

Digital Versus Print Reading in Higher Education: A Comparative Analysis of Student Comprehension in Pakistan and Turkey

Lubna Farhan Ali ¹ Areesha Sahar ² Sacida Saçaklı ³ Farhan Ali ⁴

¹ PhD Scholar, College of Education, Institute of Business Management, Karachi, Sindh, Pakistan.

Email: lubnafarhanali2@gmail.com

² BS Scholar, Department of Humanities and Social Sciences, Bahria University, Karachi, Sindh, Pakistan.

Email: areeshasahar003@gmail.com

³ BS Scholar, Department of Humanities and Social Sciences, Bahria University, Karachi, Sindh, Pakistan.

Email: sacida.s@outlook.com

⁴ MS Scholar, Department of History, University of Karachi, Karachi, Sindh, Pakistan.

Email: Farhan_aliagha@yahoo.com

ABSTRACT: Digital technologies have increasingly shifted university students from print to digital reading. This shift has attracted increasing scholarly attention, particularly in non-Western contexts. For longer, complex texts, print reading offers the advantage of deeper comprehension; on the other hand, digital reading provides accessibility, availability, and convenience of digital academic resources. However, comparative research on print vs. digital reading comprehension remains limited across different cultural contexts, particularly in Turkey and Pakistan. This study compared digital vs. print reading comprehension among university students of Pakistan and Turkey and investigated how distinct reading modes influence students' self-reported comprehension. The study employed a quantitative cross-sectional survey approach in which data were collected from N = 174 English-medium university students from Pakistan (n = 101) and Turkey (n = 73) through stratified random sampling. An online questionnaire using a five-point Print and Digital Reading Habits scale was administered. The findings demonstrated that print reading mode was significantly preferred by Turkish students for better comprehension (M = 3.75) compared to digital mode (M = 3.38, p = .007). Pakistani students showed a balanced pattern, with neither reading mode showing a statistically significant distinction. The results indicated that the effects of reading medium on comprehension ability vary across cultural and educational factors, while highlighting the need for context-dependent reading instruction in digitally transitioning institutions.

KEYWORDS: Digital Reading, Print Reading, Reading Comprehension, Higher Education, Cross-cultural Comparison, Pakistan, Turkey

Introduction

In the current age of information, reading habits are no longer limited to traditional printed books. Progressing technological devices, such as smartphones, tablets, Kindles, and e-ink devices, have replaced the traditional methods of reading and changed how individuals comprehend a text. Digital reading has become the most preferred mode of reading in recent years (Liu, 2012). A study from Pakistan revealed that a significant number of students prefer e-

Pages: 1 – 16

Volume: 5

Issue: 3 (March 2026)

Corresponding Author

Lubna Farhan Ali

✉ lubnafarhanali2@gmail.com

Cite this Article: Ali, L. F., Sahar, A., Saçaklı, S., & Ali, F. (2026). Digital Versus Print Reading in Higher Education: A Comparative Analysis of Student Comprehension in Pakistan and Turkey. *The Regional Tribune*, 5(3), 1-16.

<https://doi.org/10.55737/trt/v-iii.251>

books and online learning for academic work (Soroya & Ameen, 2020). Another study showcased that students aiming for comprehension tend to favor print reading practices (Mushtaq & Soroya, 2021). This illustrated how different reading practices are utilized based on students' goals. It is a widely observed pattern that online reading can be perceived as a distracting practice due to emerging notifications and advertisements, which raises questions regarding the role of online reading and its impact on comprehension.

Despite the rapidly growing globalized digitalization process in higher education, the influence of reading format on comprehension outcomes remains underexplored in cross-cultural, non-Western contexts (Aziz et al., 2024). In addition, the English language has become the predominant language in the world, and from this perspective, there are considerable challenges for the students of non-Western countries with regard to access and engagement with the language (Ali, 2018; Ali & Habib, 2025). The comparison of Pakistan and Turkey is especially relevant as both are Muslim-majority countries experiencing digitalization of education at a fast pace but with varying socio-cultural and technological contexts of the institutions and varying language backgrounds. The purpose of this study is to emphasize the reading differences between digital and print reading in higher education students' comprehension levels in these contexts.

Literature Review

Definitions of Digital Literacy, Digital Reading, and Print Reading

Under the context of higher education, digital literacy refers to the ability to access, evaluate, interpret, and construct meaning from digital texts through electronic platforms such as computers, tablets, and smartphones (Liu, 2005). Early exposure to digital technology influences student's reading habits, attention patterns and comprehension competency in a specific format which determines how they will engage with digital academic texts, even before entering in higher education (ASHA, 2015; Childwise, 2017). Digital literacy encompasses critical skills such as ensuring the credibility of online information, managing multifaceted content, and operating information on a rapidly changing platform (Ng, 2012; Hobbs, 2017). Ali and Ali (2026a) stated that the use of digital reading extends beyond the ordinary function of reading, as it enables learners to learn throughout their lives independently. Especially in Pakistan, a developing country, digital reading can provide numerous open education opportunities to learners in comparison to print reading. Furthermore, digital reading contains the necessary skills for navigating hypertexts, multimedia environments, and interactive digital interfaces. For that reason, the definition of digital reading cannot be limited to only reading on a screen; it is a process shaped by scrolling, hyperlinking, multimedia integration, notifications, and screen-based navigation, which is cognitively complex (Liu, 2005).

Print reading practice refers to the traditional mode of reading, as research has shown that print reading provides deeper comprehension and better recall (Mangen et al., 2013; Delgado et al., 2018). Furthermore, Eldredge (1988) states that print reading can lead to increased comprehension as frequent exposure to commonly used words improves individuals' visual recognition of those words (Bresó-Grancha et al., 2022). Contrarily, present studies also show that university students prefer digital sources rather than print due to decreased time spent on reading (Terra, 2015).

Moreover, Mangen and van der Weel's (2016) experimental work on digital reading processes has offered insight into how certain digital qualities can have an impact on attention allocation, memory encoding, and reading depth. Print reading differs from digital reading due to its cognitive role, as it is characterized by linearity, tactile engagement, and visual stability. Researchers state that digital environments can lead to further cognitive load for the reader due to distractions and non-linear navigation (Sweller, 1988; Paivio, 1990). Therefore, digital reading skills may impact how efficiently readers comprehend electronic texts as an essential part of the contemporary academic field (Leu et

al., 2014). Recent findings further display multimodal navigation, algorithmic awareness, and online information verification as important factors of digital literacy influencing comprehension outcomes (Salmerón et al., 2024).

