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Research Article

The Needs Assessment for the Development of Mobile Application Based on Scaffolded Reading Experiences and Gamification for Enhancing Digital Reading Literacy of Lower Secondary School Students

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Abstract

This study aimed 1) to investigate the need for developing a mobile application based on scaffolded reading experiences and gamification to enhance the digital reading literacy of lower secondary school students and 2) to explore the students' current and desired states of digital reading literacy competencies at the lower secondary level. The sample consisted of 646 lower secondary students selected through multi-stage sampling. The research instrument was a questionnaire (reliability coefficient of 0.903), which included sections on demographic information, learning needs concerning mobile applications use, and digital reading literacy requirements. Data were analyzed using descriptive statistics and the Modified Priority Needs Index ($PNI_{Modified}$). The findings revealed the top priorities in each domain of learning management to enhance digital reading literacy: 1) mobile application-based learning—sharing opinions or work with teachers and peers via social media on mobile applications ($PNI_{Modified}$ = 0.27), 2) scaffolded reading experiences—reading articles on mobile applications while highlighting key information during reading ($PNI_{Modified}$ = 0.42), and 3) gamification—collecting reward badges from participating in article-reading activities on mobile applications ($PNI_{Modified}$ = 0.39). Regarding digital reading literacy competencies, the top three essential needs were: (1) the ability to explain the meaning of words, sentences, and main ideas in sequence and interpret the main concept by connecting it with real-life situations ($PNI_{Modified}$ = 0.25), (2) the ability to search for information on the internet using appropriate keywords aligned with specific objectives ($PNI_{Modified}$ = 0.20), (3) the ability to identify the main idea of a text and support it with clearly connected and logically consistent evidence ($PNI_{Modified}$ = 0.19).

Keywords: mobile application, scaffolded reading experiences, gamification, digital reading literacy

Introduction

In today's rapidly evolving digital era, low levels of reading proficiency remain a pressing concern particularly in Thailand, where 64.7% of people aged 15–64 fall below foundational reading literacy levels, limiting their ability to interpret and act on everyday texts such as health information (World Bank, EEF (Thailand) and Thammasat University, 2024). This skills gap is especially alarming in light of the growing demand for 21st-century competencies, which require individuals to search for, process, and critically evaluate digital information. The urgency is further amplified by the fact that 91.2% of the Thai population is online and mobile broadband subscriptions exceed 139% of the population (Kemp, 2025), highlighting the need for effective digital reading literacy instruction that meets learners where they already are on mobile devices.

International assessments such as the OECD's Programme for International Student Assessment (PISA) consistently underscore the importance of digital reading literacy a skill that extends beyond simply reading text on screens to include evaluating credibility, integrating multiple sources, and applying information in real-life contexts (OECD, 2021). Thai students' performance in PISA 2015 and 2018 showed scores below the OECD average with a declining trend (OECD, 2019), signaling the urgent need for innovative, evidence-based instructional frameworks aligned with students' digital behaviors.

One promising approach is the scaffolded reading experience (SRE), which structures learning into pre-reading, during-reading, and post-reading stages to promote comprehension, critical thinking, and learner autonomy (Fitzgerald & Graves, 2004). For young learners, self-regulating while engaging with complex texts is challenging; however, appropriate scaffolding during reading has been shown to significantly improve outcomes (Lunrasri et al., 2022). When delivered via mobile applications, SRE can be made more accessible and adaptable. Mobile learning has been shown to increase engagement, especially when integrated with gamification the use of points, badges, competition, and level progression to sustain motivation (Abu Sa'aleek & Baniabdelrahman, 2020; Mingsiritham, 2023). Recent studies confirm its effectiveness: a 2024 Thai study found gamified reading instruction improved both comprehension and learner engagement (Matyakhan et al., 2024), while a 2025 Chinese study reported that gamified e-books integrating metacognitive reading strategies enhanced reading motivation and problem-solving performance (Shao et al., 2025).

