

Self-Regulated Learning Strategies and Perceived Effectiveness in Mobile-Assisted Japanese Language Learning

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Abstract

This study investigates the self-regulated learning (SRL) strategies used by university students in mobile-assisted Japanese language learning and explores their perceptions of effectiveness and the challenges they face. Using a mixed-methods approach, data were collected from 42 questionnaire respondents and 10 interview participants at a Thai university. Findings reveal strong engagement with cognitive and motivational strategies, particularly in vocabulary acquisition, where spaced repetition and progress tracking were commonly used. However, participants reported difficulty transferring listening practice to real-world situations and noted challenges in applying metacognitive planning without structured guidance. The study highlights the importance of integrating metacognitive scaffolding into mobile applications and calls for the development of authentic listening content to support skill transfer. These findings offer implications for app design, language pedagogy, and future SRL research in mobile contexts.

Keywords: Self-Regulated Learning (SRL), Mobile-Assisted Language Learning (MALL), Japanese language learning, Learner autonomy

Introduction

The rapid development of digital technology has transformed how languages are learned, with mobile-assisted language learning (MALL) gaining widespread popularity in both formal and informal educational contexts. Language learning applications such as Duolingo, LingoDeer, and Anki have become widely accessible tools that support vocabulary acquisition, listening comprehension, pronunciation, and grammar practice (Loewen et al., 2020). These applications typically incorporate features such as spaced repetition, progress tracking, and immediate feedback, which align with key components of self-regulated learning (SRL), including goal setting, self-monitoring, and performance evaluation. Their portability and gamified features allow learners to study independently and flexibly at their own pace, making them especially useful for self-directed learning beyond the classroom.

In the context of Thailand, university students increasingly turn to mobile applications as supplementary tools for language learning, including less commonly taught languages such as Japanese. However, the effective use of these tools depends not only on their design but also on the learner's ability to self-regulate their learning. Self-regulated learning (SRL), defined as the ability to plan, monitor, and reflect on one's learning process, is a crucial competency in mobile learning environments (Zimmerman, 2000). SRL has been shown to support motivation, goal persistence, and academic achievement (Uztosun, 2020), making it particularly important for learners who navigate digital learning tools without the direct guidance of a teacher.

While many mobile language apps offer features that can facilitate self-regulated learning (SRL), such as spaced repetition, reminders, progress tracking, and self-assessment tools, the extent to which learners engage with these features varies. Yang (2020) found that although mobile learning environments can support self-efficacy and autonomy, students often underutilize SRL strategies when there is no explicit instruction or scaffolding. This highlights the importance of understanding how learners apply SRL strategies in informal mobile learning settings, particularly when they pursue their own language goals outside structured classroom contexts.

Existing research on MALL has primarily focused on English, while comparatively little attention has been paid to Japanese. However, Japanese poses distinctive challenges for foreign language learners, particularly in the areas of listening and vocabulary development. The Japanese language is characterized by three writing systems (hiragana, katakana, and kanji) and complex phonological features, which require sustained and structured learning efforts. These characteristics place greater demands on learners' ability to regulate their learning, particularly in managing vocabulary memorization and developing listening comprehension over time. These skills are crucial at the beginner level and require consistent and strategic practice. Although mobile applications for Japanese learning are becoming increasingly popular, there remains limited empirical research examining how SRL strategies are enacted in mobile-assisted Japanese language learning, particularly in informal, self-directed contexts, and how students use these tools to regulate their learning and to address difficulties such as maintaining motivation or coping with the constraints of app-based content (Yang, 2020). These issues are especially relevant in Asian university contexts, where learners often engage with mobile tools voluntarily and without formal integration into the curriculum. To address these research gaps, the present study investigates how university students engage in mobile-assisted Japanese language learning beyond formal classroom settings. It examines three main areas: (1) the self-regulated learning strategies employed when using mobile language applications, (2) students' perceptions of the effectiveness of these SRL strategies in developing skills such as vocabulary and listening, and (3) the challenges they encounter while maintaining self-directed learning. By focusing on Japanese, which remains underrepresented in MALL and SRL research, and by highlighting students' experiences in informal learning contexts, this study offers valuable insights into how mobile tools can enhance learner autonomy and promote student-centered innovation in language education.

