA flow diagram (see Figure 1).

3.1 Inclusion and Exclusion Criteria

The review was restricted to peer-reviewed scientific articles published from 2010 onward. This timeframe was considered to be sufficient to capture the substantial growth of digital reading research while maintaining a manageable scope for analysis. Given the significant increase in scholarly publications on digital reading during this period, the selected timeframe was deemed appropriate enough to provide a comprehensive overview of contemporary research in the field.

A systematic search was conducted of the Web of Science (WoS) database. WoS was selected due to its broad coverage of high-quality, peer-reviewed scholarly literature, rigorous indexing criteria, and established use in systematic review research. The research was conducted between July and August 2025 using the following search string in the title, abstract, and author keyword fields: ("digital reading" OR "screen reading" OR "e-reading" OR "monitor reading") AND

("higher education" OR "college students" OR "university students"). The retrieved records were screened using the predefined inclusion and exclusion criteria. The inclusion criteria were as follows: (a) the study was published in English; (b) the study was empirical and employed a qualitative, quantitative, or mixed-methods research methodology; (c) the study was peer-reviewed; and (d) the full text was accessible online.

Within the scope of the research, a total of 270 articles were initially identified. Following a quick screening, 14 articles were excluded due to duplication, as they were retrieved multiple times. Following a review of the titles and abstracts, any articles deemed irrelevant to the research scope were excluded, resulting in a selection of 109 articles for further evaluation. The exclusion criteria included studies falling outside the scope of the topic, grey literature (conference proceedings, master's dissertations, and doctoral theses), non-empirical research, articles not written in English, and any studies where full access could not be obtained. Following a more comprehensive review, an additional 40 articles were excluded due to misalignment with the research focus. Following the completion of this initial review, a total of 69 articles were retained for detailed analysis (see Figure 1).