Given these trends and empirical findings, the integration of SRE with mobile applications and gamification represents a high-potential framework for promoting digital

reading literacy. This article focuses specifically on the need assessment phase, aiming to: 1) identify the current and desired digital reading literacy competencies of lower secondary students, and 2) determine their instructional needs and preferred gamified features. These insights will serve as the foundation for the design and development of a mobile application that is theoretically grounded and contextually relevant.

Objectives

1. To investigate the need for developing a mobile application based on scaffolded reading experiences and gamification to enhance the digital reading literacy of lower secondary school students.

2. To explore the students' current and desired states of digital reading literacy competencies at the lower secondary level.

Literature Review

Mobile Application

A mobile application is a portable communication device that allows users to use wireless technology to assist them in completing desired goals (Nakhonsongkhla, 2018; Phulthawitham, 2023). Mobile phones have become an important part of teaching and learning, providing opportunities for learning in a mobile sense, or ubiquitous learning, both in and out of the classroom (Peng, 2022). Their mobile capabilities and embedded technologies allow true mobility with the opportunity for students to practice their language in an active fashion in fluid environments (Keezhatta & Omar, 2019). Research evidences how mobile applications enhance reading motivation by expanding through the accessibility of mobile phones as informal learning supports (Hendriwanto & Kurniati, 2019). Mobile-app-based learning has been supported by students' positive attitudes towards mobile app learning (Lam et. al, 2022), and Shofi and Jannah (2022) specifically found significant learner interest and engagement for language improvement. There is significant potential for enhancing learning outcomes and for them to be user-friendly.

Scaffolded Reading Experience

The Scaffolded Reading Experience (SRE) approach is a teaching procedure that provides a systematic method to read texts. It is divided into a pre-reading, during-reading, and post-reading context. SRE allows the reader to align their reading process with their learning outcomes, facilitating understanding, purpose, using strategies, and enjoyment while they read. Each phase provides scaffolding based on the complexity of the content to help learners be successful (Clark & Graves, 2005). Numerous studies demonstrate that SRE produces improved outcomes. The experimental group showed consistent and robust improvement when compared to a control group, as well as developing a more positive orientation towards learning (Herawati et. al, 2020). The SRE also provided an experience of creating purposeful reading with a specific goal, supported through scaffolded teacher support to deal with potential challenges, facilitating understanding, motivation, and enjoyment of learning a new text. Students reported that the scaffolded strategies were beneficial in assessments as well, so it could make reading easier (Yawiloeng, 2022; Qushoy, 2022).

Gamification

Gamification uses game design elements and principles in the field of education to enhance learners' motivation via an engaging, exciting, and competitive environment. These environments harness attention, engage learners, and tie the development of skills with instruction for outcomes that promote learning (Hsu & Chen, 2018; Sheldon, 2020). The advantages of gamified settings have been documented in research; studies have shown that when students were involved in a gamified environment, they had higher motivation and better reading outcomes than students in traditional settings (Abu Sa'aleek & Baniabdelrahman, 2020). Even though there are challenges surrounding high dropout rates in online learning, gamification has shown to create satisfaction and sustain motivation (Toimah et. al, 2021). Studies have shown that motivation remains elevated during reading activities that need gamified aspects, and students' motivation remained higher than normal baseline levels, even when the gamified features were removed (Zhu et al., 2019).

Digital Reading Literacy

Digital reading literacy is defined as the ability to read, search for information, understand, integrate, and critically assess the credibility of single or multi-sourced texts using an electronic device. This process entails the application of various reading techniques necessary for navigating and processing information from digital texts. As an evolving skill, digital literacy could be defined in three fundamental areas of knowledge: 1) Locating Information: Finding and retrieving relevant data from a digital document. 2) Understanding Content: Skimming or interpreting the underlying message of the document. 3) Evaluating and Reflecting: Judging the value, accuracy, and importance of the document and contemplating its consequences (Mullis et al., 2021; OECD, 2021; National Assessment Governing Board, 2023).

Synthesis of Literature

While each component mobile applications, SRE, and gamification offers distinct benefits, their integration forms a synergistic framework for promoting digital reading literacy. Mobile applications provide the flexible, ubiquitous access necessary for delivering reading instruction in contexts aligned with learners' daily digital practices.