Literature Review

1. Self-Regulated Learning (SRL) in Language Education

Self-regulated learning (SRL) refers to the active and cyclical process by which learners plan, monitor, and reflect on their learning in order to achieve academic goals (Zimmerman, 2000). Rather than being passive recipients of instruction, self-regulated learners take deliberate steps to manage their cognitive resources, motivation, and learning environments. This capacity is especially important in language education, where mastering new skills requires persistence, self-awareness, and adaptability.

SRL is typically described through three interrelated categories of strategies: cognitive, metacognitive, and motivational or behavioral regulation. Cognitive strategies focus on how learners process and practice new information. For example, rehearsal, elaboration, and summarizing help students internalize vocabulary and grammatical structures. Panadero (2017) notes that these strategies increase depth of processing and lead to stronger retention of language items.

Metacognitive strategies involve planning, monitoring, and evaluating one's own learning. Learners may set specific goals for vocabulary or listening practice, track their progress over time, and adjust their methods if results are unsatisfactory. Research shows that students who engage in these planning and monitoring activities achieve higher levels of success in second and foreign language learning, because they are better able to align their study behaviors with their goals (Panadero, 2017).

Motivational and behavioral regulation strategies help learners sustain effort and manage external conditions. These include maintaining interest, encouraging oneself through positive self-talk, rewarding progress, and managing study time or learning environments. Zimmerman (2000) emphasizes that such strategies support persistence when tasks become challenging, which is crucial for mastering a new language over time.

Together, these SRL strategies create a framework for successful language learning. Learners who plan their study routines, use cognitive techniques to practice new material, monitor their progress, and maintain motivation are more likely to achieve higher levels of autonomy and proficiency (Panadero, 2017). In technology-enhanced and mobile learning contexts, where teacher guidance is limited, the ability to self-regulate becomes an even stronger predictor of positive outcomes.

2. The Role of SRL Strategies in MALL

SRL strategies play a critical role in the success of Mobile-Assisted Language Learning (MALL), especially in informal and out-of-class contexts where learners must independently manage their goals, motivation, and learning behaviors. The learner-centered and flexible nature of mobile environments requires students to exercise autonomy, discipline, and strategic thinking—skills that SRL fosters.

Autonomy and Flexibility

MALL provides learners with unprecedented control over their learning, enabling them to decide what, when, and how to study. However, without well-developed SRL skills such as goal setting, planning, monitoring, and self-reflection, this autonomy can become overwhelming and may result in poor time management and disengagement (Viberg et al., 2021; Zhang et al., 2021). Learners who possess strong SRL abilities are better able to take full advantage of the opportunities offered by mobile learning, which leads to more consistent engagement and lower dropout rates (Botero et al., 2019).

Enhanced Language Learning Outcomes

The use of SRL strategies has been associated with improved performance across various language skills, including vocabulary, grammar, and speaking. Research indicates that learners who apply SRL approaches in MALL environments, such as spaced repetition, goal tracking, and self-testing, demonstrate significantly stronger language development than those who do not (Boroughani et al., 2023). These strategies help learners retain information more effectively and promote deeper cognitive engagement with learning materials. Wang and Hasim (2024) also highlight that while SRL-enhanced mobile learning is effective, areas such as listening and informal skill transfer remain underexplored, calling for further research in learner-driven regulation across diverse language domains.

Motivation, Engagement, and Affective Regulation

SRL also enhances learners' ability to manage their emotions and motivation, which plays a crucial role in self-directed learning. Affective self-regulation, including maintaining interest, reducing anxiety, and building self-efficacy, has been shown to influence persistence and success in mobile learning environments (Viberg et al., 2023). When learners can monitor and regulate their emotional states, they are better able to sustain effort, cope with challenges, and remain engaged even without direct teacher guidance.

Lifelong and Transferable Skills

Beyond immediate learning outcomes, SRL fosters lifelong learning skills. Learners who actively engage in SRL become more autonomous, reflective, and capable of transferring effective learning strategies across different subjects and contexts (Dignath et al., 2020). This is particularly valuable in mobile learning environments, where the boundaries between formal and informal learning often overlap.

