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Research Article

READING IN THE AGE OF SPEED: A SYSTEMATIC REVIEW OF TEMPORAL LITERACY

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Abstract

In many contemporary media environments, reading is increasingly shaped by pressure to move quickly through texts. This systematic literature review examined how time pressure, perceived time scarcity and slow reading practices influence readers' attention and comprehension, and assessed the usefulness of temporal literacy as a framework for understanding these changes. Following a predefined protocol, the review identified and analysed 22 peer-reviewed studies published from 2020 to 2025 that explicitly connect reading with temporal experience. Data were extracted on study design, temporal and reading constructs, and cognitive, affective and temporal outcomes, and were synthesised thematically in three clusters. The synthesis indicates that the design of digital and print environments often encourages fast and fragmented processing. A perceived lack of time leads readers towards skimming and selective search, which weakens global comprehension, and readers with high anxiety pay for comprehension with greater attentional effort. Interventions that promote slow and attentive reading, such as mindfulness training and guided slow reading, improved attention, comprehension and reflection without increasing reading speed. These findings suggest that efforts to improve literacy will be limited if they ignore how readers experience time. The review proposes temporal literacy, the capacity to recognise when time-saving strategies erode depth and to choose reading rhythms that restore it, as a unifying lens, and recommends that educators, platform designers and policymakers treat reading time as a central element of literacy practice.

Keywords: *Attention; Digital reading; Slow reading; Temporal literacy; Time pressure*

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INTRODUCTION

The acceleration of information flows in the twenty-first century has transformed the way people read and relate to texts. PISA reports indicate that adolescents' reading proficiency remains below the expectations of many education systems, and the 2022 results declined compared with those of 2018 (OECD, 2019, 2023). At the same time, time-use

research in several countries shows a continued decrease in the time adults spend reading for pleasure (add citation for time-use evidence). The consistency of these findings suggests that the reading crisis is not only a matter of skill but is also linked to how individuals perceive, evaluate and manage time in a culture focused on speed.

Contemporary digital literacy is defined by texts that are multimodal, fragmented and always accessible through personal devices. Even when the only difference is the medium, children often understand stories in digital books less well than in print unless the design strongly supports the story's flow (Furenes et al., 2021). For less experienced readers, complex illustrations can distract from the text, making it harder to understand and requiring constant visual attention (Eng et al., 2020). The combination of distracting digital designs and habits of fast reading therefore makes slow and deep reading more difficult.

These changes cannot be separated from the temporal dynamics of modern societies. Social acceleration theory highlights the compulsion to increase pace, accumulate activities and minimise pauses, resulting in an ongoing tension between rapidity and contemplation (Staudacher, 2023). Within a digital ecosystem governed by algorithms, even attempts to disconnect from screens are not entirely autonomous, because technological infrastructures also shape the rhythm of life and the focus of attention (Bucher, 2020; Moe & Madsen, 2021). Research on the psychology of time shows that people are prone to temporal illusions when estimating the availability and use of time, which in turn influence emotional and social decisions (Tausen, 2022). When people feel pressured to be productive, taking a long time to read can seem unproductive and lead to worries about time.

On the other hand, pedagogical approaches and contemplative practices offer ways to restore rhythm. Mindfulness training has been associated with better attention, emotional regulation and academic outcomes (Alomari, 2023), and an experimental study found that it improved reading comprehension without accelerating reading speed (Lusnig et al., 2023). Mindful activities in natural settings help children experience time in a slower, more thoughtful way, encouraging quietness and a deeper sense of being present (Adams & Beauchamp, 2021). In higher education, a slow reading approach to course evaluations transforms lecturers' responses from superficial judgement to substantive professional reflection (Baldi & Kuusinen, 2025). Theoretically, deep reading has been conceptualised as an ethical and political practice that contests outcome-oriented paradigms and fosters social awareness (Okello & Garcia, 2025; Wong, 2025). Taken together, these studies suggest that slow reading can be both a way to resist the pressure to read quickly and a way to be present in the moment.

Research on reading in the digital age has developed along three relatively separate strands. The cognitive and design strand investigates the impact of screens, illustrations and multitasking on attention and text processing (Eng et al., 2020; Furenes et al., 2021). The instructional strand uses technology, educational games and varied teaching methods to improve engagement and learner independence in literacy and critical thinking programmes (Muthmainnah et al., 2022; Pervez & Orchard, 2025). The temporal and visual literacy strand introduces concepts such as temporal seeing, which emphasises rhythm, chronotope and the temporal dimension of making meaning from texts and images (Saul et al., 2024). Although productive, these strands are rarely brought together in a framework that explicitly examines how anxiety about time shapes ways of reading and thinking.