The SRE framework ensures that reading activities are structured, scaffolded, and cognitively engaging, guiding learners from pre-reading preparation through active reading and post-reading synthesis. Gamification, when embedded within mobile SRE-based activities, sustains motivation and fosters persistence through meaningful rewards, competition, and immediate feedback. Together, these elements create a high-potential instructional model that not only supports the acquisition of digital reading skills but also cultivates the intrinsic and extrinsic motivation needed for sustained literacy development.

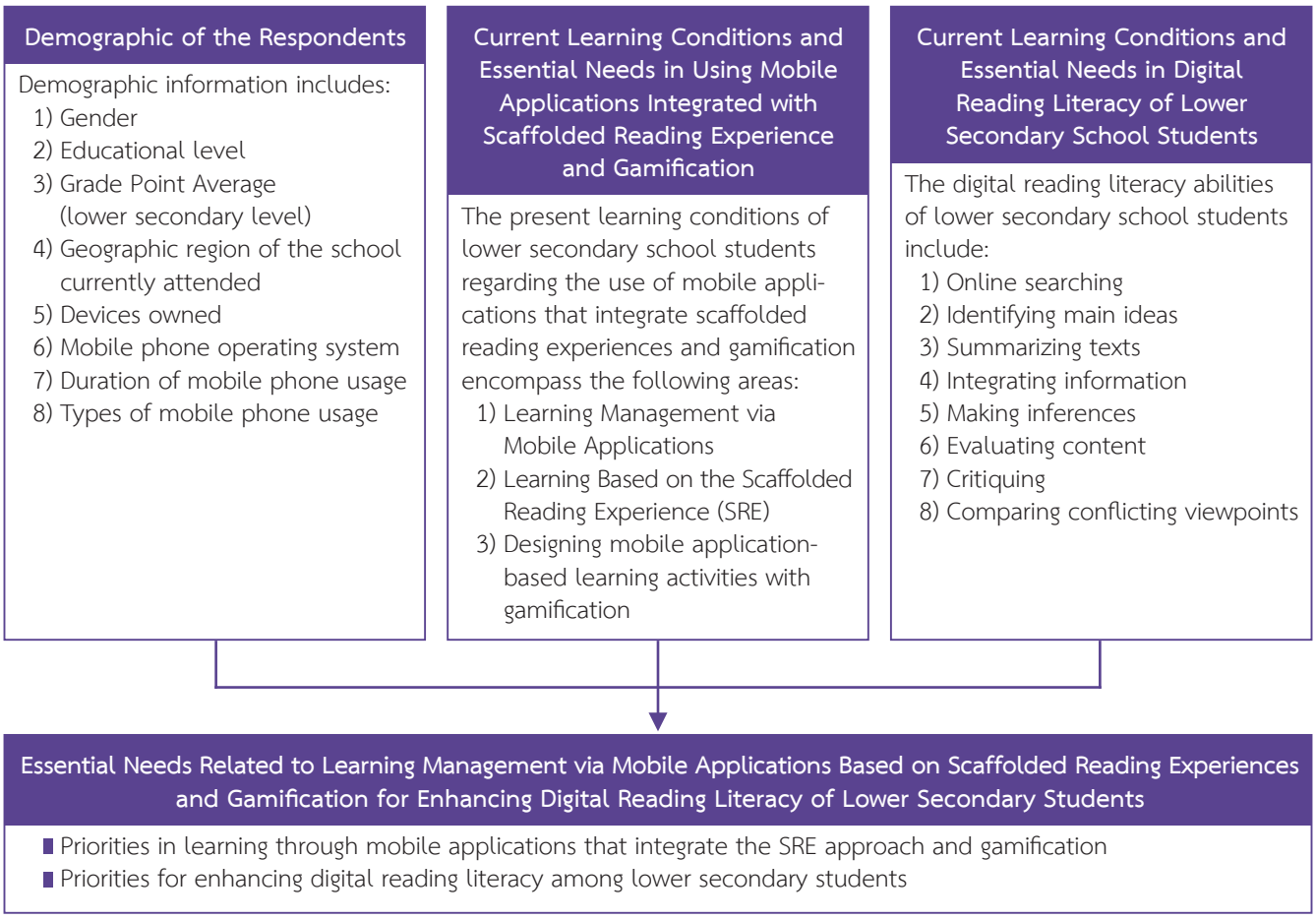
Methodology

The study adopted a survey research design as its primary method for data collection. The research methodology consisted of the following steps: 1) Analyzing the sample demographics: A comprehensive analysis of the participants' demographic characteristics was conducted. 2) Investigating the need for a mobile application: The study examined the requirements for developing a mobile application based on scaffolded reading experiences and gamification to enhance the digital reading literacy of lower secondary school students. 3) Exploring digital reading literacy competencies: The research evaluated the current and desired states of digital reading literacy competencies among lower secondary school students. Data were collected using online questionnaires, which facilitated efficient and comprehensive responses from the target sample.

Research Framework

Figure 1

Research Framework



Population and Sample

The study population includes lower secondary students aged 13 to 15 years, covering Grades 7 to 9. In 2022, this group totaled 1,690,198 students (National Statistical Office, 2024). Using the Krejcie and Morgan (1970) formula, a minimum sample of 384 was required for representativeness. To account for potential non-responses in the web-based questionnaire, the sample was increased to 600 students, assuming a 50% response rate (Rattanamanee, 2019).

Sampling was conducted in two stages. First, stratified random sampling selected one school from each of five geographic regions—North, Northeast, Central, East, and South—resulting in five schools. Each school contributed

120 students. Second, within each school, simple random sampling selected 40 students from each grade (7, 8, and 9). Participation was voluntary, and only students with informed

Research Instruments Development

