

Exploring EFL students' skimming experiences through metacognitive strategies in digital e-book reading

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ABSTRACT

This study aims to examine the use of metacognitive-based skimming strategies in the context of academic reading among EFL students reading academic e-books. This study uses mixed method design with sequential explanatory approach to integrate quantitative and qualitative data systematically. The study participants consisted of ten students of the fifth semester of the English Language Education Study Program at Universitas Kuningan who were selected through convenience sampling and involved in all stages of the research. Data collection was conducted through four stages, namely initial observation to identify student skimming strategies before intervention, application of metacognitive-based skimming learning that includes planning, monitoring, and evaluation stages, filling out questionnaires through Google Forms, and open interviews to explore student experiences and reflections. Quantitative Data were analyzed using descriptive statistics, while qualitative data were analyzed thematically. The results showed that in the early stages, most students apply skimming intuitively and unstructured with a limited level of metacognitive awareness. After the implementation of metacognitive-based learning, students showed noticeable improvement in setting reading goals, controlling the skimming process, as well as evaluating the accuracy of the main ideas obtained.



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Academic reading practices in the digital age have undergone significant transformation, requiring new approaches to processing information. Twenty-first century students are increasingly exposed to complex, multimodal, and information-dense academic texts. Under these conditions, linear and detailed reading is often insufficient to meet the demands of fast-paced academic environments (Allehyani et al, 2025; Bogaert et al, 2025; Fok et al, 2024; Ounissi

et al, 2025). Recent studies indicate that digital readers rely more on visual pattern recognition, contextual cues, and selective attention, reflecting a shift from sequential reading toward strategic information filtering (Song et al, 2026). This shift is particularly relevant to skimming practices in EFL contexts, where learners are required to quickly identify main ideas without processing every linguistic detail. In such contexts, skimming becomes a practical strategy that aligns with selective attention processes, allowing EFL learners to manage complex academic texts more efficiently despite limitations in vocabulary and language proficiency. Therefore, skimming is no longer merely a speed-reading technique but a strategic academic skill that enables readers to identify main ideas, understand text structure, and evaluate relevance efficiently (Fadilla et al, 2024; Nguyen & Nguyen, 2024).

Despite the growing importance of skimming, teaching practices in English as Foreign Language (EFL) contexts still reveal clear gaps. In many EFL classrooms, reading instruction is still primarily oriented toward general comprehension skills, such as understanding details, answering questions accurately, and processing texts linearly. This broad focus on comprehension often overlooks the distinction between intensive reading and selective reading strategies. Instruction often emphasizes detailed comprehension and accuracy, while selective reading skills such as skimming receive limited attention (Al-Hawamdeh, 2025; Capin et al, 2025; Fitria et al, 2024; Nursalim et al, 2025). This approach contrasts with contemporary pedagogical perspectives that highlight goal-oriented and strategic reading processes (Yeo, 2026). In practice, many EFL learners continue to read texts word by word, even when full comprehension is not required (Hazaea, 2025). This suggests that the issue lies not in the absence of skimming strategies, but in the lack of structured practice and instructional support that position skimming as an essential academic skill.

Furthermore, skimming should be understood as a strategic reading technique that is regulated by metacognitive processes rather than a purely mechanical skill. Recent research emphasizes that effective reading depends on learners' ability to regulate their cognitive processes, including setting reading goals, monitoring comprehension, and evaluating outcomes (Jang et al, 2025; Wei et al, 2025; Ramli et al, 2025). This perspective aligns with interactive models of reading, which highlight the dynamic interaction between reader intention, text structure, and strategic decision-making, particularly in digital and multimodal environments (Nash et al, 2026). Empirical evidence also shows that metacognitive strategies mediate the relationship between reading motivation and comprehension outcomes, especially in contexts requiring efficiency (Bogaert et al, 2025). Moreover, controlling reading pace—rather than merely increasing speed is essential for maintaining comprehension accuracy (Schwalm et al, 2026). These findings highlight the importance of metacognitive regulation in effective skimming practices.

In addition, digital reading environments offer potential support for strategic reading, although their educational use remains under-optimized.