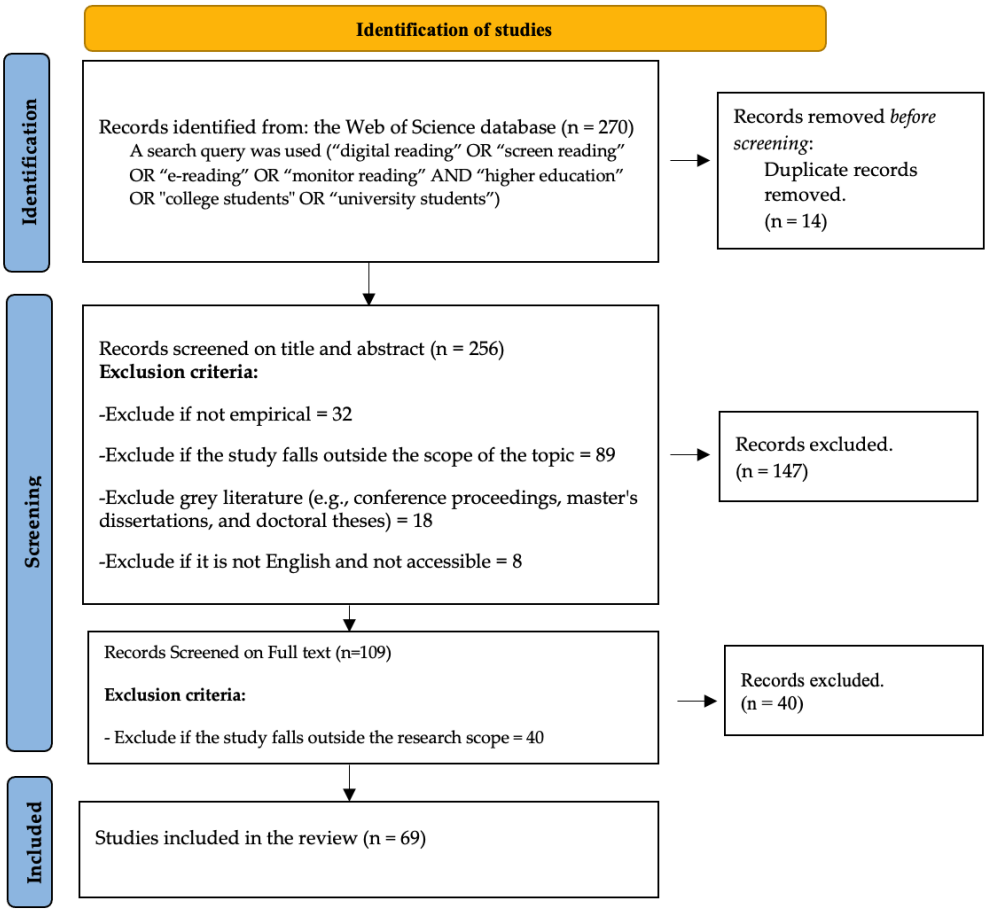

Figure 1: Flowchart of the Selection Process

3.2 Data Analysis Method

The data analysis was conducted using a thematic analysis approach supported by Microsoft Excel (Braun & Clarke, 2006). First, relevant information from each of the 69 included studies, including the article title, author(s), year of publication, country of origin, participant characteristics, and research methodology, was extracted and recorded in an Excel spreadsheet. Then, the full texts of the studies were reviewed systematically to identify findings relevant to the research questions. During this process, key concepts, patterns, and findings were identified and coded. Similar codes were subsequently grouped into broader categories and refined into themes that reflect the main areas of focus within the literature. The themes were reviewed again to ensure that they accurately represented the evidence across the studies and addressed the objectives of the review.

Finally, the studies were organised according to the identified themes, facilitating a structured synthesis of the literature. Table 1 provides an overview of the characteristics of the 69 studies included in this review. The thematic analysis enabled the identification of major trends and current practices in digital reading within higher education, as well as evidence-based strategies for enhancing students' digital reading comprehension and engagement. Microsoft Excel was used to manage the extracted data, organise the codes, compare findings across the studies, and support the development and refinement of the themes.

3.3 Reliability

Reliability was ensured through a systematic study selection process. Clear inclusion and exclusion criteria were established and consistently applied to identify studies that were relevant to the research objectives. The selected studies were screened for relevance and suitability for inclusion. To further enhance reliability and reduce selection bias, the inclusion and exclusion criteria, as well as the final set of included studies, were independently reviewed by two faculty members with expertise in the field. Their evaluation helped confirm that the selected studies met the required quality standards and were appropriate for addressing the aims of the review. These procedures contributed to the consistency, credibility, and trustworthiness of the study findings.

Table 1: Characteristics of the Studies Included

	Research Theme	**No. of Studies**	**Publication year**	**Country of studies**	**Participants**	**No. of Participants**	**Methodology& Data Collection Tools**
1	Digital Reading Comprehension and Comparisons with Print Reading	14	2014 to 2023	US= 6 China=2 Spain=2 Norway=2 Mauritius=1 Norway= 1	Undergraduate & Graduate Students	1,725	Quantitative Research Survey Eye-tracking Test (pre and post)

2	Digital Reading Behaviour and Student Preferences and Perceptions	20	2012 to 2024	Pakistan =1 US = 5 UK= 2 Canada= 1 Spain= 1 India= 2 China= 1 Italy= 1 Turkey= 1 Australia= 1 Japan= 1 Germany= 1 Slovakia= 1 Egypt= 1	Undergraduate & Graduate Students Faculty members	5,315	Quantitative + Qualitative + Mixed-Methods Survey Diary Focus group Eye-tracking
3	Digital Reading Competency	5	2011 to 2024	Iran= 1 Turkey= 1 Argentina= 1 Spain= 1 India=1	Undergraduate & Graduate Students	2,027	Quantitative research Survey
4	Improving Digital Reading Behaviour: Strategies and Factors	20	2020 to 2025	China= 10 Germany=1 Austria= 1 Switzerland =1 Italy=1 South Arica=1 US= 1 Spain= 1 Pakistan= 1 New Zealand=1 Norway= 1	Undergraduate & Graduate Students Librarians Faculty members	7,329	Quantitative + Qualitative + Mixed-Methods Multiple-choice test Survey Eye-tracking Observation Interview
5	Digital Reading in Special Education and Language Learning Contexts	10	2013 to 2024	Saudi Arabia=1 US= 1 Turkey= 1 Malaysia= 1 Slovakia= 1 South Korea= 1 Colombia= 1 Taiwan= 1 Iran= 1 China= 1	Undergraduate & Graduate Students	720	Quantitative + Qualitative + Mixed-Methods Survey Test (Pre and post) Journals Post-task surveys Interview Summarisation task Eye-tracking
	Total	69 Study	2011 to 2025	27 Countries		17,116 Participants	