SRL strategies are essential in MALL because they empower learners to navigate flexible and technology-rich environments effectively. These strategies support improved academic outcomes, greater motivation and emotional resilience, and the development of transferable learning skills. As mobile technologies become more embedded in language education, the importance of explicitly supporting SRL in app design and pedagogy continues to grow.

3. SRL Strategies in MALL for Listening and Vocabulary

SRL strategies are essential to effective language acquisition in MALL, particularly for listening and vocabulary development. Through mobile technologies, learners can set goals, monitor comprehension, regulate motivation, and evaluate progress independently. These behaviors correspond to the cognitive, metacognitive, behavioral, and affective dimensions of SRL.

SRL Strategies in Mobile Listening

Listening comprehension in a second or foreign language requires both cognitive control and metacognitive awareness. In MALL contexts, learners engage in goal setting and planning before listening tasks, identifying the purpose and selecting appropriate listening materials (Zhou et al., 2024). During the listening phase, learners apply metacognitive strategies such as monitoring understanding, using replay and pause functions, and evaluating comprehension across repeated listening sessions (Xiong et al., 2024). These actions allow learners to move flexibly between global and analytical strategies, adjusting their focus as they progress (Çakmak, 2021).

Motivational regulation also plays a crucial role in sustaining listening practice. Mobile applications that include progress tracking, interactive feedback, and gamified elements can help learners persist by providing visual evidence of improvement (An et al., 2021). In addition, social and collaborative strategies such as sharing reflections or participating in online listening challenges enhance engagement and self-reflection by promoting peer accountability (Viberg et al., 2021). Although mobile-supported SRL enhances learners' metacognitive awareness, findings remain mixed regarding its superiority over non-SRL approaches for improving listening outcomes (Çakmak, 2021; Xiong et al., 2024).

SRL Strategies in Mobile Vocabulary Learning

Vocabulary learning is one of the most extensively researched areas in MALL, with strong evidence supporting the effectiveness of SRL-based approaches. Learners employ intentional and repetitive strategies through mobile applications that include digital flashcards, spaced repetition systems, and self-testing tools. These methods strengthen long-term retention and retrieval of lexical items (Chen et al., 2018; Lei et al., 2022).

Beyond cognitive repetition, self-monitoring and reflection are equally important. Learners track their vocabulary growth using app dashboards or performance analytics, which helps them recognize progress and identify gaps (Boroughani et al., 2023). Organizational strategies, such as grouping words by topic or frequency, provide structure to learning, while seeking assistance from peers or built-in dictionary features promotes autonomy and problem solving (Octaviani et al., 2023).

Affective and motivational factors also contribute to successful vocabulary learning. Enjoyment, self-efficacy, and perceived usefulness of mobile tools are significant predictors of persistence and achievement (An et al., 2021). Studies show that applications designed with SRL principles, particularly those incorporating goal-setting mechanisms

and progress tracking, result in higher vocabulary retention and stronger intrinsic motivation than traditional materials (Chen et al., 2018).

Overall, SRL strategies in MALL have shown greater effectiveness for vocabulary learning than for listening. Evidence consistently demonstrates improvements in lexical knowledge, motivation, and self-efficacy when learners actively regulate their study through mobile tools (Lei et al., 2022; Boroughani et al., 2023). For listening, SRL enhances metacognitive awareness and learner autonomy but may not always lead to significant gains in comprehension scores (Çakmak, 2021). Research also emphasizes the importance of explicit strategy instruction. Learners who receive guidance on how to plan, monitor, and evaluate their mobile learning experience demonstrate stronger SRL behaviors and improved outcomes (Zhang et al., 2021). Integrating SRL training into mobile app design and instructional practice can therefore maximize the potential of technology-mediated language learning.

4. Students' Perceptions and Challenges of SRL Strategies in MALL for Listening and Vocabulary

Students generally perceive SRL strategies as beneficial in MALL, particularly for vocabulary and listening skill development. However, their ability to fully utilize these strategies is often influenced by various internal and external challenges.