Features such as digital annotation, text tagging, and navigation tools can facilitate strategic information management when used appropriately (Mendhakar et al, 2025; Jose, 2025). Interactive elements, including social annotation and embedded quizzes, have also been shown to enhance engagement and promote reflective reading (Clinton-Lisell, 2026). However, studies indicate that the mere use of e-books does not automatically improve reading quality without clear instructional guidance (Islam et al, 2025; Moradi & Ghabanchi, 2025; Andong et al, 2025). Evidence further suggests that structured support systems, such as guided instruction and scaffolding, are necessary to transform digital access into meaningful reading development (Ready et al, 2026; Xue, 2026). This confirms that technology alone is insufficient to foster metacognitive skimming skills.

This condition reveals a significant research gap. Although studies on e-books, metacognitive strategies, and skimming have advanced, they are often examined in isolation. E-book research tends to focus on motivation and engagement, while metacognitive studies emphasize internal cognitive processes. Meanwhile, skimming is frequently treated as a traditional reading technique (Maili, 2025; Liu & Mohd Saad, 2025; Suparmi & Susanto, 2025). Large-scale studies further indicate that the effectiveness of ICT in reading literacy is influenced by metacognitive awareness and reading engagement rather than technology use alone (Altimura, 2023; Liu & Zhang, 2026). However, limited research explicitly integrates metacognitive strategies with skimming practices in digital reading environments. Consequently, there is a lack of empirical evidence on how metacognitive-based skimming can be effectively applied in e-book contexts for EFL learners.

To address this gap, this study conceptualizes skimming as a metacognitively guided reading practice within a digital environment. This perspective aligns with theoretical frameworks that view reading success as the integration of cognitive processing, strategic regulation, and communicative purpose, particularly in academic contexts requiring efficient meaning extraction (Kumar & Sathyanathan, 2026; Liswaniso, 2026). Psycholinguistic perspectives further emphasize the importance of strategic reading in managing complex texts under cognitive and time constraints (Cubilla-Bonnetier et al, 2026; Liao, 2026). Accordingly, this study is guided by the following research questions: (1) How do EFL students perceive the use of metacognitive reading strategies when skimming in an e-book reading environment? (2) How do metacognitive reading strategies relate to EFL students' reported skimming practices in identifying main ideas in academic texts?

This study aims to explore students' perceptions and examine the impact of metacognitive strategies on skimming practices in digital reading contexts. Its significance lies in contributing to theoretical discussions on strategic reading in the digital era, as well as providing practical insights for the development of technology-integrated EFL reading instruction.

METHOD

Research Design

This study employed a mixed-methods design using an explanatory sequential approach. The quantitative phase was conducted first through questionnaires to identify general patterns of students' perceptions and their use of metacognitive skimming strategies. The results of this phase were used to inform the qualitative phase by identifying specific areas that required deeper exploration, such as students' difficulties in setting reading goals and monitoring their comprehension during skimming. Based on these findings, the qualitative phase was carried out through open ended responses and interviews to further explain and elaborate the patterns identified in the quantitative data. This sequential process allowed the researcher to gain a more comprehensive understanding of students' metacognitive awareness and skimming practices in a digital.

The study involved 10 fifth semester students from the English Language Education Study Program at Universitas Kuningan. The participants were selected using a convenience sampling technique, as they were actively engaged in academic reading activities and familiar with digital texts. All participants were involved in each stage of the study, including initial observation, treatment, questionnaire completion, and open-ended interviews.

Although the sample size is relatively small, it is considered appropriate for this study because the research aims to explore students' metacognitive reading strategies and skimming practices in depth rather than to generalize findings to a larger population. In mixed-methods research with an explanatory sequential design, a smaller sample can provide sufficient initial quantitative insights while allowing for more detailed qualitative exploration.

Furthermore, the use of open-ended interviews enables the researcher to obtain rich, detailed data that support the interpretation of quantitative findings. Therefore, the focus of this study is on depth of understanding and contextual insight, which supports the use of a limited number of participants.

Instruments and Procedures

Survey questionnaire

The study employed four main instruments: (1) academic e-books, (2) a metacognitive-based skimming framework, (3) a structured questionnaire, and (4) open-ended interview questions, each serving distinct analytical functions. The academic e-books functioned as reading materials to observe students' skimming practices across different stages of the study. The metacognitive-based skimming framework was used as an instructional and analytical guide, structured around three stages: planning, monitoring, and evaluation.