4. Results and Findings

As digital technologies become increasingly embedded within higher education and blended learning models continue to expand, digital reading has attracted considerable scholarly attention as a key area of research and pedagogical practice. As shown in Figure 2, the 69 studies included in this review were published between 2011 and 2025, demonstrating sustained scholarly interest in digital reading in higher education over the past decade. Research on digital reading competency appeared earliest, with studies published from 2011 onwards, while research on digital reading behaviour and student preferences spanned the widest period (2012–2024). Notably, studies investigating strategies and factors that improve digital reading behaviour were concentrated in more recent years (2020–2025), indicating a growing shift in the literature from understanding digital reading practices towards identifying evidence-based interventions and support mechanisms for enhancing digital reading outcomes.

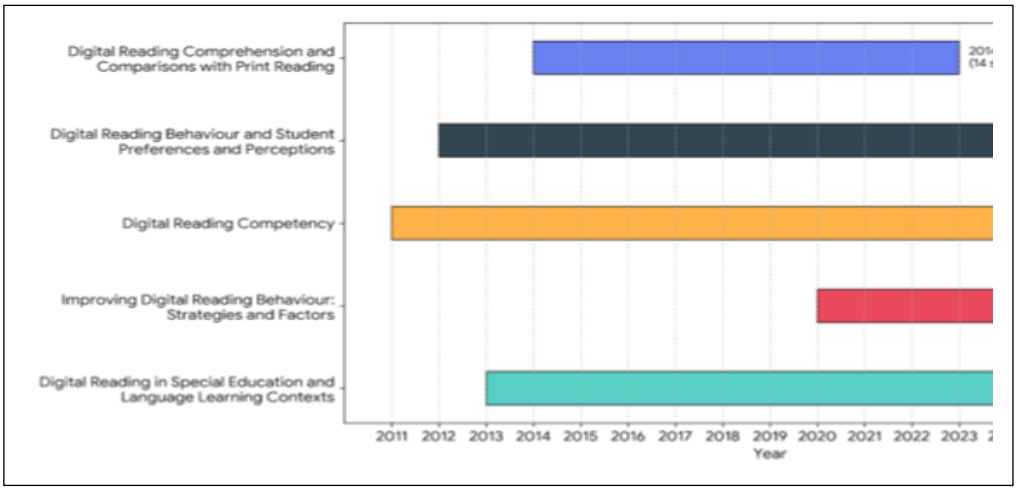

Figure 2: Publication Year Range

Note. Figure generated using Gemini based on prompts developed by the authors

Figure 3 illustrates the geographical distribution of the studies included in this review. The 69 studies originated from 27 countries, demonstrating the global relevance of digital reading research. However, the distribution was uneven. China (n = 14) and the United States (n = 13) accounted for a substantial proportion of the literature, while most other countries were represented by only one or two studies. This pattern suggests that, within the scope of this study, the research on digital reading remains concentrated in a limited number of countries, whereas evidence from many regions is still relatively rare. The uneven geographical distribution may also help to explain some of the variation in the findings reported across the studies. Differences in educational systems, digital infrastructure, access to technology, institutional practices, and learners' digital experiences can influence how digital reading is adopted, used, and perceived.

Therefore, digital reading should be viewed as a context-dependent experience, with students' preferences and reading behaviours influenced by the educational and cultural settings in which they study. These findings highlight the need for

further research in underrepresented contexts to develop a more comprehensive understanding of digital reading practices in higher education.