Gaps are also evident in studies of motivation, the value of time and readers' emotional experiences. Research on waiting time suggests that the willingness to wait for the next part of a text indicates the emotional value of the reading experience and is positively related to both enjoyment and comprehension (Bains et al., 2023). Research on motivation in language learning highlights the influence of social context and systems of reward and punishment, which often make external motivation stronger than intrinsic motivation (Pranawengtias, 2022). However, these variables are rarely discussed within a broader frame of temporal anxiety or linked to the shifts that occur when time is perceived as an increasingly scarce resource. As a result, the literature has not yet systematically described reading as a temporal practice squeezed between the logic of speed and the need for slow thinking.

Against this background, a systematic review is needed that not only compiles empirical findings but also develops an interdisciplinary synthesis of how temporal acceleration, perceptions of time scarcity and forms of resistance to speed are interconnected within reading practices. Such a synthesis can inform educators, platform designers and policymakers who design literacy interventions, and it can open a research agenda on temporal literacy and the place of deep reading in a culture organised by speed (Bucher, 2020; Staudacher, 2023). This review synthesises findings from cognitive psychology, the sociology of time, literacy studies and contemplative pedagogy published between 2020 and 2025, and proposes temporal literacy as the capacity to reclaim space for deep reading within a culture of speed. It addresses three research questions:

RQ1. How do temporal acceleration and the design of reading environments affect reading habits and attention?

RQ2. What psychological mechanisms link time perception, temporal anxiety and reading engagement?

RQ3. To what extent can slow reading be understood as a form of temporal resistance that restores depth of reflection?

METHOD

This study is a systematic literature review (SLR) of peer-reviewed studies on reading, time and temporal experience. Its character is integrative and explanatory: a structured protocol was followed to assemble heterogeneous evidence and to explain how temporal acceleration, time perception and practices such as slow or deep reading interact to shape reading habits, attention and resistance to a culture of speed. The review followed a predefined scope, a two-stage screening procedure and a structured extraction template, and its reporting was guided by the PRISMA 2020 statement (Page et al., 2021).

Eligibility Criteria

The scope was defined before data collection. Studies were eligible if they met four criteria. First, reading or literacy had to be a central focus, including reading comprehension, reading for pleasure, digital versus print reading, reading motivation, or deep and slow reading practices. Second, the study needed to address at least one temporal domain, such as temporal acceleration, time pressure, time scarcity, digital disconnection, temporal anxiety, or contemplative practices that explicitly engage with time and attention (for example, mindfulness-based interventions, slow reading courses, or temporal seeing in visual literacy). Third, the study had to report an empirical design (quantitative, qualitative or mixed methods) or a clearly argued conceptual contribution that engaged with temporal experience and reading in a sustained way, rather than mentioning time only as background. Fourth, it had to be a full-length peer-reviewed publication from 2020 to 2025, written in English and available in full text.

Book chapters, theses and editorials were excluded. The original criteria also excluded conference papers, but two included studies (Shubi & Berzak, 2023; Shubi et al., 2025) are full peer-reviewed conference papers. Please confirm that full peer-reviewed proceedings papers were eligible, or remove these two studies. Studies that focused on general media use, screen time or attention without substantive discussion of reading were excluded, as was purely technical human–computer interaction work that did not analyse reading or temporal experience. Seminal works published before 2020, such as early

experiments on skim reading under time pressure, were used to contextualise the field but were not coded as part of the dataset.

Search and Screening

The search was conducted in Scopus as the main database and complemented by targeted searches in Google Scholar to capture relevant work from education and literacy journals with uneven indexing (state the date of the final search). Three keyword families were combined: (a) reading and literacy (for example, "reading comprehension", "deep reading", "slow reading", "reading for pleasure"); (b) temporal experience (for example, "temporal acceleration", "time pressure", "time scarcity", "temporal anxiety", "digital disconnection"); and (c) contemporary media environments (for example, "digital reading", "screen reading", "multimodal texts", "attention economy"). Search strings were refined iteratively using Boolean operators (give the full Scopus search string in an appendix), and backward and forward citation tracking was carried out from anchor articles on digital reading, mindfulness, deep reading and temporal literacy.