Global Practices of Digital and Print Reading

In a global context, digital reading has become a preferred practice due to easy access to e-books, online journals, and institutional digital libraries. Research has shown that higher education students, especially in technologically advanced education systems, tend to use online resources more commonly (Baron, 2015; Mizrachi et al., 2018). Contemporary studies confirm that students' engagement with print vs. digital formatted instructional material influences reading comprehension outcomes (Quinto et al., 2025). According to the screen inferiority effect, digital reading of long and complex texts lowers comprehension levels (Delgado et al., 2018). Unlike screen reading, print reading enables students to locate text, reconstruct plot sequence, and gain kinesthetic information from moving through a book, which leads to increased comprehension and memory (Baron, 2021). According to Singer and Alexander (2017), students believe digital reading is more convenient to use, but print reading builds higher comprehension. Similarly, Al-Sulaimi and Al-Shihi (2017) found that scrolling, screen distractions, and lower meta-comprehension negatively affect digital comprehension.

A different strand of research suggests that digital reading can lead to similar comprehension outcomes as print reading when appropriate strategies and familiarity are applied (Clinton, 2019). Research also reported that in the case of controlled text complexity, the comprehension differences across digital and print formats are inconsequential (Alisaari et al., 2018). Tanner (2014) explained cognitive overload, digital fatigue, and weak sensory engagement as reasons for lower comprehension in digital format for long passages. Additionally, scholars noted that the type of device used during reading is a critical factor, as it can increase or decrease comprehension levels (Hou et al., 2017; Mangen & van der Weel, 2016). Despite the digitalization process, factors like cognitive load, reading purpose, device type, and reader proficiency continue to influence comprehension outcomes, showing inconsistent results across studies (Sweller, 1988; Paivio, 1990). Moreover, studies display a narrowing gap between digital and print reading, as skilled digital readers show similar performance across both mediums (Stiegler-Balfour et al., 2023).

Digital and Print Reading Practices in Turkey

Turkey has adapted an increasing number of digital reading and literacy skills after the COVID-19 pandemic, which led to higher levels of digital skills and awareness due to the shift from face-to-face to online education (Karagül et al., 2021; Tüzün & Toraman, 2021; Sarac, 2021). Scholars argue that Turkish students aiming for deep learning prefer print reading, whereas digital reading is preferred for convenience and immediate access to information (Harputlu & Güray, 2024; Kaya & Korucuk, 2022). A different research experiment from Turkey demonstrates that individuals reading printed texts comprehend written material better compared to those who read digital texts, based on response time and answer accuracy (Kaygısız, 2025). Furthermore, different English proficiency levels in Turkish EMI universities play an important role in how Turkish students engage with digital English texts (Soruç et al., 2021). According to Hudayarova (2019), the difference in curriculum across the educational institutions of Turkey influence how learner's exposed to, engaged and trained in different reading formats. Regardless of these findings, very few studies directly focus on how digital and print reading practices impact comprehension levels of students, marking a clear gap. However, the access of digital devices in public and private Turkish universities is not uniform, creating a significant digital divide educational institutions (Demir et al., 2023).

Digital and Print Reading Practices in Pakistan

Digital tools have become a common strategy for learning, particularly in language classrooms such as EFL, which emphasizes the importance of understanding how learners' comprehension is affected by different reading mediums (Ali et al., 2024; Ali & Nauman, 2026). In Pakistan, the research approach adopted in the field is mostly descriptive, which involves examining variables like various online learning practices, digital tools, and reading habits (Soroya & Ameen, 2020; Mushtaq et al., 2021). Previous research on Pakistani youth reading preference trends noted a shift from print to digital reading mode, which laid the foundation for understanding of current preferences of digital reading mode (Soroya & Ameen, 2016). According to another study, accessibility, low cost, and great variety are factors that motivate people to read digital texts over print texts (Jabeen et al., 2024). As digital reading practices are preferred extensively by Generation Z and millennials, print reading still remains effective for increased comprehension (Mushtaq et al., 2021). A Pakistani study investigating digital and print reading practices found that 45.2% of the students prefer print reading, whereas 17.2% prefer digital reading, indicating print reading as the most commonly used method despite the convenient quality of digital text (Khalid & Anavarathan, 2021).

University students in Pakistan show an increased preference for digital reading formats such as e-books and online journals due to the ability to easily extract, duplicate, and insert the most recent information; however, this selection does not always lead to increased comprehension (Aslam et al., 2024; Aziz et al., 2024). Furthermore, research has identified how digital reading practices lead to challenges such as eye fatigue, disrupted focus due to hyperlinks, and cost-related issues for students in Pakistan (Aslam et al., 2024).

Current Debates in the Field

Researchers have proposed different theories on how digital and print reading practices impact cognition. The Dual-Coding Model (Paivio, 1990) and Cognitive Load Theory (Sweller, 1988) describe how online and digital reading practices impact the process of comprehension. Another study suggests that researches comparing comprehension level across screen and paper formats showed a significant difference in text processing techniques and learner's attitude, depending on the reading format (Jensen et al., 2024). As digital reading can challenge readers through distracting images and hyperlinks, it requires a higher level of concentration, resulting in an overloaded working memory (Sweller, 1988). On the other hand, the New Literacies Theory encourages the use of digital tools for reading and states that literacy is not limited to only traditional reading and writing (Leu et al., 2014). It argues that modern literacy skills like digital reading can encourage students to critically evaluate and use different aspects of media in order to achieve meaning (Leu et al., 2014).

Ackerman and Lauterman (2012) highlighted better comprehension results in print-based reading under time pressure, while no notable difference was found when the time limit was sufficient. Another frequently discussed moderating variable is readers' digital exposure. Some studies argue that increased exposure to digital technology at an early age promotes superior comprehension outcomes for newer generations (Ackerman & Lauterman, 2012). Contrarily, others argue that excessive technology use leads to increased speed, multitasking, and distracted attention, which reduces processing rather than improving comprehension (Lauterman & Ackerman, 2014; Wolf & Barzillai, 2009). Most empirical evidence suggests that greater exposure to technology does not automatically improve comprehension, but can hinder reading performance (Duncan et al., 2015; Pfoest et al., 2013). A contemporary study explains that task complexity and the reader's digital strategy play a more important role than the medium alone (Altamura et al., 2025).