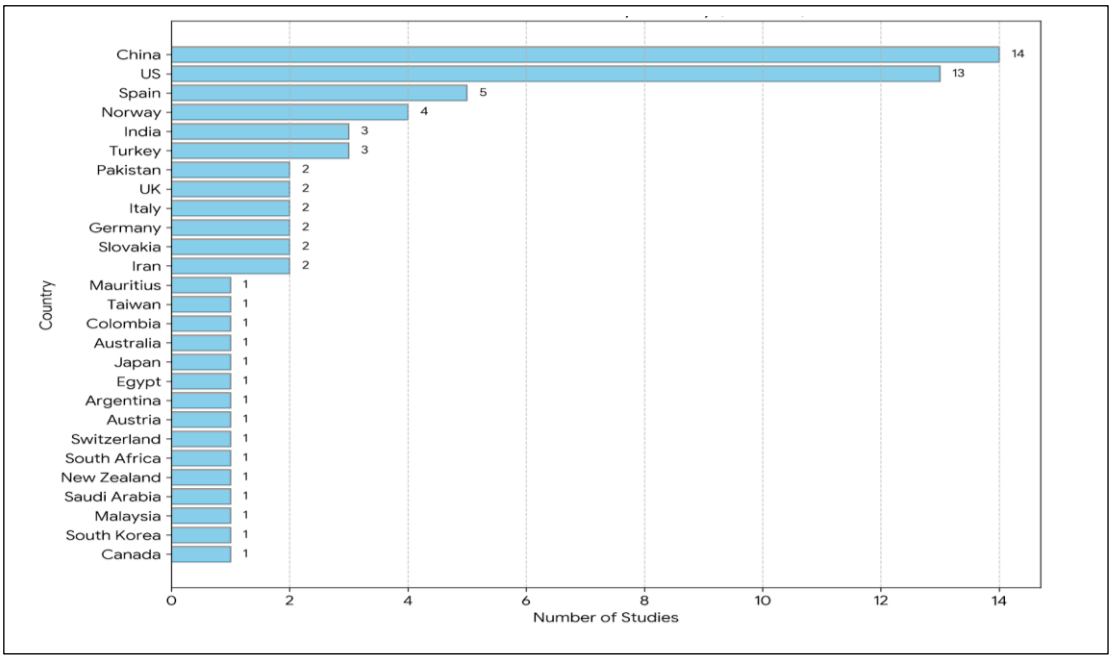

Figure 3: Distribution of Studies by Country

Note. Figure generated using Gemini based on prompts developed by the authors.

4.1 Trends in Digital Reading Research in Higher Education

To answer the first research question concerning trends in digital reading research, a thematic analysis was conducted across the included studies. The analysis identified five major research themes: (a) digital reading comprehension and comparisons with print reading, (b) digital reading behaviour, students' preferences, and perceptions, (c) digital reading competency, (d) strategies and factors that enhance digital reading, and (e) digital reading in special education and language learning contexts. These themes represent the principal areas of scholarly attention within the digital reading literature and provide insight into how students engage with digital texts, the factors influencing their reading experiences and format preferences, and the conditions that support effective comprehension and engagement in higher education settings.

4.1.1 Digital Reading Comprehension and Comparisons with Print Reading

Comparisons between digital and print reading emerged as a prominent theme in the literature, as researchers frequently use print reading as a reference point for evaluating digital reading outcomes. The findings suggest that comprehension differences are rarely attributable to the reading medium alone. Instead, outcomes appear to be shaped by the interaction of task demands, reading purpose, time constraints, digital literacy, and individual reading abilities.

Many studies reported an advantage in print reading when the texts required deep comprehension, sustained attention, or the retention of key ideas and details (Chen et al., 2014; Singer & Alexander, 2017; Sage et al., 2020; Baron & Mangen,

2021). They reported that print reading supports deeper comprehension, retention, and sustained attention, particularly in demanding academic tasks. Across multiple studies, processing time emerged as a consistent explanatory factor. Singer et al. (2019) extended their earlier work and found that reduced time spent reading digitally was associated with lower comprehension, consistent with speed–accuracy trade-off explanations. Agreeing with that, several studies suggest that digital reading is often associated with faster reading times and lower comprehension, especially under time pressure or among less skilled readers (Bresó-Grancha et al., 2022; Stiegler-Balfour et al., 2023; Delgado & Salmerón, 2021).