The questionnaire consisted of 15 items using a 5-point Likert scale (ranging from strongly disagree to strongly agree), designed to measure students' perceptions of their use of metacognitive strategies during skimming activities. The items were developed based on key constructs of metacognitive reading strategies, including goal setting, comprehension monitoring, and self-evaluation.

The open-ended interview questions were used to explore students' experiences in greater depth, particularly regarding how they applied metacognitive strategies and how these strategies shaped their skimming practices in a digital reading environment.

Data collection was conducted in four stages. In the first stage (initial observation), students were asked to skim an academic e-book titled *What Is English Teaching?* by Chris Davis within a limited time, without prior instruction on metacognitive strategies. They were required to identify the main ideas of the text, while observations were conducted to examine their initial strategies and difficulties.

In the second stage (treatment), students were introduced to metacognitive-based skimming strategies using the e-book *Teaching Business English: An Introduction to Business English* by Mark Ellis and Christine Johnson. During this stage, students applied planning strategies by reviewing headings and setting reading goals, monitoring strategies by focusing on key textual elements, and evaluation strategies by reflecting on the accuracy of their identified main ideas.

In the third stage, students completed an online questionnaire using Google Forms. The questionnaire measured students' perceptions of metacognitive reading strategies, the usefulness of e-book features, and their confidence in applying skimming techniques.

In the final stage, students completed open-ended written responses via Google Forms. These responses were used to explore students' reading experiences, perceived strategy changes, and their reflections on metacognitive awareness in digital reading contexts.

Data Analysis Procedures

Quantitative data were analyzed using descriptive statistics, including mean scores and percentage distributions, to identify general trends in students' perceptions of metacognitive reading strategies and their skimming practices. These results were used to provide an overall picture of students' responses and to inform the focus of the qualitative analysis.

Qualitative data were obtained from structured classroom observations and open-ended written responses. During the initial skimming task, observations focused on specific indicators, including students' reading behaviors (e.g., reading sequence, attention to headings, and time management), strategy use (e.g., identifying keywords, topic sentences, and text structure), and observable difficulties. These observations were recorded using field notes guided by a structured observation checklist based on metacognitive components (planning, monitoring, and evaluation).

The qualitative data were analyzed using thematic analysis. The analysis followed several stages. First, initial codes were generated inductively from the data by identifying recurring patterns related to students' skimming behaviors and metacognitive awareness. Second, these codes were grouped into broader categories aligned with the metacognitive framework (planning, monitoring, and evaluation). Third, themes were refined by reviewing the consistency and relevance of each category across different data sources. Finally, key themes were defined and interpreted to explain how students engaged in skimming practices within the digital reading context.

To enhance the credibility of the findings, triangulation was applied by comparing data from observations, questionnaire results, and open-ended written responses. Consistency was ensured by using the same analytical framework across all data sources. In addition, transparency was maintained by clearly documenting the coding and categorization process.

Ethical considerations were also taken into account. All participants were informed about the purpose of the study and provided voluntary consent prior to data collection. Participant confidentiality was strictly maintained, and all data were used solely for academic purposes.

FINDINGS

Students' Initial Skimming Practices and Metacognitive Awareness

The initial observation showed that EFL students used different skimming practices and had varying levels of metacognitive awareness when reading English academic e-books without direct metacognitive instruction. Most students approached skimming in an intuitive and disorganized way. They mainly relied on surface cues from the text instead of using strategic planning or evaluation.

Several students used surface-level skimming strategies, such as reading the text multiple times, searching for keywords, and highlighting single sentences. These students focused mostly on visible text elements like subheadings or bolded words and did not demonstrate clear efforts to set

reading goals or evaluate their understanding. For example, one student noted in the written response, "I just look at the bold words and try to guess the meaning quickly without reading everything." Another student stated, "I read again and again because I am not sure which part is important." These responses indicate that their reading decisions were made spontaneously rather than through planned strategies.

This pattern suggests that students demonstrated a basic level of metacognitive awareness. While they were able to locate specific information, they often struggled to construct a clear understanding of the main ideas. Observation data also showed that students frequently paused when asked to explain the overall meaning of the text, indicating limited monitoring and evaluation during the skimming process.