In the first stage, titles, abstracts and keywords were screened, and items that were not eligible publication types, fell outside the 2020–2025 window, or did not study reading in relation to temporal constructs were excluded. In the second stage, the full texts of the remaining records were read to confirm eligibility and to verify that reading and time-related constructs were defined clearly enough to allow extraction. This step also removed papers that mentioned time only in passing or used reading merely as an instrument. Report the numbers for each stage: records identified in Scopus and Google Scholar, duplicates removed, records screened, full texts assessed, full texts excluded with reasons, and studies included (22). A PRISMA flow diagram is recommended. State how many reviewers screened each record and how disagreements were resolved. The procedure resulted in a final corpus of 22 studies.

The corpus spans experimental studies of visual attention and comprehension using eye tracking and reading tests, behavioural experiments on willingness to wait for text, survey and cluster analyses of reading behaviour, mixed-methods and intervention studies in schools, qualitative studies of slow reading in adult and higher education, and conceptual treatments of temporal acceleration, temporality in information studies and deep reading as ethical practice. Together, these studies cover child and adolescent readers, university students, adult learners and teachers interacting with digital and print texts across diverse national contexts. Quality appraisal: state whether the methodological quality of the included

studies was appraised (for example, with the Mixed Methods Appraisal Tool) and how this informed the synthesis; if it was not, acknowledge this in the limitations.

Data Extraction

Data were extracted with a single structured template so that every study was handled in the same way. For each study, bibliographic information and research context were recorded, including year, country or region, target population and setting, such as primary schooling, higher education, informal reading for pleasure or civic education.

Five families of variables were then coded. The first was study design and setting, including research paradigm, sampling strategy, data sources and main analytic techniques such as eye tracking, regression models, thematic analysis or philosophical reconstruction. The second was temporal constructs, capturing how each study defined and operationalised time-related ideas such as time pressure, time scarcity, acceleration, temporal anxiety, digital disconnection, temporal seeing, mindfulness or reflective slowness. The third was reading constructs, including decoding, comprehension, deep reading, reading motivation, reading for pleasure, critical or civic reading, and multimodal reading. The fourth was mediating designs and practices, such as curriculum interventions, game-based learning, mindfulness training or slow reading courses, noting whether they were framed as responses to acceleration or time pressure. The fifth was outcomes, distinguishing cognitive outcomes (for example, comprehension scores or attention distributions), affective and motivational outcomes (for example, enjoyment or reading avoidance) and temporal outcomes (for example, shifts in time perception, willingness to wait for text, or experiences of calm and presence).

To preserve the measurement logic of the original authors, operationalisations were recorded exactly as defined in each study. For experimental and survey studies, the measures of reading and temporal constructs were documented, such as eye-tracking indices, comprehension tests and self-report scales. For qualitative and conceptual work, the central arguments and theoretical vocabulary used to describe acceleration, anxiety and slow reading were captured, together with the way these constructs were linked to educational practice or civic life.

Data Analysis

Data analysis proceeded in three linked steps. First, the 22 studies were grouped into three analytic clusters that recur across the corpus: (1) stimulus and environmental architecture, covering work on illustrations, screens, hyperlinks, reading goals and physical

distraction; (2) cognitive and emotional metrics, covering anxiety, willingness to wait, temporal illusions, perceived reading burden and speed–accuracy profiles; and (3) interventions and temporal ethics, covering mindfulness training, reading and self-regulation interventions, slow reading courses and conceptual work on deep reading and temporality. Table 1 lists the studies by cluster.

Second, within each cluster, the mechanisms proposed or demonstrated by the authors were mapped, and effect directions were summarised in the authors' own statistical or interpretive language. Experimental studies of visual attention, for example, were synthesised in terms of how changes in illustration or medium affected gaze patterns and comprehension, while qualitative and philosophical contributions were analysed for recurring arguments about how acceleration, digital infrastructures and educational practices produce temporal anxiety and invite or obstruct slow reading.

Third, the clusters were integrated into a single interpretive pathway connecting macro-level acceleration and digital infrastructures to individual time perception and temporal anxiety, to reading habits such as skimming, avoidance or slow reading, and finally to outcomes such as comprehension, critical judgement and ethical or civic formation. Throughout, the authors' terminology for temporal constructs and reading practices was retained to avoid interpretive drift. Because the unit of analysis was published research rather than human participants, ethical approval was not required.