To examine the underlying cognitive processing, several studies used eye-tracking to capture how students allocate attention and integrate information. These studies indicate that print reading promotes more integrative and intentional processing patterns that support comprehension (Latini et al., 2020; Jian, 2022). From a CLT perspective, hyperlinks, notifications, multitasking, and non-linear navigation may increase the cognitive demand in digital environments, whereas the more stable structure of print texts may support deeper processing (Sweller, 1988). However, the findings remain mixed. Several studies reported no significant differences in comprehension, learning, or metacognitive outcomes between print and digital reading under comparable conditions, suggesting that reading purpose and task characteristics may be more influential than the medium itself (Daniel & Woody, 2012; Margolin et al., 2013; Norman & Furnes, 2016; Latini et al., 2019).

Overall, the evidence suggests that reading comprehension is shaped by learner characteristics, task demands, and the features of the reading environment rather than by the reading medium alone. These findings support a shift away from simple print–digital comparisons and towards understanding the conditions that promote effective reading across both formats.

4.1.2 Digital Reading Behaviour and Student Preferences and Perceptions

Digital reading behaviour is another prominent area of interest. Across surveys, interviews, diaries, focus groups, and mixed-method studies, the students' format choices were consistently shaped by reading purpose and task demands. Several studies reported that students preferred print for academic and comprehension-intensive reading because it was perceived to support concentration, annotation, and deeper understanding, whereas digital formats were valued for their accessibility, portability, convenience, and interactive features (Sanz & Goicoechea, 2012; Chou, 2012; Rod-Welch et al., 2013; Foasberg, 2014; Mizrachi, 2015; Baron et al., 2017). Later studies reported similar patterns, with students often favouring print for familiarity, deeper comprehension, and reduced distraction, while adopting digital materials because of their affordability, convenience, and interactive features such as bookmarking and note sharing (Benoit, 2018; Rabaud et al., 2018; Maden, 2018; Johnston & Salaz, 2019).

In several studies, hybrid reading emerged as a common pattern across studies, with students generally preferring print for academic reading and digital formats

for convenience and accessibility (Adefila et al., 2020; Soroya & Ameen, 2020; Ramos et al., 2023). Despite increased digital use, print remained associated with deeper learning, greater satisfaction, and better concentration, whereas digital reading was valued for its flexibility and accessibility (Mizrachi & Salaz, 2022; Hargreaves et al., 2022; Daha, 2023; Welsen et al., 2023).

Research also suggests that digital reading is often characterised by browsing, scanning, and selective attention rather than sustained, linear reading (Khatri, 2020; Liu, 2022). Eye-tracking studies indicate that distractions such as notifications, hyperlinks, and advertisements can increase cognitive load and negatively affect comprehension (Ronconi et al., 2024). However, students with stronger digital reading skills and higher levels of motivation demonstrated more adaptive reading behaviours, including better attention management and resistance to distractions (Vuorinen et al., 2024). Cognitive Load Theory offers a possible explanation for these findings, suggesting that the information-rich nature of digital environments can increase the cognitive demand and interfere with comprehension. Students with stronger digital reading skills may be better equipped to manage this demand and maintain effective engagement with digital texts.

Taken together, these findings suggest that the students' format preferences are not simply a matter of personal preference but reflect strategic responses to different reading demands. Print was consistently associated with tasks requiring sustained attention, deep comprehension, and annotation, whereas digital formats were preferred when convenience, accessibility, and efficiency were prioritised. This pattern helps explain the widespread adoption of hybrid reading practices and suggests that students actively select reading formats based on their perceived suitability for specific learning goals.

4.1.3 Digital Reading Competency

As a result of the expanding role of digital texts in higher education, a growing set of studies has examined the competencies required for effective digital reading. Across this literature, digital literacy, prior exposure to digital environments, and discipline-specific familiarity with technology were repeatedly associated with more strategic reading, stronger self-efficacy, and better comprehension outcomes in digital contexts.