Other students showed a moderate level of engagement by combining skimming and scanning techniques. They focused on keywords, repeated terms, and paragraph openings. For instance, one student stated, "I try to read the first sentence of each paragraph and look for repeated words to understand the topic." Another student explained, "Sometimes I change the way I read depending on the question, like I look for specific words first." These responses indicate that students were beginning to recognize how text structure supports meaning and were starting to adjust their reading strategies based on task demands.

However, this regulation appeared to be inconsistent. Some students admitted that they did not evaluate their understanding after reading. As one student noted, "After skimming, I don't check again if my answer is correct." This shows that while elements of monitoring were emerging, evaluation strategies were not yet consistently applied.

A smaller group of students displayed stronger metacognitive skimming practices. They intentionally focused on important parts of the academic e-book, such as the table of contents, introductory sections, and recurring concepts. One student reported, "Before reading, I check the headings and think about what I want to find." Another stated, "I focus on the main ideas and skip details that are not important." These responses reflect clearer planning and more strategic control during the skimming process.

Their ability to identify main arguments efficiently without detailed reading indicates a higher level of metacognitive regulation. Observation data also showed that these students spent less time rereading and were more confident when explaining the overall meaning of the text.

Overall, the findings show that students' initial skimming practices ranged from instinctive to more strategic approaches, with noticeable differences in how

metacognitive processes were applied. While some students relied on surface-level behaviors, others began to demonstrate awareness of planning and monitoring during skimming. However, systematic evaluation of understanding was still largely absent at this stage, indicating that metacognitive regulation had not yet been fully developed prior to the instructional intervention.

Changes in Students' Skimming Strategies after Metacognitive-Based Instruction

Following the implementation of metacognitive-based skimming instruction, the findings indicate improvements in students' reading strategies across planning, monitoring, and evaluation stages, as reflected in both observation data and students' written responses. Compared to the initial observation, students engaged with academic e-book texts in a more structured and intentional way. At the **planning stage**, most students set clear reading goals before starting their skimming. These goals include predicting content based on titles and subheadings, identifying the main idea, or grasping the overall focus of the text. Many students showed greater awareness of their reading purposes by matching their skimming strategies with specific academic tasks. This change shows a clear improvement in metacognitive planning. Students no longer viewed skimming as a random activity; instead, they treated it as a goal-oriented reading process.

Improvements were also clear at the **monitoring stage**, where students showed better use of textual cues. Instead of depending only on keyword searching, students focused on headings, opening paragraphs, repeated key terms, and conceptual signals within the text. Many students adjusted their skimming strategies while reading, indicating greater awareness of their comprehension process. Although the monitoring level varied among students, the overall pattern suggests a shift toward more controlled and adaptable reading behavior. The most significant change occurred at the **evaluation stage**. After the instructional intervention, students became better at assessing the accuracy of their skimming results. Several students felt confident in identifying main ideas and key arguments, while others showed critical awareness by recognizing gaps in their understanding. This reflective behavior shows the development of higher-level thinking. Students were able to assess the effectiveness of their strategies instead of just completing the reading task.

Overall, the results suggest that instruction focused on metacognition helped students shift from intuitive skimming to strategic and self-regulated reading. Students demonstrated clearer planning, more consistent monitoring, and more thoughtful evaluation of their comprehension. This highlights the

importance of metacognitive guidance in improving academic e-book reading performance.

Students' Perceptions of Skimming Effectiveness and Digital Reading

Table 1 Students' Perceptions of Skimming Effectiveness and Metacognitive Awareness in Academic E-book Reading