Research Gap and Research Questions

Existing research on digital and print reading practices offers a mixed view about the efficiency of these reading modes, pointing out several gaps which need to be addressed. How different reading modes impact comprehension levels of higher education students is a problem that has not been directly answered yet. Several studies examine different contexts and factors influencing reading modes individually but fail to answer how these factors, directly or indirectly, impact comprehension levels. Another gap arises from the lack of comparative cross-cultural studies, especially in the context of Pakistan and Turkey. Studies focus on individual contexts while examining how reading behaviours change depending on linguistic, cultural, and educational differences. Lastly, many researchers have applied qualitative approaches to school or high school children using measures such as response time, navigation pattern, and recall tests; there is limited focus on higher education students. This reveals the need for quantitative research focusing on higher education students by comparing different contexts.

This study addresses the following research questions:

RQ1: How do students in Pakistan and Turkey differ in their preferences for digital versus print reading?

RQ2: How do digital and print reading habits differ across academic tasks (assignments and exam preparation) in both countries?

RQ3: How do students in both countries perceive their comprehension when reading academic texts in digital versus print formats?

RQ4: To what extent do digital distractions affect reading focus?

RQ5: Do reading time, field of study, and national context predict students' digital comprehension confidence?

RQ6: How does the primary reading device relate to digital comprehension outcomes?

RQ7: Which reading mode is associated with higher overall academic reading effectiveness, and does this vary by task type?

Methodology

Research Design

This study applies a quantitative approach and a cross-sectional survey design to inspect the relationship between reading medium (print vs. digital) and reading comprehension, reading habits, and contextual factors among higher education students in Pakistan and Turkey. The survey method is selected to facilitate the collection of standardized data from a large number of students in a short timeframe and permits statistical analysis including comprehension levels, group comparisons, correlation testing, regression modelling, and examination of reader strategies (Maden, 2018; Subaveerapandiyan & Sinha, 2021). The relevance of examining reading medium is supported by empirical literature demonstrating that comprehension outcomes can be influenced by reading format (Delgado et al., 2018; Fontaine, 2021).

Participants

A total of 200 questionnaires were distributed online to undergraduate students (aged 18–25 years) enrolled in English-medium universities in Pakistan and equivalent higher education institutions in Turkey. After screening for incomplete responses and ensuring eligibility criteria, a final analytical sample of $N = 174$ was retained, comprising Pakistan ($n = 101$) and Turkey ($n = 73$). Eligible participants were: (a) full-time university students, (b) students with regular engagement with print and digital reading material for academic purposes, and (c) students possessing intermediate to advanced English proficiency.

The study involved stratified random sampling, where the population was divided into sub-populations based on specific characteristics, and then random samples were taken from each sub-population (Makwana et al., 2023; Etikan, 2017). This method was used to provide a fair balance between different academic disciplines, science, business and humanities. This research followed ethical guidelines for involving human participants as per the Declaration of Helsinki (World Medical Association, 2013). Participation was voluntary, and informed consent was obtained digitally. The research was conducted with approval granted by the Institutional Review Board of the university in Karachi. Table 1 presents the demographic profile of participants.

Table 1*Demographic Distribution of Participants*

Demographic Variable	Pakistan (n = 101)	Turkey (n = 73)	Total (N = 174)
Field of Study			
Science / Engineering	42.4%	25.0%	35.1%
Humanities / Arts	33.3%	20.8%	28.1%
Social Sciences / Business	18.2%	14.6%	16.7%
Other	6.1%	39.6%	20.1%
Daily Reading Time			
Less than 1 hour	21.2%	18.8%	20.2%
1–2 hours	39.4%	45.8%	42.1%
2–3 hours	22.7%	25.0%	23.7%
More than 3 hours	16.7%	10.4%	14.0%

Instruments / Measures

The study employed an online self-administered questionnaire (Google Forms), which is a method that can be used to gain access to participants from a variety of sources (Couper, 2008). To achieve linguistic equivalence (Brislin, 1970), this questionnaire was translated into Turkish and then back-translated into English. It was broken up into three parts.

Demographic Information: Age, Gender, Country (Pakistan or Turkey), University Sector (private or public), Field of Study, Semester, Daily Academic Reading Time, and Primary Academic Reading Devices.

Section 2: Reading Habits and Preferences: These were adapted from the Printed and Digital Reading Habits Scale (Subaveerapandiyani, 2021) and included reading mode preference, digital reading behaviour, and print reading behaviour. Items captured included the frequency of reading in each reading mode, type of devices being used, reading engagement, and reading time.

Section 3: Self-Reported Reading Comprehension: This section measured students' confidence, focus, main-idea identification, and perceived comprehension ability in both digital and print formats, adapted from Mizrachi (2018) and supported by empirical results on media effects on comprehension (Delgado et al., 2018). Responses were evaluated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Internal reliability was verified by a pilot test with 30 participants, indicating strong reliability: $\alpha = .85$ for comprehension and $\alpha = .82$ for reading habits.

Procedure

Following ethical clearance, participants were recruited from the university email systems, student WhatsApp groups, and online class announcements in Pakistan and Turkey. Briefing of the purpose of the study, confidentiality of participants and privacy of the study was done prior to participation. Clear instructions were given to minimize

response bias. The survey was open for two weeks in Fall 2025 and took 15-20 minutes to complete. Compilation and organization of responses for statistical analysis were done at the close of the survey.

Data Analysis

SPSS Version 29 was used to analyze the quantitative data. The descriptive statistics (mean, standard deviation and frequency) were utilized to find an overview of participants' reading preferences and comprehension patterns (Field, 2018). The relationships between reading medium preference, reading frequency and comprehension outcomes were analyzed using Pearson's correlation analysis (Cohen, 1988). Independent-samples t-tests compared mean differences in reading preferences and comprehension between Pakistani and Turkish students. A one-way ANOVA measured variation in digital comprehension confidence across daily reading time groups. Multiple regression analysis (Sun et al., 2023) verified whether reading time, field of study, and device type predicted digital comprehension outcomes. The dataset was screened for normality, missing values, and outliers before beginning the analysis. Missing data (<3%) was addressed through mean substitution along with reassessment of scale reliability (Cronbach's $\alpha > .80$). Statistical significance was set at $p < .05$ (Maden, 2018; Anwar et al., 2023).