The researcher developed the questionnaire based on a thorough review of relevant literature and prior studies to ensure comprehensive coverage and suitability for lower secondary students. Content validity was assessed using the Index of Item-Objective Congruence (IOC). The questionnaire included four sections: personal information (8 multiple-choice items); current learning conditions and needs for mobile applications integrated with the SRE and gamification (14 items on a five-point Likert scale); current learning conditions and needs in digital reading literacy (8 items on a five-point Likert scale); and one open-ended question on digital reading literacy with a scoring rubric. Five experts reviewed the IOC, with scores ranging from 0.66 to 1.00, confirming good content validity. After incorporating expert feedback, the questionnaire was piloted with five similar students to improve clarity and then field-tested with 50 lower secondary students to assess reliability. Cronbach's alpha showed high internal consistency at 0.903. The study was approved by the Human Research Ethics Committee of Chulalongkorn University (COA No. 225/67).

Data Collection

The researcher formally requested permission from the principals of five public secondary schools to conduct data collection involving lower secondary students. Data collection was carried out between May and July 2024. Approval to distribute the research instruments was obtained from Thai language teachers, who were then provided with a link to the online questionnaire for student participation. Following the completion of data collection, the researcher reviewed the returned questionnaires, resulting in 646 valid responses that were used for subsequent data analysis.

Data Analysis

The analysis of essential learning needs among learners was conducted using the Modified Priority Needs Index ($PNI_{Modified}$), adapted by Nonglak Wiratchai and Suwimon Wongwanich (Wongwanich, 2007). The interpretation of the results employed the five-level mean score scale proposed by Witkin (1984), defined as follows:

Mean scores between 4.51 and 5.00 indicate the highest level of need.

Mean scores between 3.51 and 4.50 indicate a high level of need.

Mean scores between 2.51 and 3.50 indicate a moderate level of need.

Mean scores between 1.51 and 2.50 indicate a low level of need.

Mean scores between 1.00 and 1.50 indicate the lowest level of need.

Descriptive statistics were subsequently utilized for further analysis. Arithmetic mean and standard deviation were calculated to examine current learning conditions and essential needs, while percentages were employed to analyze respondents' demographic information. Responses to the open-ended question on digital reading literacy were evaluated using a predetermined scoring rubric.