Aspect	Questionnaire Indicator	SA n (%)	A n (%)	N n (%)	Dn (%)	SD n (%)
Reading Comprehension Efficiency	Skimming helps understand the main idea more quickly	6 (60%)	4 (40%)	0 (0%)	0 (0%)	0 (0%)
	Digital reading strategies help identify key information	5 (50%)	4 (40%)	1 (10%)	0 (0%)	0 (0%)
	Ability to grasp general meaning without reading every sentence	4 (40%)	5 (50%)	1 (10%)	0 (0%)	0 (0%)
	Digital tools help focus on important parts of the text	3 (30%)	4 (40%)	3 (30%)	0 (0%)	0 (0%)
Metacognitive Awareness	Thinking about reading goals before reading	6 (60%)	4 (40%)	0 (0%)	0 (0%)	0 (0%)
	Monitoring understanding during reading	7 (70%)	3 (30%)	0 (0%)	0 (0%)	0 (0%)
	Evaluating understanding after reading	2 (20%)	6 (60%)	2 (20%)	0 (0%)	0 (0%)
	Metacognitive strategies help control digital reading	4 (40%)	5 (50%)	1 (10%)	0 (0%)	0 (0%)
Attitude Toward Digital Reading	Enjoy reading English texts digitally	3 (30%)	6 (60%)	1 (10%)	0 (0%)	0 (0%)
	Digital reading reduces intimidation	5 (50%)	4 (40%)	1 (10%)	0 (0%)	0 (0%)
	Confidence in reading English digitally	3 (30%)	4 (40%)	3 (30%)	0 (0%)	0 (0%)
	Digital reading increases motivation	4 (40%)	5 (50%)	1 (10%)	0 (0%)	0 (0%)
Strategy Use in Skimming	Using headings and subheadings	7 (70%)	3 (30%)	0 (0%)	0 (0%)	0 (0%)
	Focusing on first and last paragraphs	6 (60%)	4 (40%)	0 (0%)	0 (0%)	0 (0%)
	Relying on keywords	4 (40%)	5 (50%)	1 (10%)	0 (0%)	0 (0%)
	Digital tools support skimming strategies	2 (20%)	5 (50%)	2 (20%)	1 (10%)	0 (0%)
Perceived Impact of Instruction	Guided steps improve skimming effectiveness	6 (60%)	4 (40%)	0 (0%)	0 (0%)	0 (0%)
	Increased awareness of reading strategies	4 (40%)	5 (50%)	1 (10%)	0 (0%)	0 (0%)

Improved reading efficiency after treatment	2 (20%)	6 (60%)	2 (20%)	0 (0%)	0 (0%)
Willingness to apply strategies in future tasks	4 (40%)	5 (50%)	1 (10%)	0 (0%)	0 (0%)

The results from the questionnaire (N = 10) suggest that students generally held positive perceptions toward the use of skimming strategies and metacognitive awareness in digital reading contexts (see Table 1). Overall, students tended to perceive skimming as a helpful strategy for identifying main ideas and supporting more efficient engagement with academic texts. This pattern may reflect a movement toward more selective and goal-oriented reading practices within digital environments.

Students also reported that digital reading strategies appeared to support their ability to locate key information and grasp general meanings without engaging in detailed reading. However, perceptions regarding the effectiveness of digital tools in directing attention to essential information were more varied, suggesting that some students may still require guidance in using these features strategically. From a metacognitive perspective, the findings reveal strong engagement in planning and monitoring processes. Students demonstrated awareness of setting reading goals prior to reading and actively tracking their comprehension during the process. These behaviors align with metacognitive regulation frameworks, which highlight planning and monitoring as central components of effective reading strategies. However, the evaluation stage was less consistently developed, indicating that students were not yet fully accustomed to critically reflecting on the effectiveness of their reading strategies. This pattern supports previous findings that evaluation is often the most challenging aspect of metacognitive development and requires explicit instructional support.

In terms of attitudes toward digital reading, students expressed generally positive responses, particularly in relation to increased motivation and reduced anxiety when engaging with English texts in digital formats. This suggests that digital environments can enhance affective engagement in reading. Nevertheless, variations in students' confidence indicate that digital familiarity does not automatically translate into reading self-efficacy, highlighting the need for continued support in developing confidence alongside strategic skills.

Regarding strategy use, students demonstrated a clear preference for structured skimming techniques, such as focusing on headings, subheadings, and paragraph positioning. Keyword-based strategies were also commonly applied. These findings indicate that students are beginning to recognize the importance of text structure in supporting comprehension. However, the varied responses

regarding the effectiveness of digital tools suggest that technological affordances alone are insufficient without proper instructional integration.

Finally, students reported that metacognitive-based instructional guidance had a strong impact on their reading practices. They perceived improvements in reading efficiency, increased awareness of strategy use, and expressed willingness to apply these strategies in future tasks. This finding reinforces the role of explicit metacognitive instruction in fostering self-regulated learning and enhancing reading performance. Overall, the results suggest that the integration of metacognitive strategies within digital reading environments can effectively support the development of strategic, efficient, and reflective reading behaviors among EFL learners.