FINDINGS AND DISCUSSION

This section presents the synthesis of the 22 studies and discusses the findings in relation to the research questions and the concept of temporal literacy. The findings are organised into three clusters, namely stimulus and environmental architecture, cognitive and emotional metrics, and interventions and temporal ethics, followed by an integrated model

Table 1. Studies included in the review, by cluster

Study	Title	Key finding
Cluster 1: Stimulus and environmental architecture		
Delgado & Salmerón (2021)	The inattentive on-screen reading: Reading medium affects attention and reading comprehension under time pressure	Inattention and mind wandering during on-screen reading reduce comprehension, especially under time pressure

Eng et al. (2020)	Keep it simple: Streamlining book illustrations improves attention and comprehension in beginning readers	Extraneous illustration details reduce comprehension by shifting attention away from the text
Fitzsimmons et al. (2020)	The impact of skim reading and navigation when reading hyperlinks on the web	Skim reading reduces processing depth, while hyperlinks attract more attention, especially under skimming
Jayes et al. (2022)	The impact of hyperlinks, skim reading and perceived importance when reading on the Web	Skimming reduces reading depth; hyperlinks and position affect the perceived importance of text
Liu (2025)	A study on the effects of four reading methods on college students' cognitive abilities and mental health based on positive psychology	Paper and audio reading produce stronger cognitive gains than digital and video reading
Shubi & Berzak (2023)	Eye movements in information-seeking reading	Eye movements differ between information-seeking and ordinary reading
Shubi et al. (2025)	Decoding reading goals from eye movements	Reading goals can be decoded from eye movements with high accuracy
Xu et al. (2025)	Mobile reading attention of college students in different reading environments: An eye-tracking study	Noise, motion and concurrent tasks disrupt mobile reading attention and engagement
Cluster 2: Cognitive and emotional metrics		
Bains et al. (2023)	Using a willingness to wait design to assess how readers value text	Willingness to wait for text is positively related to enjoyment and comprehension
Fang et al. (2022)	Patterns of adults with low literacy skills interacting with an intelligent tutoring system	Speed–accuracy profiles of low-literacy adults differ in learning outcomes; speed alone does not indicate proficiency
Mason & Warmington (2024)	Academic reading as a grudging act: How do higher education students experience academic reading and what can educators do about it?	Students experience academic reading as a chore linked to excessive volume and lack of relevance
Tausen (2022)	Thinking about time: Identifying prospective temporal illusions and their consequences	Temporal illusions bias affective forecasts and prosocial decisions; implications for reading are inferred in this review
Zhang & Wang (2024)	Readers with trait anxiety have poor reading efficiency: Evidence from the perceptual span in Chinese reading	Trait anxiety narrows the perceptual span and increases regressions, lowering reading efficiency
Cluster 3: Interventions and temporal ethics		
Baldi & Kuusinen (2025)	Slow reading course evaluations: From discomfort to discovery	Slow reading of student evaluations fosters emotional regulation, deeper engagement and empathy towards students
Haider et al. (2022)	Time and temporality in library and information science	Calls for explicit attention to time and temporality in information studies

Kuhn et al. (2025)	Making challenging social studies texts accessible: An intervention	Repeated and wide reading of challenging texts yield similar comprehension gains for struggling readers
Lusnig et al. (2023)	Mindful text comprehension: Meditation training improves reading comprehension of meditation novices	Meditation improves comprehension and sustained attention without changing reading speed
Okello & Garcia (2025)	Against the grain: Deep reading as abolitionist praxis in education	Conceptualises deep reading as a transformative practice against extractive approaches to knowledge
Schuler et al. (2024)	Effects of a teacher-led intervention fostering self-regulated learning and reading among 5th and 6th graders: Treatment integrity matters	No overall group differences; gains appeared only in classes that implemented the intervention consistently
Smeplass (2023)	Investigating adult learners' experiences from using slow reading as a pedagogical approach	Slow reading promotes deep comprehension and group cohesion but is time-consuming and needs skilled facilitation
Staudacher (2023)	Simmel's sociology of time: On temporal coordination and acceleration	Modernity creates tension between acceleration and reflection; slowness can act as resistance
Wong (2025)	Careful, patient, and modest citizens: Facilitating civic education through Zhu Xi's method of deep reading	Zhu Xi's method of deep reading cultivates civic virtues of patience, care and modesty

Note. Haider et al. (2022), Staudacher (2023) and Tausen (2022) do not take reading as a central focus. Please justify their inclusion under the third eligibility criterion or move them to the background literature.