Shabani et al. (2011) found that PhD students reported a higher tolerance for digital reading and relied less on print than master's students, and that students in technical and engineering disciplines were more likely to adopt digital formats. Across the studies, similarly, digital literacy, prior experience with technology, and formal training were consistently associated with stronger reading strategies, higher self-efficacy, and better comprehension outcomes (Pinto et al., 2014; Divya & Haneefa, 2018; Tabullo & Pulifiato-Hamann, 2024; Kirbas & Bulut, 2024). Although the studies were conducted in different contexts and disciplines, they consistently point to digital literacy being a key factor influencing digital reading performance. Students with greater familiarity with digital technologies generally demonstrated stronger reading strategies, higher confidence, and more effective engagement with digital texts. This suggests that differences in digital reading

outcomes may be partly explained by variations in students' digital competencies rather than by the reading medium itself.

4.1.4 Improving Digital Reading: Strategies and Factors

Recent research has increasingly shifted from identifying digital reading challenges to examining strategies that improve digital reading outcomes. To enhance digital reading comprehension, at the level of text presentation, Shi et al. (2020) showed that signalling supports comprehension and navigation when reading digitally, both physical signalling (bolding, underlining) and verbal signalling (organisational charts) improved understanding compared with plain text, with stronger effects for recall. Mason et al. (2023) compared learner-generated highlighting with instructor-provided highlighting and found that passive highlighting could be more effective for comprehension and recall, while also noting that effectiveness depends on individual differences such as prior knowledge, metacognitive strategy use, and self-efficacy. From a CLT perspective, these design features may support comprehension by reducing unnecessary cognitive effort and allowing learners to focus more effectively on the reading task.

Interface design for a digital reading medium could also shape comprehension, strategy use, and motivation. Haverkamp et al. (2023) found that paging supported better understanding and more backtracking than scrolling. Li et al. (2025) found that display choices, such as a light green background, could improve performance and reduce visual fatigue and negative emotion, although the effects varied by task complexity and individual differences. Zeng et al. (2016) reported that e-book format and device matter; a flexible EPUB format may be better suited for small screens, whereas fixed-layout PDFs can be more effective on larger screens for readability and comprehension.

Research also highlights the importance of instructional and institutional support. Structured reading interventions, teacher guidance, and accessible digital resources were associated with stronger engagement and comprehension outcomes (Wang et al., 2022; Yuan & Qian, 2024; Kumara et al., 2025). Similarly, usefulness, ease of use, accessibility, and personalisation consistently emerged as factors influencing the students' adoption of digital reading tools (Liu et al., 2021; Luo et al., 2021; Zhang et al., 2022; Lin & Yu, 2023; Chang et al., 2023; Mirza and Jabeen, 2025). Although the studies examined different forms of support, they collectively indicate that students benefit most when digital reading is supported by coordinated instructional guidance, accessible resources, and effective institutional infrastructure.

Beyond the acceptance of technology, sustained engagement with digital reading depends on digital literacy, reading competence, motivation, and institutional support (Kuhn et al., 2024; Zhan et al., 2020; Curado-Fuentes, 2024; Rzyankina, 2024). The findings suggest that technological fluency alone is insufficient for effective academic digital reading and that both students and instructors may benefit from targeted digital literacy development and ongoing support.

The literature in this section suggests that effective digital reading depends on the alignment of technology, pedagogy, and institutional support. While design

features can reduce cognitive barriers, their benefits are strengthened when combined with digital literacy development, instructional guidance, and supportive learning environments. This helps explain why interventions that address multiple dimensions of the digital reading experience tend to produce the most positive outcomes.

4.1.5 Digital Reading in Special Education and Language Learning Contexts

The reviewed literature also demonstrated the value of digital reading tools in special education and language learning contexts, where accessibility, multimedia, and scaffolding features can address specific learner needs. Across the examined studies, digital reading tools were associated with improved accessibility, learner autonomy, motivation, vocabulary development, and reading comprehension (Alsalem, 2017; Huang, 2013; Khezrlou, 2019; Zamborova & Klimova, 2023). Their benefits appeared particularly evident when digital features addressed specific learning needs or provided additional support for language processing and comprehension.