Table 2 Open-Ended Interview Findings on Students' Experiences Using Metacognitive-Based Skimming in E-book Reading

Theme	Key Findings	Example Respondents
Experience	Skimming improved speed	"I can find the main idea faster by reading headings and first sentences" (R1); "Skimming helps me not read everything but still understand" (R4).
Strategies	Used titles, headings, TOC, keywords, summarizing	"I use the table of contents before reading" (R6); "I focus on keywords and important sentences" (R3)
E-book Features	Highlighting, navigation, bold text aided comprehension	"Highlighting helps me remember important parts" (R2); "Navigation tools make it easier to find information" (R7)
Difficulties	Complex vocabulary, long texts, overlapping ideas	"Sometimes the vocabulary is too difficult to understand quickly" (R9); "Long texts make it hard to stay focused" (R3)
Impact	Helped set goals, verify comprehension understanding	"I try to set a goal before reading now" (R1); "After reading, I check if I understand the text" (R5)

The open-ended interviews showed that EFL students made clear improvements in their skimming skills after receiving instruction focused on metacognition while reading e-books. Students said that skimming helped them find the main idea faster and improved their overall reading comprehension. Many students mentioned that the strategies they used before, during, and after reading—like paying attention to titles, headings, subheadings, key sentences, keywords, and summarizing—greatly improved their efficiency in processing academic texts. For example, respondents pointed out that using the table of contents and digital navigation tools let them

quickly find important information. They also found that reflecting after reading helped reinforce their understanding.

When it came to e-book features, students highlighted that tools such as highlighting, bold text, table of contents, and direct navigation made the skimming process easier and supported strategic reading. However, some students noted that links or complicated formatting occasionally distracted them or slowed their comprehension. These comments suggest that digital reading tools can improve strategic reading when used well, but they can also create challenges if overused or not understood.

Students reported facing several difficulties during the skimming process. Common challenges included unfamiliar or complex vocabulary, long paragraphs, dense academic language, and overlapping ideas. Despite these issues, the metacognitive strategies they learned helped them manage these challenges. These strategies encouraged goal setting, monitoring understanding, and evaluating reading outcomes. Students noted greater awareness of their reading process and more control over their comprehension. This indicated a shift from mechanical, intuitive skimming to a more conscious and strategic approach.

Overall, the interviews suggest that instruction based on metacognition in digital reading environments supports both the development of skimming strategies and students' reflective and self-regulatory skills. Participants reported a noticeable improvement in their ability to focus on relevant information, organize reading activities, and assess their understanding. This demonstrates the effectiveness of combining metacognitive strategies with e-book features to improve academic reading efficiency.

DISCUSSION

Metacognitive Instruction and the Development of Strategic Skimming

The findings of this study suggest that metacognitive-based instruction contributed to observable improvements in EFL students' skimming practices in academic e-book reading. Initially, students tended to demonstrate intuitive and unstructured skimming behaviors, relying primarily on surface textual cues such as keywords, headings, and repeated terms without engaging in systematic planning or evaluation. This pattern may be explained by the limited emphasis on explicit strategy instruction in many EFL reading contexts, where reading is often approached as a product-oriented activity rather than a regulated cognitive process.

This finding aligns with previous studies suggesting that EFL learners often approach digital texts mechanically, with limited strategic engagement and metacognitive regulation (Escobar & Espinoza, 2025). Such behavior reflects a relatively basic level of metacognitive awareness, in which reading decisions are

made spontaneously rather than through deliberate control (Jang et al., 2025; Wei et al., 2025). Following the implementation of metacognitive-based instruction, students demonstrated more structured engagement across the stages of planning, monitoring, and evaluation. At the planning stage, students began to set clearer reading goals and align their skimming strategies with academic purposes, indicating a shift toward more goal-oriented reading. This development can be interpreted through the lens of self-regulated learning (SRL), which conceptualizes learning as a cyclical process involving forethought, performance, and reflection. As highlighted by Sari et al. (2026), effective language learning emerges when learners are explicitly guided to engage in goal-setting, monitoring, and reflective evaluation, suggesting that metacognitive instruction plays a crucial role in fostering learner autonomy.