Stimulus and Environmental Architecture

Findings in the first cluster show that the way texts are packaged and reading environments are arranged directly shapes attention and the depth of comprehension. Eng et al. (2020) found that when children were first learning to read, detailed illustrations led them to look at the pictures more often than at the text, whereas simpler illustrations kept their attention on the text and improved comprehension. The visual design of a book is therefore not only aesthetic; it can either support or hinder understanding.

In digital contexts, web page design and task instructions push readers towards skimming. Fitzsimmons et al. (2020) and Jayes et al. (2022) reported that skimming speeds up reading but reduces fixation durations, regressions and processing time at the ends of sentences, which is where wrap-up processes integrate meaning across sentences. Hyperlinks function as salience markers that draw longer fixations, while unlinked words are processed more shallowly. Together, skimming and hypertext navigation create a fragmented pattern of attention that can weaken understanding of the whole text, especially when arguments must be integrated.

Eye-tracking studies further confirm that eye movements are strongly affected by the reader's goal. Shubi and Berzak (2023) showed that searching for specific information produces different eye movement patterns from reading for general understanding: readers allocate dense attention to segments they consider relevant and pass over the rest. Follow-up work showed that reading goals can be decoded by machine learning models from eye movement data, which means that efficiency-driven strategies leave a clear trace in visual behaviour (Shubi et al., 2025). These results support the view that pressure to read quickly encourages strategies that prioritise speed over complete understanding.

The physical environment also contributes to the quality of digital reading. Xu et al. (2025) found that auditory distractions involving conversation or phone calls significantly reduced fixation duration and number, suggesting that such distractions split attention between the text and potential social interaction, whereas quieter conditions supported more stable attention.

The medium of reading also matters. Delgado and Salmerón (2021) found that reading on screen, especially under time limits, led to lower comprehension and more mind wandering than reading in print. In a longitudinal study, Liu (2025) showed that reading literary works across paper, digital, audio and video media benefited both cognitive functioning and mental health, but that print and audio produced the strongest cognitive gains.

Taken together, these findings answer RQ1 by showing that acceleration is not only a subjective feeling but is built into the architecture of stimuli and environments. Texts designed for rapid navigation, hyperlinks that encourage jumping, and physical settings full of social distraction all push readers towards time-saving strategies of skimming and rapid selection. As a consequence, wrap-up time at sentence boundaries shrinks and the cross-sentence integration needed for deep comprehension becomes fragile. Temporal acceleration thus operates through media, interfaces and physical settings to produce cognitive fragmentation, consistent with accounts of social acceleration outlined in the introduction (Staudacher, 2023).

Cognitive and Emotional Metrics

The second cluster explains how time functions as a cognitive and emotional resource that shapes reading strategies and engagement. At the level of cognitive metrics, Zhang and Wang (2024) showed that readers with high trait anxiety have a narrower perceptual span when reading Chinese: they process fewer characters to the right of fixation, read more slowly and make more regressions than readers with low anxiety. Although final

comprehension did not differ greatly, the high-anxiety group had to invest greater visual effort to achieve similar outcomes. This illustrates one face of temporal anxiety, in which readers "pay" for comprehension with heavier attentional work.

Experiments on waiting have framed time explicitly as a currency that readers spend to obtain the reading experience. Bains et al. (2023) found that willingness to wait for subsequent text was positively related to both enjoyment and comprehension: readers who enjoyed a text more were willing to invest more time in continuing it. Time here is not merely objective duration but an indicator of the affective value attached to a text.

Temporal illusions also show how people evaluate time. Tausen (2022) found that people systematically misjudge the time that future activities will take and the time they will have available. Although that study did not examine reading, the pattern may help explain why readers postpone long texts until a deadline and then feel that there is not enough time to read carefully, turning to skimming and searching as quick fixes.

Mason and Warmington (2024) found that many university students experience academic reading as a chore. Heavy reading loads and assessment pressure lead them to search for quotations, jump to keywords and read only what assignments require, so that time is treated not as an opportunity to think but as a scarce resource to be managed. Fang et al. (2022) identified profiles of adult readers with limited literacy that differed in speed and accuracy, and showed that fast and accurate readers and slow but accurate readers outperformed those who read quickly but inaccurately. Speed alone is therefore not a reliable indicator of reading proficiency, and careful strategies that prioritise thorough processing can confer advantages.