Findings

This section reports the findings of a comparative statistical analysis examining university students' digital and print reading preferences, reading habits, and comprehension in Pakistan (n = 101) and Turkey (n = 73). Results are organized according to the research questions.

RQ1: Reading Mode Preference

Students in Pakistan demonstrated a nearly equal preference for digital and printed academic texts, whereas students in Turkey showed a clearer preference for digital formats (see Table 2).

Table 2

General Academic Reading Format Preference by Country

Country	Digital Texts (%)	Printed Texts (%)
Pakistan (n = 101)	51.5	48.5
Turkey (n = 73)	58.3	41.7

Note: Percentages represent students' self-reported primary reading preference.

RQ2: Reading Habits and Academic Usage

In both countries, digital reading was the dominant mode for completing assignments. However, when preparing for examinations, students in both Pakistan and Turkey shifted toward printed materials, with Turkish students showing a slightly stronger reliance on print for high-stakes academic tasks (see Table 3).

Table 3

Primary Reading Mode by Academic Task and Country

Task	Country	Digital Reading (%)	Printed Reading (%)
Assignments	Pakistan	57.6	42.4
	Turkey	72.9	27.1
Exams	Pakistan	48.5	51.5
	Turkey	47.9	52.1

Note: Percentages indicate the primary mode selected for each task.

RQ3: Perceived Comprehension by Reading Mode

In Pakistan, no significant difference was observed between perceived comprehension in digital and print formats. In contrast, Turkish students reported significantly higher comprehension when reading printed texts compared to digital texts (see Table 4).

Table 4

Comparison of Perceived Comprehension by Reading Mode and Country

Country	Digital Comprehension (M)	Print Comprehension (M)	t	p
Pakistan	3.48	3.46	0.15	.878
Turkey	3.38	3.75	-2.83	.007**

Note: Scale ranges from 1 (Strongly disagree) to 5 (Strongly agree). ** $p < .01$.

RQ4: Digital Distraction

Digital distractions were reported as a moderate concern in both countries. Pakistani students reported slightly higher levels of distraction from notifications and multitasking ($M = 3.52$) compared to Turkish students ($M = 3.35$). Students in both contexts identified distractions as a challenge in digital reading.

RQ5: Reading Time, Field of Study, and National Context

A one-way ANOVA indicated a significant relationship between daily academic reading time and digital comprehension confidence, $F(3, 170) = 4.12$, $p < .05$. Students reading more than three hours daily reported higher digital comprehension scores (Pakistan $M = 3.91$; Turkey $M = 3.80$) compared to those reading less than one hour (Pakistan $M = 3.14$; Turkey $M = 3.00$). Post-hoc comparisons (Tukey HSD) confirmed significant differences between the less-than-one-hour and more-than-three-hours groups ($p < .05$). Multiple regression analysis revealed that reading time ($\beta = .28$, $p = .003$), field of study ($\beta = .17$, $p = .031$), and device type ($\beta = .22$, $p = .009$) jointly predicted digital comprehension confidence, $R^2 = .19$, $F(3, 170) = 13.24$, $p < .001$ (see Tables 5 and 6).

Table 5

Digital Comprehension Confidence by Daily Reading Time (Mean Scores)

Daily Reading Time	Pakistan (M)	Turkey (M)	Combined Average
Less than 1 hour	3.14	3.00	3.08
1–2 hours	3.46	3.32	3.40
2–3 hours	3.60	3.58	3.59
More than 3 hours	3.91	3.80	3.87

Table 6

Preference for Digital vs. Print by Field of Study (Pakistan Only)

Field of Study	Digital Reliance (%)	Print Reliance (%)
Science / Engineering	61.0	39.0
Humanities / Arts	45.0	55.0
Social Sciences / Business	50.0	50.0

RQ6: Device Use and Comprehension

The analysis indicated a clear screen-size advantage. Students using laptops reported the highest digital comprehension scores (combined $M = 3.55$), followed by tablet/e-reader users ($M = 3.38$), and smartphone users reported the lowest comprehension levels ($M = 3.10$). The difference between laptop and smartphone users was statistically significant, $t(172) = 3.41, p < .05$ (see Table 7).

Table 7

Digital Comprehension Scores by Primary Device

Primary Reading Device	Pakistan (M)	Turkey (M)	Combined Average
Laptop / PC	3.58	3.52	3.55
Tablet / E-Reader	3.40	3.35	3.38
Smartphone	3.15	3.05	3.10
Hybrid (multi-device)	3.50	3.42	3.46

Note: Means are on a scale of 1–5. Differences between Laptop and Smartphone are statistically significant, $p < .05$.

RQ7: Overall Reading Effectiveness and Task Type

The results reveal a cultural and academic divergence between the two nations regarding which format students find most effective. For quick, task-oriented goals, 72% of students in Pakistan and 79% of students in Turkey preferred digital reading. However, for deep comprehension-oriented goals, 52% of Pakistani students and 71% of Turkish students preferred print reading (see Table 8).

Table 8

Preference for Deep Comprehension vs. Quick Tasks

Reading Goal	Country	Digital Preference (%)	Print Preference (%)
Quick Information (Search)	Pakistan	72	28
	Turkey	79	21
Deep Retention (Exams)	Pakistan	48	52
	Turkey	29	71

Discussion

Overview

The present study has examined how digital and print reading habits impact comprehension levels and reading habits for higher education students in two different contexts, Pakistan and Turkey. The present findings showcase how these two reading habits show differing results in both contexts and offer insight into how cultural, disciplinary, and technological resources and preferences influence reading behaviours for higher education students.