Following the implementation of metacognitive-based instruction, students appeared to demonstrate more structured engagement across the stages of planning, monitoring, and evaluation. At the planning stage, students began to set clearer reading goals and align their skimming strategies with academic purposes, indicating a shift toward more goal-oriented reading. This development is consistent with the findings of Wang and Zhang (2026) and Chen et al. (2026), who emphasize the importance of self-regulated strategies, particularly goal-setting, in supporting academic reading effectiveness. These findings are further supported by studies emphasizing the importance of structured instructional design. For instance, materials developed based on learners' needs have been shown to enhance motivation and engagement in language learning contexts (Sari, 2019). Similarly, strategy-based approaches such as reciprocal questioning demonstrate that guided interaction and cognitive engagement can significantly improve reading comprehension (Sari et al., 2024). Taken together, these findings reinforce the idea that metacognitive instruction is most effective when it is explicitly taught, practiced, and supported within structured learning environments.

Improvements were also observed in the monitoring stage, where students showed greater attention to structural elements such as headings, paragraph openings, and repeated key terms. This may indicate an increased awareness of comprehension processes and a growing ability to adapt reading strategies based on task demands (Ready et al., 2026; Shen et al., 2026). At the evaluation stage, some students demonstrated emerging ability to reflect on their understanding and identify limitations in their strategies, suggesting the gradual development of higher-level metacognitive regulation (Cesur, 2026; Teng & Mizumoto, 2025). However, this aspect appeared less consistent, indicating that evaluative skills may require longer-term practice and reinforcement.

Overall, these findings suggest that metacognitive instruction may help shift skimming from a largely intuitive activity toward a more structured and self-

regulated reading process, although the extent of this development should be interpreted cautiously given the small sample size.

The Role of Digital E-Book Features in Supporting Metacognitive Reading

The findings suggest that e-book features, such as highlighting, tables of contents, navigation tools, and bolded text, may support students' metacognitive skimming practices by making the structural organization of texts more visible. These features appear to function as external scaffolds that guide attention toward key information, thereby reducing cognitive load during selective reading. In this sense, supportive features may help students engage in more efficient information filtering, which is essential in digital reading environments.

In contrast, features such as hyperlinks and complex formatting were reported to occasionally disrupt reading processes. One possible explanation is that these elements increase cognitive demands by requiring readers to shift attention across multiple sources or navigate non-linear text structures. For learners who are still developing strategic reading skills, this additional cognitive load may interfere with comprehension rather than support it. This contrast suggests that digital features do not inherently support reading; rather, their effectiveness depends on how they interact with learners' cognitive and metacognitive capacities. Features that simplify structure and guide attention tend to support skimming, whereas features that increase navigation complexity may hinder it.

This interpretation is consistent with research on technology-enhanced language learning, which highlights that digital tools can improve learning outcomes when integrated with pedagogical guidance. For example, AI-based tools such as text-to-speech systems have been shown to enhance learning by providing immediate feedback, increasing engagement, and supporting individualized learning experiences (Putra et al., 2025). However, these benefits are contingent upon guided use, as unguided interaction with technology may lead to cognitive overload or distraction. Thus, digital reading environments should be understood as supportive rather than self-sufficient, requiring instructional scaffolding to maximize their effectiveness. Prior research emphasizing that digital reading environments can facilitate selective information processing when supported by appropriate instructional guidance (Appleget & Yang, 2026; Fadilla et al., 2024; Kok et al., 2026; Schwalm et al., 2026). Therefore, these findings highlight the importance of not only providing digital tools but also supporting students in using them strategically. Without such guidance, the same features that are intended to support reading may instead become sources of distraction.

Metacognitive Awareness and Self-Regulated Learning in Digital Reading

The findings of this study suggest that metacognitive-based instruction may be associated with increased reflective awareness and more intentional reading behaviors. Students reported increased confidence, improved focus, and a greater willingness to apply skimming strategies in future academic tasks. However, these findings are based on self-reported perceptions and do not constitute a direct measurement of self-regulated learning.