Strategy-focused studies suggest that pairing digital texts with explicit reading strategy instruction can improve comprehension for second-language learners. Babashamasi et al. (2022) found that international students trained in cognitive and metacognitive strategies achieved stronger online reading comprehension compared to the control group. Çetin (2023) identified common strategy patterns in digital reading, including problem-solving strategies (rereading, online searching, and attention adjustment), general strategies (purposeful reading and credibility checking), and support strategies (notetaking, highlighting, and annotation), often supported by tools such as online dictionaries and search functions. Jung and Lee (2023) also emphasised the importance of reading purpose. They found that reading to learn promoted deeper processing and better recall than skim reading, which increased speed but reduced retention.

Rodríguez-Fuentes et al. (2025) further demonstrated that well-designed digital reading platforms can improve EFL fluency outcomes, including oral reading rate and prosody. The findings again suggest that positive outcomes are not solely attributable to the digital technologies themselves. Rather, improvements in comprehension and language learning appear to depend on how digital tools are combined with effective reading strategies and purposeful instructional support. However, challenges remain. Distractions, technical issues, and increased cognitive demands may reduce the effectiveness of digital reading tools when they are poorly designed or insufficiently supported (Park et al., 2020; Yang & Hu, 2024). The findings suggest that the effectiveness of digital reading in language learning and special education contexts depends on how the digital tools are designed and implemented. While digital features can support accessibility and engagement, poorly designed or cognitively demanding environments may reduce their educational benefits.

4.2 Strategies for Improving Digital Reading Behaviour and Application in Higher Education

Across the five research areas identified above, a consistent conclusion is that higher education benefits from a balanced hybrid reading approach in which students use print and digital formats strategically based on purpose, text complexity, and learning goals. These findings suggest that research is moving beyond simple comparisons of print versus digital reading to examine how technological design, instructional practices, and institutional support shape reading behaviours, highlighting emerging directions focused on optimising digital tools, promoting digital literacy, and addressing equity and accessibility in higher education. To answer the second research question, based on the thematic synthesis of the reviewed studies, a conceptual framework is proposed in which digital reading comprehension and engagement represent the primary outcomes of digital reading.

These outcomes are shaped by four interrelated dimensions that are associated with successful digital reading outcomes in higher education: (a) digital literacy and competency development, (b) the regulation of reading behaviour and cognitive load, (c) the design and personalisation of digital reading environments, and (d) institutional and instructional support. The framework suggests that successful digital reading depends not on the reading medium alone but on interactions between learner characteristics, technological features, and educational support structures. The following sections discuss each area in relation to the evidence identified in the reviewed literature.

4.2.1 Digital Literacy and Competency Development

Across the reviewed studies, digital literacy emerged as a foundational factor influencing the students' ability to navigate, evaluate, and comprehend digital texts (Shabani et al., 2011; Chen et al., 2014; Pinto et al., 2014; Divya & Haneefa, 2018; Stiegler-Balfour et al., 2023; Tabullo & Pulifiato-Hamann, 2024; Kirbas & Bulut, 2024). Students with stronger digital competencies demonstrated more effective strategy use and higher levels of comprehension in digital environments. The findings suggest that digital literacy functions as an enabling condition for successful digital reading. Efforts to strengthen students' digital literacy skills may contribute to more effective engagement with digital texts.

4.2.2 Reading Behaviour and Cognitive Load Management

Multitasking, information overload, and digital distractions were consistently associated with reduced comprehension and fragmented reading behaviour (Khatri, 2020; Liu, 2022; Ronconi et al., 2024). In contrast, students with stronger self-regulation and metacognitive skills were better able to maintain attention and engage deeply with digital texts (Shi et al., 2020; Mason et al., 2023; Babashamasi et al., 2022; Çetin, 2023; Jung & Lee, 2023). These findings suggest that effective digital reading depends on the students' ability to manage cognitive demands and regulate their reading processes.