Positive Perceptions of SRL in MALL

Learners consistently report increased motivation, engagement, and satisfaction when applying self-regulated learning (SRL) strategies through mobile tools. The autonomy and flexibility provided by MALL allow learners to study at their own pace and in a variety of contexts, which strengthens their sense of ownership over the learning process (Lei et al., 2022; Zhang et al., 2021). In vocabulary learning, students particularly value features such as spaced repetition, self-monitoring, and gamified feedback, which help sustain interest and enhance perceived effectiveness (An et al., 2021; Chen et al., 2018; Sakkir & Syamsuddin, 2023). In a recent study, Indonesian students using Duolingo reported high satisfaction with vocabulary learning, noting that gamification and spaced review supported both motivation and memory retention—key principles in SRL.

Many learners also show a willingness to self-regulate by setting personal goals and planning their study routines. Octaviani et al. (2023) found that learners frequently use organizational and goal-setting strategies, especially when vocabulary applications include visible learning pathways or progress tracking features. Similarly, Xu and Richardson (2024) demonstrated that learners with access to gamified social features such as badges and peer activity updates exhibited stronger SRL behaviors and long-term engagement than those using non-social versions of the same mobile vocabulary app. These findings reinforce the value of mobile features that not only support cognitive strategies but also promote persistence and emotional regulation.

In addition, social and interactive elements such as peer sharing, feedback functions, and collaborative activities are viewed positively, particularly for listening practice where students benefit from communicative and supportive environments (Kaliappan et al., 2023). Together, these findings underscore that when SRL strategies are

embedded in the design of mobile tools—through both cognitive supports and motivational feedback loops—learners perceive the experience as more enjoyable, productive, and aligned with their personal learning goals.

Challenges in Applying SRL in MALL

Despite these positive perceptions, learners face several challenges when attempting to implement self-regulated learning (SRL) strategies effectively. One of the most common obstacles is digital distraction, particularly from social media notifications on mobile devices. Bowles (2024) found that students demonstrated lower commitment regulation when using mobile devices, especially smartphones, compared with laptops. Device usability also influences SRL engagement; students report finding it easier to maintain focus and control their learning routines on laptops than on smartphones (Bowles, 2024). This challenge is compounded by cognitive overload, a frequent issue in mobile environments. Zhou and Mohamed (2025) note that while ubiquitous learning allows for flexibility, learners often face multitasking demands, reduced attention spans, and declining motivation. These conditions are especially detrimental for students who lack advanced SRL strategies, making self-management more difficult and less effective.

Although learners may acknowledge the importance of SRL, many struggle to apply a diverse range of strategies beyond basic approaches such as seeking assistance or organizing content (Octaviani et al., 2023). Limited metacognitive awareness and insufficient training in SRL techniques often reduce the effectiveness of self-regulated efforts, particularly in complex tasks like listening comprehension (Çakmak, 2021). Students with lower language proficiency often require explicit guidance and continuous scaffolding to apply SRL strategies successfully. Zeng et al. (2018) and Yabukoshi (2022) emphasized that teacher-supported strategy instruction is essential for developing metacognitive regulation in out-of-class listening activities. Without this support, learners may experience uncertainty and frustration in managing their progress.

In addition to cognitive challenges, affective factors play a critical role in SRL implementation. Viberg et al. (2023) highlight that emotional regulation—including the management of anxiety, interest, and frustration—is often overlooked in MALL design. Learners who lack emotional support mechanisms may struggle to maintain motivation and attention, resulting in disengagement and less effective learning. These affective challenges, when combined with high cognitive demands and frequent interruptions, can significantly undermine the self-regulatory process.

These findings indicate that while learners appreciate the autonomy and interactivity offered by MALL environments, their ability to fully benefit from SRL strategies depends on thoughtful app design, affective support, sufficient user training, and supportive learning contexts.