Therefore, while some aspects of students' responses—such as goal-setting, monitoring, and reflection—may indicate emerging characteristics related to self-regulation, these should be interpreted cautiously. The study design does not provide sufficient evidence to confirm the development of fully established self-regulated learning. Instead, the findings may be better understood as reflecting early stages of metacognitive awareness that are potentially linked to self-regulated reading processes. This interpretation remains consistent with previous studies suggesting that metacognitive instruction can support aspects of motivation, awareness, and strategic engagement (Asriyanti, 2025; Wang & Zhang, 2026; Cesur, 2026; Chen et al., 2026), while also acknowledging the methodological limitations of the present study.

This development can be further understood by considering individual differences in learners' ability to regulate their learning processes. Research has shown that factors such as personality traits are closely related to self-regulated learning behaviors, influencing learners' ability to plan, monitor, and evaluate their learning (Aprizani et al., 2023). For instance, traits such as conscientiousness and openness are associated with stronger metacognitive engagement and more effective learning strategies. This suggests that the variability observed in students' evaluation practices may be partly influenced by individual differences in self-regulatory capacity.

In addition, reflective awareness in language learning is often shaped by learners' experiences and sustained engagement with the learning process. As illustrated in autoethnographic accounts of language learning, reflection, persistence, and gradual strategy development play a crucial role in building language proficiency and confidence (Sari, 2025). Similarly, interactive instructional strategies have been shown to enhance engagement and comprehension by encouraging active participation and reflection. For example, the "Give One, Get One" strategy promotes collaborative learning and increases students' confidence in reading tasks (Novalina & Sari, 2025). These findings suggest that metacognitive awareness develops most effectively when supported by both reflective practices and interactive learning environments.

Pedagogical Implications for EFL Digital Reading Instruction

The findings of this study provide several implications for EFL teaching practices, although they should be interpreted with caution due to the limited sample size. The results suggest that metacognitive strategies may be beneficial when explicitly integrated into reading instruction, particularly in digital learning environments. Teachers may consider providing structured guidance that supports students in practicing planning, monitoring, and evaluating their reading processes.

In addition, the use of digital tools may be more effective when accompanied by clear instructional frameworks. Rather than relying solely on technology, educators can design activities that encourage strategic engagement with texts, such as guided skimming tasks, reflective exercises, and goal-oriented reading activities.

Overall, integrating metacognitive-based instruction with digital reading environments appears to offer a potentially useful approach for supporting students' development of strategic reading practices, although further research with larger samples is needed to confirm these findings.

CONCLUSION

This study examined the use of metacognitive-based skimming strategies in a digital e-book reading context among EFL students. The findings indicate that students initially demonstrated largely intuitive and unstructured skimming practices, with limited evidence of planning, monitoring, and evaluation. Following the instructional intervention, students appeared to show more structured and intentional engagement in their skimming processes, particularly in goal-setting and strategy use during reading.

In addition, students generally reported positive perceptions toward the use of skimming strategies and digital reading features, although some aspects—such as the use of certain digital tools—showed less consistent effectiveness. The qualitative findings further suggest that students experienced changes in their reading approaches, particularly in becoming more aware of how to navigate texts and identify key information.

Future research should address several limitations identified in the present study. First, the small sample size ($N = 10$) and the use of convenience sampling limit the transferability of the findings. Therefore, future studies are recommended to involve larger and more diverse participant groups in order to provide more robust and representative insights into students' skimming practices in digital reading contexts.

Second, the study relied primarily on self-reported data from questionnaires and written responses, which may not fully capture students' actual reading behaviors. Future research could incorporate more objective

measures, such as reading comprehension tests, performance-based tasks, or digital tracking tools, to obtain a more comprehensive and accurate understanding of students' metacognitive skimming practices.

Third, although this study adopted a mixed-methods approach, the integration between quantitative and qualitative phases was limited. Future studies should more explicitly connect the two phases, for example by using quantitative findings to guide participant selection or question development in the qualitative phase, in line with a more rigorous explanatory sequential design.

In addition, longitudinal research is needed to examine how metacognitive skimming strategies develop over time and whether the observed changes can be sustained beyond short-term instructional interventions. Addressing these areas would contribute to strengthening both the methodological rigor and the theoretical understanding of metacognitive-based reading strategies in EFL digital contexts.

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