Results

Aligned with the objectives of the study, the findings are presented in three sections: First, the demographic profile of the respondents; second, the needs for learning through mobile applications incorporating scaffolded reading experiences and gamification to enhance digital reading literacy among lower secondary school students; and third, the current and desired levels of digital reading literacy competencies among participants.

Part 1 Demographic Characteristics of the Respondents

The analysis revealed that the sample consisted of 290 male students (44.37%) and 356 female students (55.63%). The majority of participants were in Grade 9, comprising 230 students (35.60%). Most students reported a cumulative grade point average (GPAX) in the range of 3.51 to 4.00, accounting for 395 students (57.12%). Smartphones were the most commonly used device, as indicated by 421 students (65.17%). Regarding operating systems, Android was the most widely used, with 430 students (66.56%), followed by iOS (Apple), used by 155 students (23.99%). Additionally, 370 students (57.28%) reported using their mobile phones for more than five hours per day. Social media emerged as the most common purpose for mobile phone use (21.26%), followed by making phone calls and conducting internet searches, as detailed in Table 1.

Table 1

An Analysis of Demographic Information

(n = 646)

Variable	Categories	*n*	%
Gender	Male	290	44.37
	Female	356	55.63

Table 1
(continued)

Variable	Categories	*n*	%
Educational level	Grade 7	211	32.66
	Grade 8	205	31.73
	Grade 9	230	35.60
Grade Point Average (lower secondary level)	0.00-2.00	9	1.39
	2.01-2.50	19	2.94
	2.51-3.00	82	12.69
	3.01-3.50	167	25.85
	3.51-4.00	369	57.12
Geographic region of the school currently attended	Northern region	123	19.04
	Central region	137	21.21
	Southern region	125	19.35
	Eastern region	131	20.28
	Northeastern region	130	20.12
Devices owned	smartphone	421	65.17
	smartphone, tablet	61	9.44
	smartphone, laptop	60	9.29
	smartphone, desktop computer (PC)	25	3.87
	smartphone, tablet, laptop	22	3.41
	smartphone, desktop computer (PC), laptop	19	2.94
	smartphone, tablet, desktop computer (PC), laptop	19	2.94
	smartphone, tablet, desktop computer (PC)	14	2.17
	Tablet	3	0.46
	Laptop	2	0.31
Mobile phone operating system	Android	430	66.56
	iOS (Apple)	155	23.99
	iOS (Apple), Android	48	7.43
	iOS (Apple), Android, Window Phone	6	0.93
	Android, Window Phone	5	0.77
	iOS (Apple), Window Phone	2	0.31
Duration of mobile phone usage	0-1 hour	7	1.08
	2-3 hours	106	16.41
	4 hours	80	12.38
	5 hours	83	12.85
	More than 5 hours	370	57.28

Table 1
(continued)

Variable	Categories	*n*	%
Types of mobile phone usage	Making and receiving calls	548	20.47
	Searching for information	546	20.40
	Using social media	569	21.26
	Taking photos and videos	475	17.74
	Playing games	515	19.24
	Others	24	0.90

Part 2 Current Learning Conditions and Essential Needs in Using Mobile Applications Integrated with Scaffolded Reading Experience and Gamification

The study investigated the essential needs for utilizing mobile applications based on the Scaffolded Reading Experience (SRE) approach integrated with gamification to enhance digital reading literacy among lower secondary school students. In the category of mobile application-based learning, the most significant need identified was the ability to share opinions or work with teachers and peers via social media integrated into mobile applications, with a PNIModified value of 0.27. For the SRE approach, the highest-ranked need was reading articles on mobile applications where key ideas were highlighted during reading, aiding students in identifying main concepts. This feature had the highest PNIModified value at 0.42. Regarding gamification, the most essential feature was the ability to earn reward badges through participation in article-reading activities on mobile applications. This aspect was ranked with a PNIModified value of 0.39.

Table 2 provides a detailed breakdown of the top three prioritized needs across each of these categories, highlighting the areas where students demonstrated the greatest requirements for effective digital reading literacy development.