Methodology

1. Research design

This study employed a mixed-methods design with a qualitative emphasis to explore how university students engage in self-regulated learning (SRL) strategies when using mobile applications for Japanese language learning, particularly for vocabulary and listening development. The qualitative component was used to explain and elaborate on the quantitative findings, particularly in relation to students' SRL strategy use, perceived effectiveness, and learning challenges. The research was conducted at Mae Fah Luang University, a public university in northern Thailand, where Japanese is offered as part of elective language study options. While mobile language learning is not formally integrated into the curriculum, many students voluntarily use language learning apps as supplementary tools.

2. Participants

Participants were undergraduate students enrolled in Japanese language courses who reported using mobile applications to support their language learning outside the classroom. The course was offered as a general elective, and participants were drawn from a range of academic majors. Their Japanese proficiency levels varied from beginner to lower-intermediate. Some participants had no prior experience with Japanese before enrolling in the course, while others had limited prior exposure from secondary education. A purposive sampling strategy was used to recruit participants who had at least three months of experience using mobile apps (e.g., LingoDeer, Duolingo, Memrise) for vocabulary or listening practice. A total of 42 students completed the questionnaire, and from this group, 10 were selected for follow-up semi-structured interviews based on app usage frequency and willingness to reflect on their learning behaviors.

3. Instruments

The questionnaire included both closed-ended and open-ended items. It was designed based on the three-phase model of Self-Regulated Learning (SRL) proposed by Zimmerman (2000), which includes forethought, performance, and self-reflection. The items addressed three main areas: (1) the frequency of SRL strategy use including cognitive, metacognitive, motivational, and behavioral regulation strategies; (2) students' perceptions of mobile app effectiveness in improving vocabulary and listening skills; and (3) specific challenges encountered in mobile-assisted language learning (MALL).

To ensure contextual alignment with the digital learning environment, the questionnaire was also informed by the Self-Regulation for Learning Online (SRL-O) framework developed by Broadbent, Panadero, and Lodge (2023). This framework extends traditional SRL constructs into online and mobile contexts by identifying key learning strategies such as planning and time management, metacognitive regulation, effort regulation, and management of digital learning environments.

Items were adapted from previously validated instruments on self-regulated learning (SRL) and technology-assisted language learning (e.g., An et al., 2021; Chen et al., 2018). Content validity was established through expert review by two specialists in language education and educational technology. Minor revisions were made based on their feedback to ensure clarity, relevance, and alignment with the research objectives. Internal consistency reliability was assessed using Cronbach's alpha, which indicated acceptable reliability across the main constructs ($\alpha > .70$). Specifically, Cronbach's alpha values ranged from .72 to .86, indicating satisfactory internal consistency. The questionnaire included quantitative items rated on a five-point Likert scale (1 = Never / Strongly Disagree to 5 = Always / Strongly Agree), as well as open-ended items designed to elicit students' reflections on their experiences, perceived effectiveness, and challenges in using the apps.

The semi-structured interview protocol was developed to provide deeper, contextualized insights into the questionnaire findings. Interview questions focused on three core areas: (1) specific SRL strategies used during app-based practice; (2) students' perceptions of the effectiveness of mobile apps in supporting real-world Japanese language use; and (3) challenges faced in maintaining engagement, managing digital distractions, and navigating self-study without explicit instructional support. The interview data served to triangulate the quantitative findings and to provide richer explanations of observed patterns. The semi-structured format allowed for follow-up questions to probe emergent themes not addressed in the questionnaire.

4. Data Collection

Participants were invited to complete the online questionnaire via a link distributed through course instructors. The survey included a section for participants to volunteer for a follow-up interview. The semi-structured interviews were conducted with the selected subset of ten participants within two weeks of the survey completion to ensure continuity of responses. All interviews were conducted individually via a video conferencing platform, were audio-recorded with consent, and lasted approximately 30–45 minutes each.

5. Data Analysis

The mixed-methods analysis proceeded in two stages, corresponding to the data type. Quantitative data from the questionnaire were analyzed descriptively using frequency counts, percentage distributions, means (M), and standard deviations (SD) to summarize patterns of SRL strategy use and perceptions of app effectiveness and challenges. Qualitative data from the open-ended questionnaire items and the semi-structured interviews were analyzed thematically. The qualitative analysis employed a hybrid approach, combining deductive coding based on the three phases of the SRL theory (Zimmerman, 2000) with inductive coding to capture emergent themes related to learner experiences, motivation, and contextual challenges. Interview transcripts were transcribed verbatim prior to coding. The qualitative findings were then used to explain, support, and enrich the quantitative results, ensuring integration between the two data strands.