These findings answer RQ2 by revealing mechanisms that link acceleration to reading difficulties. Perceptions of time scarcity and temporal illusions make long reading feel burdensome, pushing readers towards avoidance or quick extraction, and for readers with high anxiety reading demands even greater attentional investment. From a temporal literacy perspective, time is not neutral but a field in which the tension between speed and depth is played out: it can be treated as a cost to be minimised or as a space deliberately opened to enable comprehension and reflection.

Interventions and Temporal Ethics

The third cluster shows how pedagogical interventions and ethical frameworks can reshape readers' relationships with time and reading. Experimentally, Lusnig et al. (2023) showed that a meditation training programme improved text comprehension among novices

without increasing reading speed. The training also strengthened concentration and some aspects of emotion regulation, although these did not fully mediate the comprehension gains. Mindfulness appears to help readers stay focused and reduce distraction, leading to deeper processing at the same reading speed. Improving depth, in other words, does not require reading faster but changing how present the reader is while reading.

In primary education, Kuhn et al. (2025) found that both repeated and wide reading of challenging social studies texts improved comprehension among struggling readers, with the largest gains among students with the lowest initial skills. This highlights the importance of providing enough time and appropriate difficulty so that vulnerable readers experience complete, successful reading. Schuler et al. (2024) tested an intervention combining self-regulated learning with reading strategies and found improvements only in classes that implemented it consistently, which suggests that changes in reading strategies and time management require stable, sustained implementation.

Smeplass (2023) showed that slow reading sessions in small groups helped vocational teacher students understand difficult theoretical texts, connect them to professional experience and build a sense of community, although some participants felt that the practice was time-consuming and clashed with a culture of accelerated study. Baldi and Kuusinen (2025) reported that slow reading of student evaluations helped lecturers move from a defensive stance to open reflection, reducing emotional reactivity and framing evaluations as opportunities for professional learning. Both studies indicate that changing reading rhythms also changes how educational actors experience academic time.

Okello and Garcia (2025) and Wong (2025) address the ethical dimension of slow reading. Okello and Garcia describe deep reading as a practice that resists extractive reading aimed only at finding key points quickly, and argue that slowing down and opening oneself to complexity, particularly when reading marginalised voices, is a political and ethical act. Wong argues that Zhu Xi's method of deep reading cultivates virtues such as patience, carefulness and humility, which require a willingness to delay judgement and give a text time to work on the reader.

Staudacher's (2023) reading of Simmel shows that modernity generates a persistent conflict between acceleration and reflection, and Haider et al. (2022) call for more explicit consideration of time in information studies. Combined with the empirical findings on mindfulness, slow reading and pedagogical interventions, these contributions provide a foundation for temporal literacy as a capacity to read and manage time reflectively. In answer to RQ3, temporal literacy concerns not only which texts are selected but also the rhythm and

depth of engagement, and it recognises slowness as a deliberate choice within a dominant logic of speed.

Integrating the Temporal Literacy Model

Synthesising the three clusters makes it possible to formulate a conceptual pathway linking temporal acceleration, reading strategies and interventions. Acceleration, built into media environments and institutional expectations, fosters perceptions of time scarcity and temporal anxiety, especially when readers face long and complex texts.

In response, readers shift from comprehensive reading to skimming, keyword searching and hyperlink-driven selective reading. These strategies reduce the perceived temporal burden but also cut wrap-up time at sentence ends and the opportunities for cross-sentence integration. Cognitive fragmentation then emerges, as information is processed in pieces that are not bound into a global representation, contributing to weaker deep comprehension and reduced capacity for the slow thinking needed for critical reflection and ethical formation.

Interventions centred on slow reading and contemplative practice enter this pathway as efforts to reverse its direction. Mindfulness training, individual and collective slow reading sessions, mindful activities in nature and reading tasks that allow sufficient time help readers restore focused attention and emotion regulation. When readers are no longer driven by a constant sense of time shortage, they are better able to stay with the text, resist the urge to jump and allow integrative processes to run their course.