Reading Mode Preferences in Turkey and Pakistan

The initial findings of the present study suggest that higher education students in Pakistan showed near-equal preferences in terms of reading habits, as 51.5% preferred digital reading and 48.5% preferred print reading. However, reading preferences showed a sharper difference for higher education students in Turkey, as 58.3% preferred digital reading and only 41.7% preferred print reading. Findings regarding Pakistani students align with prior

research conducted by Khalid and Anavarathan (2021), which proposed that 45.2% of Pakistani students prefer print reading despite technological advancement. Pakistani students' inclination to use digital reading modes also aligns with prior research suggesting that millennials in Pakistan show an increased preference for digital reading modes such as e-books and online materials in academic fields (Soroya & Ameen, 2020). Historically lower print formatted reading trends among Pakistani youth shows that the balanced preference currently observed in the results highlights a gradually cultural shift, not a sudden change (Soroya & Ameen, 2016).

Turkish students' inclination towards digital reading modes may be the result of the fast adoption of digital tools as a consequence of the COVID-19 pandemic, after which reading modes were heavily shaped by digital resources and online learning (Adedoyin & Soykan, 2020; Karagül et al., 2021). Factors such as convenience and immediacy of digital access provide a ground for Turkish students' preference for digital reading (Baron, 2015; Mizrachi et al., 2018). Stiegler-Balfour et al. (2023) suggest that both digital and print reading co-exist rather than competing, which aligns with the small-scale gap between digital and print reading preferences observed in both Pakistan and Turkey.

Academic Tasks and Reading Habit Preferences

The present study's findings examining reading habits through the lens of academic tasks demonstrate a consistent pattern. A higher proportion preferred digital reading for assignment-related tasks, whereas for exam preparation both groups shifted to print reading. These task-dependent results carry theoretical importance: they show that students' preference for reading mode was shaped by two factors, reading for retrieval and reading for retention. These findings align with Singer and Alexander's (2017) research, which claims that even though students show a higher preference for digital reading, they tend to switch to print reading in order to achieve higher comprehension. The present study strengthens this claim and extends it to a cross-cultural context, as the same pattern was followed by Pakistani and Turkish higher education students.

Turkish students showed a slightly stronger shift towards print reading for exam preparation, as 52.1% preferred print and 47.9% preferred digital. 51.5% preferred print reading while 48.5% preferred digital reading in Pakistan. The results are consistent with the results of the studies that indicate that Turkish university students prefer print reading for deep learning (Harputlu & Guryay, 2024; Kaya & Korucuk, 2022). Print reading provides more comprehensive reading strategies such as annotation, re-reading and reflection, which can be beneficial when preparing for exams, as stated by Baron (2021).

Reading Preference and Comprehension

The findings offer different results regarding comprehension outcomes dependent on reading modes in Pakistan and Turkey. Pakistani higher education students showed similar results regarding digital ($M = 3.48$) and print ($M = 3.46$) comprehension ($t = 0.15$, $p = .878$). Turkish students recorded considerably higher comprehension while reading print ($M = 3.75$) compared to digital reading ($M = 3.38$) ($t = -2.83$, $p = .007$). Findings regarding Turkish students align with the screen inferiority effect, which claims that students tend to prefer print reading for long and complex texts, as digital reading tends to lower comprehension regarding these text types (Delgado et al., 2018). Study suggests that actual comprehension performance and learners' attitude toward reading mode plays a significant role in determining the format that yields improved outcomes (Jensen et al., 2024). Research shows that individuals preferring print material tend to require shorter response time and achieve higher comprehension levels (Kaygısız, 2025).

Pakistani students' near-equal results across digital and print reading regarding comprehension mediate their adaptive competence. When students constantly navigate between formats, they tend to develop flexible

comprehension strategies which allow them to alleviate disadvantages related to digital reading (Clinton, 2019). Research shows that students can develop comparable performance on digital versus print as a result of active preference and habitual use of digital sources (Bresó-Grancha et al., 2022).

Impact of Digital Distraction

The higher education students in Pakistan and Turkey demonstrated moderate digital distraction scores, with Pakistani students exhibiting slightly higher scores ($M = 3.52$) than the Turkish students ($M = 3.35$). The results are in line with previous studies that identified tags, multitasking, and hyperlink navigation as the main disruptors of digital reading (Al-Sulaimi & Al-Shihi, 2017; Tanner, 2014). These results can be understood based on the cognitive load theory that states that each time the working memory is distracted, it places more load on processing, which causes a decrease in comprehension (Sweller, 1988). The increased levels of distraction among the Pakistani students could be due to diverse device usage patterns or management of notifications, which opens avenues for further research. Research indicates that specific behavioral strategies, like reading slowly, turning off notifications, and establishing daily reading targets, are effective in minimizing digital distraction effects (Baron, 2021).

Reading Time, Discipline, and National Context

The ANOVA results suggest a significant connection between academic reading time and digital comprehension confidence, $F(3, 170) = 4.12$, $p < .05$. Students with higher daily academic reading time, more than three hours daily, reported higher scores (Pakistan $M = 3.91$; Turkey $M = 3.80$) compared to those reading less than one hour (Pakistan $M = 3.14$; Turkey $M = 3.00$). These findings align with prior research claiming that prolonged reading exposure positively impacts digital comprehension levels and increases confidence through skimming, strategic navigation, and shortcuts (Liu, 2005; Leu et al., 2014).

Field of study proved to be another significant factor in determining digital and print reading preference. In Pakistan, 61% of science and engineering students preferred digital reading, whereas only 45% of humanities students preferred digital reading. Science-related fields heavily depend on digital journals, preprints, and open-access PDFs, which makes students in these fields heavily reliant on digital literacy (Aslam et al., 2024). Contrastingly, students in humanities showed higher reliance on print reading as their curriculum requires close reading of literary and theoretical texts. Research shows that inequitable access of digital tools between Turkish universities may partially explain the difference in digital comprehension confidence recorded among group of students (Demir et al., 2023). Overall, students in Turkey show a higher preference for print reading regardless of gender, age, and field of study, indicating a purposeful preference for print in increasing comprehension. Contrastingly, Pakistan adopts a more balanced attitude, which may be the result of a wide variety in institutional infrastructure across different universities (Jabeen et al., 2024).