Table 2
Current Learning Conditions and Essential Needs in Using Mobile Applications Integrated with Scaffolded Reading Experience and Gamification

Topics	Desired condition (I)		Actual condition (D)		*t*	*p*	Modified Priority Needs Index	
	M	*SD*	*M*	*SD*			$PNI_{modified}$	Ranking
Learning Management via Mobile Applications								
You independently select and read articles using the mobile application.	4.12	0.85	3.72	0.93	11.13	0.00	0.11	3
You complete the learning activities and assessments provided within the mobile application.	4.10	0.86	3.67	0.91	11.41	0.00	0.12	2
You share your opinions or completed work with teachers and peers through social media platforms integrated into the mobile application.	4.25	0.86	3.34	0.99	20.82	0.00	0.27	1
Learning Based on the Scaffolded Reading Experience (SRE)								
You read articles on the mobile application while highlighting key information to identify essential points.	4.41	0.78	3.11	1.06	28.87	0.00	0.42	1

Table 2
(continued)

Topics	Desired condition (I)		Actual condition (D)		*t*	*p*	Modified Priority Needs Index	
	M	*SD*	*M*	*SD*			$PNI_{modified}$	Ranking
You independently answer comprehension questions while reading articles on the mobile application to analyze and connect the information.	4.32	0.80	3.41	0.99	21.73	0.00	0.27	2
You complete post-reading questions to review and synthesize the key points of the entire article.	4.21	0.81	3.40	1.04	17.89	0.00	0.24	3
Designing mobile application-based learning activities with gamification								
You earn badge rewards by participating in article-reading activities on the mobile application.	4.33	0.78	3.12	1.06	25.94	0.00	0.39	1
You engage in article-reading activities on the mobile application that involve competition with classmates.	4.23	0.80	3.11	1.07	23.79	0.00	0.36	2
You receive immediate feedback upon completing article-reading activities or answering questions on the mobile application.	4.22	0.88	3.20	1.08	21.70	0.00	0.32	3

Part 3 Current Learning Conditions and Essential Needs in Digital Reading Literacy of Lower Secondary School Students

The study examining the prioritized needs in learning management for enhancing digital reading literacy among learners identified the following highest-ranked essential needs. The top-ranked needs, both sharing an equal $PNI_{Modified}$ value of 0.25, were: 1) the ability to explain the meanings of words, key sentences, and main ideas in a logical sequence, and 2) the ability to interpret the main concepts of a text and connect them to real-life situations. These were followed by: 3) the ability to search for online information using keywords aligned with specific objectives ($PNI_{Modified}$ = 0.20), and 4) the ability to identify the main ideas of a text and support them with evidence that is clearly connected and logically sound ($PNI_{Modified}$ = 0.19). The detailed results are presented in Table 3.

Table 3
Current Learning Conditions and Essential Needs in Digital Reading Literacy of Lower Secondary School Students

Topics	Desired condition (I)		Actual condition (D)		*t*	*p*	Modified Priority Needs Index	
	M	*SD*	*M*	*SD*			$PNI_{modified}$	Ranking
You can search for information on the Internet by selecting keywords that align with the intended purpose.	4.38	0.74	3.63	0.90	20.82	0.00	0.20	2
You can identify the main ideas of a reading passage and recognize supporting details that are clearly and logically connected.	4.20	0.76	3.52	0.82	19.96	0.00	0.19	3
You can explain the meanings of words, phrases, and key sentences from the reading passage in a coherent and sequential manner.	4.26	0.76	3.40	0.91	23.58	0.00	0.25	1

Table 3
(continued)

Topics	Desired condition (I)		Actual condition (D)		*t*	*p*	Modified Priority Needs Index	
	M	*SD*	*M*	*SD*			$PNI_{modified}$	Ranking
You can interpret the main ideas of the reading passage and relate these ideas to real-life situations.	4.28	0.81	3.44	0.90	21.64	0.00	0.25	1
You can predict the causes and effects of the information derived from the reading passage in relation to real-life contexts.	4.10	0.83	3.64	0.90	12.78	0.00	0.13	6
You can evaluate the credibility of information and accurately cite sources obtained from the Internet.	4.15	0.82	3.65	0.91	13.28	0.00	0.14	5
You can assess the appropriateness of the content, language style, and presentation format of a text.	4.15	0.80	3.53	0.93	17.12	0.00	0.18	4
You can provide well-reasoned arguments to compare the similarities or differences between the information and real-life situations.	4.12	0.84	3.70	0.84	11.65	0.00	0.12	7