Within this framework, temporal literacy can be understood as the ability to recognise when time-saving strategies begin to erode depth, and the capacity to choose reading rhythms that restore it. The model brings together the answers to the three research questions: it explains how acceleration affects reading habits and attention (RQ1), maps the psychological mechanisms linking time perception, anxiety and reading strategies (RQ2), and shows how slow reading can act as a form of temporal resistance that restores depth of reflection (RQ3). Because much of the evidence comes from small or single-site studies and from conceptual work, the model should be treated as a framework for further testing rather than an established causal account.

Implications

Theoretically, this review supports the view that the reading difficulties observed in the digital era cannot be attributed only to technological distraction or declining enthusiasm

for reading. Temporal acceleration, perceived time scarcity and the adoption of time-saving strategies need to be incorporated into theories of deep reading, and temporal literacy offers a framework for integrating the cognitive, emotional, social and ethical dimensions of reading in a culture of speed.

Practically, the findings underline the need to design reading experiences around the rhythm and depth of engagement, not only the volume of reading. Educators can reduce the effect of excessive reading demands by clarifying the purpose of assigned texts, creating opportunities for collective slow reading and building attention training into reading activities. Designers of digital platforms and libraries can consider how layout, navigation features and information markers shape readers' attention, and to what extent they support or hinder deep comprehension. Literacy in an age of acceleration is therefore not only the technical ability to decode text but also the capacity to manage time and attention so that reading remains a space for thinking, feeling and self-formation.

CONCLUSION

This systematic review synthesised research published from 2020 to 2025 on how temporal acceleration, perceived time scarcity and slow reading practices influence reading habits, attention and comprehension, and examined temporal literacy as a framework for understanding these changes.

Four main findings emerged from the 22 studies. First, digital and physical reading environments, with hyperlinks, dense visuals and ambient noise, consistently direct readers towards faster and more fragmented processing, resulting in shorter fixations and weaker global comprehension. Second, time functions as a cognitive and emotional resource: subjective time scarcity, temporal illusions and anxiety push readers towards skimming and search-based strategies even when these compromise understanding. Third, empirical work on mindfulness, guided slow reading and appropriately paced reading tasks shows that depth and reflection can be restored without any increase in reading speed. Fourth, conceptual studies converge on the idea of temporal literacy as the capacity to regulate reading rhythms, recognise pressures of acceleration and treat slow reading as an intentional choice rather than a deficiency.

The main contribution of this review is to present temporal literacy as a lens that connects these strands of evidence, placing reading time at the centre of inquiry and offering a vocabulary for describing how readers negotiate speed and slowness across platforms and learning contexts. For researchers, the review underlines the need to include temporal

variables such as perceived time pressure, temporal anxiety and reading rhythm in models of reading. For educators, it supports clarifying the purpose of assigned readings, reducing excessive content and treating slow, repeated reading as a core pedagogical practice. For platform designers and policymakers, it suggests attending to interface features that shape temporal perception and broadening literacy assessment to include depth and sustained attention.

The review has limitations. It included only English-language peer-reviewed studies published between 2020 and 2025 and may have missed relevant work in other languages, earlier debates or sources outside the selected databases and keywords. The variety of designs and outcome measures made it impossible to calculate pooled effect sizes, so the synthesis remains qualitative and interpretive, and several included studies were small, single-site or conceptual. Future research should test the temporal literacy model across populations and cultural settings, develop reliable instruments to assess temporal literacy as a skill, and use longitudinal and intervention designs to determine whether changes in platform design and temporal literacy training produce sustained improvements in comprehension, critical judgement and reading engagement.

AI USE AND DISCLOSURE

Generative AI (Claude, Anthropic) was used to edit the language, check the consistency of the method and findings, verify references and format the manuscript according to the journal template. The authors reviewed and verified all content and take full responsibility for the article. Please confirm or revise this statement.

ETHICAL STATEMENT AND INFORMED CONSENT

This study is a systematic review of published research and did not involve human participants; ethical approval and informed consent were therefore not required.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

- Alda Dea Andani: Investigation, Data curation, Writing – original draft.
- Jesika Bungaria Br Sinaga: Investigation, Formal analysis, Writing – original draft.
- Lidiana Maharani: Data curation, Formal analysis, Writing – original draft.
- Silvia Ramanda Putri: Investigation, Writing – review & editing.
- Herdi: Conceptualization, Methodology, Supervision, Writing – review & editing.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this article.

DATA AVAILABILITY

No new data were generated. The extraction sheet for the 22 included studies is available from the corresponding author on reasonable request.

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