Impact of Device Type on Reading Mode Preference

Findings regarding screen size show that a bigger screen size serves as an advantage for students. Students using laptops or desktops reported the highest digital comprehension levels (combined $M = 3.55$), whereas students using tablets and e-readers reported slightly lower levels ($M = 3.38$), and smartphone users reported the lowest comprehension among all students ($M = 3.10$). The statistically significant difference between laptop and smartphone users ($p < .05$) is consistent with prior research revealing that comprehension outcomes can be influenced by physical properties of a device such as screen size, resolution, and interface (Hou et al., 2017; Mangen & van der Weel, 2016).

Through a cognitive lens, smaller screen size increases scrolling cycles, which impacts recall and comprehension negatively as spatial mapping of the text is interrupted (Baron, 2021). From an ergonomic point of view, smartphones are associated with an increase in the different kinds of notifications that create cognitive load (Sweller, 1988; Tanner, 2014). The implications for practice are quite clear: Students interested in building their understanding in academic tasks may choose a device with a bigger screen size like a laptop, rather than a smartphone.

Reading Preference for Deep Comprehension vs. Quick Tasks

The present study examined how different reading objectives, deep comprehension and quick tasks, shaped students' reading mode selection. For quick task-oriented goals, 72% of Pakistani students and 79% of Turkish students preferred digital reading. However, for deep comprehension-oriented goals, 71% of Turkish students and 52% of Pakistani students preferred print reading. These findings illustrate the significance of print reading in comprehension-sensitive tasks (Ackerman & Lauterman, 2012) and strengthen Altamura et al.'s (2025) finding that task complexity plays a predominant role in determining the comprehension difference between digital and print reading.

Pakistani students showed a hybrid attitude while selecting a reading mode for deep comprehension, 48% preferring digital and 52% preferring print, illustrating a mixed approach. Whereas Turkish students show a stronger preference for print reading for deep comprehension, as 71% prefer print and only 29% prefer digital. These differing attitudes can be caused by print infrastructure, digital literacy levels, and cultural stance toward the productivity of digital reading. Prior research shows that despite digital development in Pakistan, Generation Z prefers to engage in print reading for comprehension-related purposes (Mushtaq et al., 2021). Moreover, the type of format used in instructional material affects the students' ability to process and retain the academic texts (Quinto et al., 2025).

Conclusion

This study examined how print and digital reading formats influence comprehension ability in higher education students across Pakistan and Turkey, an underexplored area in cross-cultural academic research. Data were gathered from $N = 174$ undergraduate students using a quantitative cross-sectional survey method and analyzed utilizing descriptive statistics, independent-samples t -tests, one-way ANOVA, and multiple regression. The findings showed that students in both countries tended to prefer digital reading for assignment-related tasks, but preferred print for exam preparation, indicating that the selection of reading format depends on the purpose of the reading.

Most importantly, the Turkish students achieved significantly higher scores for their understanding of the text when reading on paper ($M = 3.75$) than when reading digitally ($M = 3.38$, $p = .007$), whereas no statistically significant difference between the two modes was found for the Pakistani students, showing a flexibility of hybrid adaptation. The other variables in the context, reading time, academic discipline, and device type also had significant influences on comprehension results. However, students who read on laptops for more than 3 hours showed a significant boost in understanding digital texts in both countries. The results of Turkish students show the screen-inferior effect proposed by Delgado et al. (2018), while the balanced results of Pakistani students corroborate the balanced approach presented by Clinton (2019) in terms of digital and print reading.

One of the problems with the study is that it uses subjective comprehension measures, which are self-reported. Furthermore, the study sample is limited to two institutional settings in Pakistan and Turkey, making generalisation difficult. Future studies are suggested to include objective comprehension measures and to enrich the cross-cultural sample. Future research should also investigate how digital reading strategy instruction influences the comprehension gap between formats. As Pakistani and Turkish educational institutions continue to transform digitally, the link between reading medium and comprehension remains a critical concern for educators and researchers.

References

- Ackerman, R., & Lauterman, T. (2012). Taking reading comprehension exams on screen or on paper? A metacognitive analysis of learning texts under time pressure. *Computers in Human Behavior*, 28(5), 1816-1828. <https://doi.org/10.1016/j.chb.2012.04.023>
- Adedoyin, O. B., & Soykan, E. (2020). COVID-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments*, 31(2), 863-875. <https://doi.org/10.1080/10494820.2020.1813180>
- Al-Sulaimi, A., & Al-Shihi, H. (2017). The effects of reading mode (digital vs printed text) on reading comprehension: A literature review of the key assessment factors. *2017 6th International Conference on Information and Communication Technology and Accessibility (ICTA)*, 1-6. <https://doi.org/10.1109/icta.2017.8336053>
- Ali, L. F. (2018). Globalization or standardization: Exploring English's Centre of Gravity. *Journal of Social Sciences & Interdisciplinary Research*, 7(2), 72-85.
- Ali, L. F., & Ali, S. F. (2026). Digital literacy as a gateway to lifelong learning for underprivileged youth: Insights from a case study. *LARS' International Research Journal*, 16(1). <https://doi.org/10.51611/iars.irj.v16i1.2026.279>
- Ali, L. F., & Habib, Z. (2025). Deconstructing the impact of gender, culture and society on public speaking anxiety: Perspectives of psychologists and business studies students. *International Journal of Emerging Business and Economic Trends*, 4(1), 56-72. <https://journals.sbbusba.edu.pk/ebet/index.php/abc/article/view/59>
- Ali, L. F., & Nauman, S. (2026). Addressing public speaking anxiety: A pedagogical action research approach. *Educational Action Research*, 1-19. <https://doi.org/10.1080/09650792.2026.2664802>
- Ali, L. F., Siraj, J., & Ali, M. F. (2024). AI-driven vocabulary development in ESL context: Advancing autonomous learning through technology. *Journal of Asian Development Studies*, 13(4), 1067-1082. <https://doi.org/10.62345/jads.2024.13.4.86>
- Alisaari, J., Turunen, T., Kajamies, A., Korpela, M., & Hurme, T. (2018). Reading comprehension in digital and printed texts. *L1 Educational Studies in Language and Literature*, 18, Running Issue(Running Issue), 1-18. <https://doi.org/10.17239/l1esll-2018.18.01.15>
- Altamura, L., Vargas, C., & Salmerón, L. (2025). Do new forms of reading pay off? A meta-analysis on the relationship between leisure digital reading habits and text comprehension. *Review of Educational Research*, 95(1), 53-88. <https://doi.org/10.3102/00346543231216463>
- American Speech-Language-Hearing Association. (2015). *Children and digital media*. ASHA Leader.
- Aslam, M. W., Hashmi, F. S., Akhtar, M. N., Batool, S., Shahzad, K., & Ashraf, K. (2024). Exploring the E-Reading Landscape among University Students in Lahore: A Quantitative Investigation. *International Journal of Politics & Social Sciences Review (IJPSSR)*, 3(III), 478-485. <https://ideas.repec.org/2024v3iiia50.html>
- Aziz, M., Hassan, A., & Aljamili, O. (2024). The effect of paper reading versus screen reading on the inferential reading performance among University ESL learners. *JURNAL ARBITRER*, 11(1), 85-95. <https://doi.org/10.25077/ar.11.1.85-95.2024>
- Baron, N. S. (2015). *Words onscreen: The fate of reading in a digital world*. Oxford University Press.
- Baron, N. S. (2021). Know what? How digital technologies undermine learning and remembering. *Journal of Pragmatics*, 175, 27-37. <https://doi.org/10.1016/j.pragma.2021.01.011>
- Bresó-Grancha, N., Jorques-Infante, M. J., & Moret-Tatay, C. (2022). Reading digital- versus print-easy texts: A study with university students who prefer digital sources. *Psicologia: Reflexão e Crítica*, 35(1). <https://doi.org/10.1186/s41155-022-00212-4>

- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 185-216. <https://doi.org/10.1177/135910457000100301>
- Childwise. (2017). *The monitor children's media use report*. Childwise Ltd.
- Clinton, V. (2019). Reading from paper compared to screens: A systematic review and meta-analysis. *Journal of Research in Reading*, 42(2), 288-325. <https://doi.org/10.1111/1467-9817.12269>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- Couper, M. P. (2008). *Designing effective web surveys*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511499371>
- Delgado, P., Vargas, C., Ackerman, R., & Salmerón, L. (2018). Don't throw away your printed books: A meta-analysis on the effects of reading media on reading comprehension. *Educational Research Review*, 25, 23-38. <https://doi.org/10.1016/j.edurev.2018.09.003>
- Demir, İ., Olgun, C. K., & Özsoz, C. (2023). Confronting the first-level digital divide in the digital age: A comparison between public and private University students in Türkiye. *Journal of Economy Culture and Society*, 0(67), 135-153. <https://doi.org/10.26650/jecs2022-1213957>
- Duncan, L. G., McGeown, S. P., Griffiths, Y. M., Stothard, S. E., & Dobai, A. (2015). Adolescent reading skill and engagement with digital and traditional literacies as predictors of reading comprehension. *British Journal of Psychology*, 107(2), 209-238. <https://doi.org/10.1111/bjop.12134>
- Eldredge, J. L. (1988). Improving the reading comprehension skills of poor readers. *Reading Horizons: A Journal of Literacy and Language Arts*, 29(1), 4. https://scholarworks.wmich.edu/reading_horizons/vol29/iss1/4/
- Etikan, I. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, 5(6). <https://doi.org/10.15406/bbij.2017.05.00149>
- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). SAGE Publications.
- Fontaine, G., Zagury-Orly, I., Maheu-Cadotte, M., Lapierre, A., Thibodeau-Jarry, N., Denus, S. D., Lordkipanidzé, M., Dupont, P., & Lavoie, P. (2021). A meta-analysis of the effect of paper versus digital reading on reading comprehension in health professional education. *American Journal of Pharmaceutical Education*, 85(10), 8525. <https://doi.org/10.5688/ajpe8525>
- Harputlu, L., & Guryay, B. (2024). Level of digital literacy among pre-service English teachers. *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi*, (62), 3641-3655. <https://doi.org/10.53444/deubefd.1527279>
- Hobbs, R. (2017). *Create to learn: Introduction to digital literacy*. John Wiley & Sons.
- Hou, J., Rashid, J., & Lee, K. M. (2017). Cognitive map or medium materiality? Reading on paper and screen. *Computers in Human Behavior*, 67, 84-94. <https://doi.org/10.1016/j.chb.2016.10.014>
- Hudayarova, F. (2019). *Türkiye Cumhuriyeti Millî Eğitim Bakanlığı ve Türkmenistan Devleti Bilim Bakanlığı ortaöğretim matematik dersi öğretim programlarının konu karşılaştırılması* (Master's thesis, Necmettin Erbakan University (Turkey)).
- Jabeen, M., Faraz, M. T., & Jabeen, M. (2024). Digital transformation of reading behaviors among allied health students: Insights from medical libraries in Pakistan. *Global Knowledge, Memory and Communication*. <https://doi.org/10.1108/gkmc-11-2023-0460>
- Jensen, R. E., Roe, A., & Blikstad-Balas, M. (2024). The smell of paper or the shine of a screen? Students' reading comprehension, text processing, and attitudes when reading on paper and screen. *Computers & Education*, 219, 105107. <https://doi.org/10.1016/j.compedu.2024.105107>
- Karagül, B. I., Şeker, M., & Aykut, C. (2021). Investigating students' digital literacy levels during online education due to COVID-19 pandemic. *Sustainability*, 13(21), 11878. <https://doi.org/10.3390/su132111878>