Table 4
Results of the Analysis of the Digital Reading Literacy Questionnaire

Educational level	*M*	*SD*	%	Ranking
Grade 7	0.39	0.51	19.5	3
Grade 8	0.43	0.54	21.5	2
Grade 9	0.60	0.55	30	1
Total	0.48	0.54		

The analysis of the performance of lower secondary school students revealed that the average score was below 50 percent. Among the grade levels, Grade 9 students achieved the highest mean score (M = 0.60, SD = 0.55), followed by Grade 8 students (M = 0.43, SD = 0.54). Grade 7 students recorded the lowest mean score (M = 0.39, SD = 0.51). Based on the scoring rubric, the low overall scores were attributed primarily to the students' inability to provide credible and appropriate explanations in their responses.

Discussion

The study investigating the essential learning needs of lower secondary school students in using mobile applications integrated with the SRE and gamification to enhance digital reading literacy revealed several key findings. Most students primarily used Android smartphones as their main device, with social media being the most frequent activity. Additionally, a significant proportion of students reported using their phones for over five hours daily.

In terms of mobile application-based learning management, the highest-ranked need was the ability to share opinions or work collaboratively with teachers and peers via social media platforms on mobile applications. This was followed by participation in lesson-related activities and quizzes, and the ability to independently select articles to read through the mobile application. These findings highlight the convenience and effectiveness of mobile applications in fostering a supportive learning environment (Singsuk, 2022). These results align with Lam's (2022) study, which indicated that learners had positive perceptions of learning applications due to their facilitation of autonomous learning and reduced performance pressure during face-to-face interactions with instructors.

The prominence of this need in the present study may be explained by the fact that Thai lower secondary students are already highly accustomed to using mobile-based social media as a primary mode of interaction. This familiarity creates a low barrier to adoption for collaborative features within educational applications, making such tools not only intuitive but also immediately relevant to their existing communication habits. Consequently, the integration of collaboration tools within a learning app directly aligns with students' preferred digital behaviors, increasing the likelihood of consistent engagement.

Regarding enhanced reading experience instruction, students placed the greatest importance on reading articles within the application while highlighting key information. This was followed by answering comprehension questions during reading to analyze and connect information, and responding to post-reading questions to synthesize main ideas. These activities underscore the importance of instructional strategies that promote active reading. Supporting this, Qushoy (2022) demonstrated that enhanced reading strategies increase engagement and comprehension. The high priority given to highlighting and in-text questioning reflects a broader need for scaffolds that help learners process complex digital texts. In the context of the SRE framework (Scaffolding Reading Experience), these activities correspond directly to the "during-reading" phase, providing real-time cognitive support that mitigates the risk of surface-level reading. This is particularly critical for students with lower baseline comprehension scores, as indicated in the study's pre-assessment results.

In the context of gamified learning activities within mobile applications, students prioritized earning badges for reading activities, participating in competitive reading tasks with classmates, and receiving immediate feedback after completing reading tasks. These gamification elements were found to effectively enhance student engagement and interest in reading. Abu Sa'aleek and Baniabdelrahman (2020) showed that gamified activities improve various reading skills, while Yu et al. (2020) highlighted the positive impact of gamified lessons in reinforcing learning through enjoyable mechanics.

The PNI results highlight gamification as a particularly strong motivator in this cohort, likely due to the competitive and reward-driven nature of Thai secondary school students' peer culture, where recognition and visible achievement markers—such as badges—serve as tangible motivators. In this way, gamified reading aligns with Deci and Ryan's self-determination theory (Vallerand, 2000), fulfilling both extrinsic motivation (through rewards) and intrinsic motivation (through enjoyment and mastery).