4.2.3 The Design and Personalisation of Digital Reading Environments

The design of digital reading environments influences both comprehension and the user experience. Features such as signalling, highlighting, paging, and

personalisation were associated with improved comprehension and reduced cognitive effort, although their effectiveness varied according to learner characteristics and task demands (Shi et al., 2020; Zeng et al., 2016; Haverkamp et al., 2023; Li et al., 2025; Mason et al., 2023). In addition, perceived usefulness, ease of use, and opportunities for personalisation were found to influence student satisfaction and the continued use of digital reading platforms (Liu et al., 2021; Luo et al., 2021; Lin & Yu, 2023). Overall, effective digital reading environments should support both usability and learning.

4.2.4 Institutional and Instructional Support for Digital Reading

Institutional and instructional support also emerged as important influences on digital reading. Lecturer attitudes, pedagogical practices, and access to digital resources significantly influenced students' engagement with digital texts (Area & Sanabria, 2014; Lin & Yu, 2023; Chang et al., 2023; Rzyankina, 2024; Curado-Fuentes, 2024). Similarly, libraries and academic support services were found to play an important role in improving access to digital resources and supporting the students' use of digital reading tools (Zhang et al., 2022; Wang et al., 2022; Mirza & Jabeen, 2025).

The findings suggest that successful digital reading depends not only on individual competencies but also on supportive educational environments. Considering the interrelated dimensions of digital literacy, effective design and instructional support are essential. They can help reduce unnecessary cognitive load and promote deeper engagement with digital texts.

5. Conclusions

This systematic review examined the current state of digital reading in higher education and synthesised evidence from 69 empirical studies published between 2010 and 2025. The findings suggest that digital reading has become an integral part of higher education, drawing scholarly attention across various countries and diverse topics. Five major themes emerged from the literature: digital reading comprehension and comparisons with print reading, digital reading behaviour and student perceptions, digital reading competency, strategies and conditions that support effective digital reading, and digital reading in special education and language learning contexts. Together, these themes provide a comprehensive picture of how digital reading is being adopted, experienced, and investigated within higher education.

The findings indicate that print and digital reading each offer distinct advantages and limitations, with their effectiveness varying according to the reading purpose, task requirements, and learning context. While print reading is often associated with deep engagement and sustained concentration, digital reading offers greater flexibility, accessibility, and interactive features that can support learning when used effectively. Rather than viewing the two formats as competing alternatives, the evidence suggests that they serve complementary functions. This may help to explain the growing prevalence of hybrid reading practices in higher education, where students strategically combine print and digital formats to meet different learning needs and objectives. The review also identified several interrelated

factors that influence digital reading outcomes, including learner competencies, cognitive demands, technological design, and educational support. Together, these factors shape the ability of students to engage effectively with digital texts and achieve positive learning outcomes.

From a theoretical perspective, this review extends the existing digital reading research by demonstrating that reading outcomes are shaped not by the reading medium alone but by the interaction between learner competencies, cognitive demands, technological design, and institutional support. The proposed framework provides a more integrated understanding of the factors influencing digital reading comprehension and engagement in higher education. As digital technologies continue to evolve, future research should move beyond comparisons between print and digital reading and focus on identifying effective approaches for enhancing digital reading comprehension and engagement. Particular attention should be given to evaluating instructional interventions and emerging technologies across diverse educational contexts.

6. Limitations of the review and recommendations for future research

The review included 69 studies and was limited to English-language, peer-reviewed journal articles identified through the Web of Science database. Relevant studies published in other languages, indexed in other databases, or available as grey literature have been excluded, introducing potential language, publication, and database biases. In addition, the search terms may not have captured all of the relevant research on digital reading.

Another limitation relates to the analytical process. Although a systematic thematic analysis was conducted and the study selection was independently reviewed by two faculty members, no formal quality assessment tool was used, and the development of the themes involved a degree of researcher judgement. The findings should be interpreted with some caution, particularly regarding their broader generalisability.

Future research could expand the search strategy by incorporating additional databases, broader search terms, and grey literature. It may also explore the role of emerging technologies, particularly artificial intelligence, in supporting reading comprehension, engagement, and self-regulated learning. Further investigation is needed to evaluate the effectiveness of AI-driven tools and their potential to enhance digital reading outcomes across diverse educational contexts.

Conflict of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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