- Kaya, H. İ., & Korucuk, M. (2022). Examination of digital literacy levels of University students. *Dinamika Ilmu*, 22(1), 167-186. <https://doi.org/10.21093/di.v22i1.4523>
- Kaygısız, Ç. (2025). Comparison of digital and printed text reading process. *Education and Information Technologies*, 30(16), 22709-22733. <https://doi.org/10.1007/s10639-025-13668-5>
- Khalid, U., & Anavarathan, V. (2021). Proclivity of E-reading versus printed among Generation Z. *Pakistan Journal of Rehabilitation*, 10(2), 56-62. <https://doi.org/10.36283/pjr.zu.10.2/011>
- KUŞ, Z., & MERT, H. (2024). Digital competence of educators in Turkey according to European digital competence framework. *Journal of Learning and Teaching in Digital Age*, 9(1), 102-114. <https://doi.org/10.53850/joltida.1301592>
- Lauterman, T., & Ackerman, R. (2014). Overcoming screen inferiority in learning and calibration. *Computers in Human Behavior*, 35, 455-463. <https://doi.org/10.1016/j.chb.2014.02.046>
- Leu, D. J., Zawilinski, L., Forzani, E., & Timbrell, N. (2014). *Best practices in teaching the new literacies of online research and comprehension*. In *Best practices in literacy instruction* (5th ed., pp. 343–364).
- Liu, Z. (2005). Reading behavior in the digital environment. *Journal of Documentation*, 61(6), 700-712. <https://doi.org/10.1108/00220410510632040>
- Liu, Z. (2012). *Digital reading*. Chinese journal of library and information science (English edition), 85.
- Maden, S. (2018). Digital reading habits of pre-service Turkish language teachers. *South African Journal of Education*, 38(Supplement 2), 1-12. <https://doi.org/10.15700/saje.v38ns2a1641>
- Makwana, D., Engineer, P., Dabhi, A., & Chudasama, H. (2023). Sampling methods in research: A review. *International Journal of Trend in Scientific Research and Development*, 7(3), 762-768.
- Mangen, A., & Van der Weel, A. (2016). The evolution of reading in the age of digitisation: An integrative framework for reading research. *Literacy*, 50(3), 116-124. <https://doi.org/10.1111/lit.12086>
- Mangen, A., Walgermo, B. R., & Brønnick, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research*, 58, 61-68. <https://doi.org/10.1016/j.ijer.2012.12.002>
- Mizrachi, D., Salaz, A. M., Kurbanoglu, S., & Boustany, J. (2018). Academic reading format preferences and behaviors among university students worldwide: A comparative survey analysis. *PLOS ONE*, 13(5), e0197444. <https://doi.org/10.1371/journal.pone.0197444>
- Mushtaq, S., Soroya, S. H., & Mahmood, K. (2021). Reading habits of Generation Z students in Pakistan: Is it time to re-examine school library services? *Information Development*, 37(3), 389-401. <https://doi.org/10.1177/0266666920965642>
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065-1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
- Paivio, A. (1990). *Mental representations: A dual coding approach*. Oxford University Press.
- Pfost, M., Dörfler, T., & Artelt, C. (2013). Students' extracurricular reading behavior and the development of vocabulary and reading comprehension. *Learning and Individual Differences*, 26, 89-102. <https://doi.org/10.1016/j.lindif.2013.04.008>
- Quinto, J. P., Catacutan, M. M., & Alda, R. (2025). Students' reading comprehension in digital and printed instructional formats. *Journal of English Language Teaching*, 67(2), 25-31. <https://doi.org/10.66121/wzh30y50>

- Şahenk Erkan, S. S., Dağal, A. B., & Tezcan, Ö. (2015). Evaluation of reading habits of teacher candidates: Study of scale development. *Journal of Education and Training Studies*, 4(1). <https://doi.org/10.11114/jets.v4i1.1068>
- Salmerón, L., Altamura, L., Delgado, P., Karagiorgi, A., & Vargas, C. (2024). Reading comprehension on handheld devices versus on paper: A narrative review and meta-analysis of the medium effect and its moderators. *Journal of Educational Psychology*, 116(2), 153-172. <https://doi.org/10.1037/edu0000830>
- Sarac, Y. (2021). *ANALYSIS–The impact of online education during COVID-19 pandemic in Turkish higher education*.
- Singer, L. M., & Alexander, P. A. (2017). Reading across mediums: Effects of reading digital and print texts on comprehension and calibration. *The Journal of Experimental Education*, 85(1), 155-172. <https://doi.org/10.1080/00220973.2016.1143794>
- Soroya, S. H., & Ameen, K. (2020). Millennials' reading behavior in the digital age: A case study of Pakistani University students. *Journal of Library Administration*, 60(5), 559-577. <https://doi.org/10.1080/01930826.2020.1760563>
- Soroya, S. H., & Ameen, K. A. (2016). Reading trends of youth in Pakistan: A pilot study. *Pakistan Journal of Information Management and Libraries*, 17, 86-96. <https://doi.org/10.47657/201617896>
- Soruç, A., Pawlak, M., Yuksel, D., & Horzum, B. (2022). Investigating the impact of linguistic and non-linguistic factors on EMI academic success. *System*, 107, 102794. <https://doi.org/10.1016/j.system.2022.102794>
- Stiegler-Balfour, J. J., Roberts, Z. S., LaChance, A. S., Sahouria, A. M., & Newborough, E. D. (2023). Is reading under print and digital conditions really equivalent? Differences in reading and recall of expository text for higher and lower ability comprehenders. *International Journal of Human-Computer Studies*, 176, 103036. <https://doi.org/10.1016/j.ijhcs.2023.103036>
- Subaveerapandian, A., & Sinha, P. (2021). Digital literacy and reading habits of the central University of Tamil Nadu students: A survey study. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3924832>
- Sun, Y., Wang, X., Zhang, C., & Zuo, M. (2023). Multiple regression: Methodology and applications. *Highlights in Science, Engineering and Technology*, 49, 542-548. <https://doi.org/10.54097/hset.v49i.8611>
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257-285. https://doi.org/10.1207/s15516709cog1202_4
- Tanner, M. J. (2014). Digital vs. print: Reading comprehension and the future of the book. *School of Information Student Research Journal*, 4(2). <https://doi.org/10.31979/2575-2499.040206>
- Terra, A. L. (2015). Students' reading behavior: Digital vs. print preferences in Portuguese context. *Communications in Computer and Information Science*, 436-445. https://doi.org/10.1007/978-3-319-28197-1_44
- TÜZÜN, F., & YÖRÜK TORAMAN, N. (2021). Online tertiary education during the COVID-19 pandemic in Turkey: A country profile based on survey with 13 thousand students. *Sosyoekonomi*, 29(50), 197-227. <https://doi.org/10.17233/sosyoekonomi.2021.04.10>
- Wolf, M., Barzillai, M., & Dunne, J. (2009). The importance of deep reading. *Challenging the whole child: reflections on best practices in learning, teaching, and leadership*, 130(21).
- World Medical Association. (2013). *Declaration of Helsinki: Ethical principles for medical research involving human subjects*.