Concerning digital reading literacy, students identified explaining the meaning of words, sentences, and main ideas in a structured manner, as well as interpreting main concepts to connect with real-life situations, as top priorities. Other needs included searching for information online using relevant keywords and identifying main ideas supported by evidence. These findings, coupled with students' sub-50% scores in initial assessments, indicate an urgent need to develop effective online reading skills. This is consistent with Coiro's (2021) findings, which highlighted the inadequacy of comprehensive digital reading activities and the critical need for structured assessments to enhance comprehension. The strong emphasis on vocabulary and main idea identification suggests that foundational comprehension skills remain a significant gap for many students in the digital reading context. This mirrors OECD (2021) data indicating that when digital tasks require higher-order integration and evaluation, students with weaker foundational skills experience disproportionate difficulty. Addressing these needs in the proposed app through scaffolded vocabulary and summarization exercises could therefore have an outsized impact on overall literacy gains.

The promotion of digital reading literacy through mobile applications is vital, particularly as students primarily engage in digital reading via smartphones for educational purposes (Sitthichaiworabutr et al., 2020). Research suggests that digital reading is more engaging when paired with instructional strategies that enhance comprehension (Azir & Sriyanto, 2021). Enhanced reading experience instruction, as advocated by Herawati et al. (2020) and Kennedy and Chinokul (2020), promotes structured processes that foster positive reading experiences and intrinsic motivation. Furthermore, gamification provides external motivation to alleviate the monotony of reading tasks, thereby sustaining engagement and improving skills (Zhu, 2019).

In summary, the prominence of the identified PNIs can be attributed to a confluence of contextual factors students' pre-existing mobile usage patterns, the cultural value placed on peer recognition, and persistent gaps in foundational reading skills. By directly aligning instructional design with these contextual realities, the integration of SRE, gamification, and mobile applications offers a uniquely tailored pathway for addressing the specific digital reading literacy needs of Thai lower secondary students.

Conclusions

From the study examining essential needs in learning management to promote digital reading literacy among lower secondary school students, it was determined that integrating mobile applications with the Scaffolded Reading Experience (SRE) approach and gamification effectively addresses learners' requirements. To design effective instructional activities, educators should

emphasize creating learning experiences that leverage mobile applications and the SRE approach. These strategies enable students to independently construct and integrate knowledge while promoting flexible learning. Structured and well-defined steps in the learning process further motivate students to engage with reading activities. However, it is crucial to consider students' readiness and technological competence, ensuring that learning activities are tailored to their capabilities and contexts. Furthermore, incorporating gamification elements such as badge collection systems and classroom-based competitive activities can significantly enhance student enthusiasm and maintain consistent engagement in learning tasks. This approach fosters a dynamic and interactive learning environment that supports the development of digital reading literacy. In addressing the research objectives, this study identified students' most pressing needs, which included collaborative mobile-based learning activities, scaffolded in-text reading strategies, and gamification features that combined competition with recognition. These findings provide a detailed profile of learners' requirements, serving as a foundation for designing a mobile application grounded in the SRE framework and enriched with motivational game elements. The implications of these findings highlight the necessity of aligning instructional technology with students' existing digital habits and cultural context, integrating academic content into platforms and formats they already use extensively, and embedding structured reading stages that provide cognitive support while sustaining engagement through gamification. The potential impact of this integrated approach includes improving reading comprehension, critical thinking, and digital literacy skills, while also addressing Thailand's below-average PISA reading scores through scalable, accessible interventions that promote educational equity. Future research should extend beyond needs assessment to the development, implementation, and rigorous evaluation of the proposed mobile application, exploring its effectiveness over time and its adaptability to other educational contexts to ensure wider applicability.

Author Contributions

Walai Tantiwitkoson: Writing – original draft, Conceptualization, Data curation, Formal analysis, Investigation, Methodology. **Prakob Koraneekij:** Writing – review & editing, Funding acquisition, Project administration, Supervision, Validation. **Jintavee Khlaisang:** Writing – review & editing, Funding acquisition, Project administration, Supervision, Validation.

Declaration of Competing Interest

The authors affirm that there are no conflicts of interest associated with the conduct of this study.

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