Results

This section presents the findings related to the three research aims: (1) SRL strategies employed by students when using mobile applications for Japanese language learning, (2) students' perceptions of the effectiveness of SRL strategies for skill Development and (3) the challenges students encountered in self-regulated mobile learning environments.

1. SRL Strategies Used in Mobile-Assisted Japanese Language Learning

Table 4.1 presents the frequency and self-regulated learning (SRL) strategies used by students when engaging with mobile-assisted Japanese language applications. These strategies are categorized into three domains: Cognitive, Motivational/Behavioral, and Metacognitive.

Table 1 Frequency of Self-Regulated Learning Strategy Use

SRL Strategy Category	Strategy Item	Mean (M)	SD
Cognitive Strategies	I practice vocabulary that the app tells me to review based on my mistakes.	4.51	0.65
	I use flashcards or quizzes to test myself on words I just learned.	4.30	0.70
	I use the app's note-taking or highlighting features to record important information.	3.90	0.78
	I look up extra examples or explanations for grammar rules within the app.	3.75	0.85
Motivational /Behavioral Strategies	I focus on keeping up my daily study "streak" or reaching other goals set by the app.	4.40	0.53
	I remind myself to keep trying when the lessons or quizzes get hard.	4.05	0.80
	I choose a specific quiet time and place to use the app without distractions.	3.95	0.88
	I give myself a small reward after finishing a big lesson or reaching a study goal.	3.60	1.00
Metacognitive Strategies	I check my progress scores and performance charts to see how well I'm learning.	4.01	0.98
	I look at my error history and think about why I made mistakes so I can fix them.	4.20	0.90

SRL Strategy Category	Strategy Item	Mean (M)	SD
	I choose new lessons based on the topics or words I still struggle with.	3.95	1.05
	I decide if an app feature (like a new game or tool) is actually helping me learn before I keep using it.	4.05	1.01

The data reveal strong engagement across all three SRL categories, with all mean scores above the scale midpoint (3.0), indicating regular use of the strategies listed. Among cognitive strategies, students most frequently used features that enabled targeted review based on errors and self-testing, suggesting a strong preference for retrieval and repetition-based learning. The highest overall strategy reported was “I practice vocabulary that the app tells me to review based on my mistakes” ($M = 4.51$), followed by “I use flashcards or quizzes to test myself on words I just learned” ($M = 4.30$). This trend highlights the central role of memory-based cognitive strategies in mobile vocabulary learning.

Motivational and behavioral strategies were also widely used. Notably, the item “I focus on keeping up my daily study streak or reaching app-set goals” ($M = 4.40$) reflected students’ high commitment to maintaining study consistency. Other frequently reported behaviors included perseverance during challenging tasks and structuring the study environment.

Metacognitive strategies showed similarly high levels of engagement. Students reported reflecting on errors ($M = 4.20$), monitoring learning progress through performance charts ($M = 4.01$), and making informed choices about study paths based on personal weaknesses or feature effectiveness. These findings indicate that participants did not merely complete tasks but actively monitored and adapted their learning behavior.

However, several items showed relatively high standard deviations ($SD \approx 1.00$), indicating considerable variation in how frequently these strategies were applied among students. This variation suggests differences in learners’ ability to regulate their learning, potentially influenced by their diverse backgrounds and levels of Japanese language proficiency. This pattern reflects individual differences in learners’ engagement and strategic behavior, suggesting that while some students consistently apply SRL strategies, others do so more selectively or inconsistently.

2. Students’ Perceptions of SRL Effectiveness for Skill Development

This section addresses the second research objective by exploring students’ perceptions of how self-regulated learning (SRL) strategies, supported by mobile applications, contributed to their Japanese language development.

2.1 Vocabulary Development

Participants perceived self-regulated learning strategies as effective in supporting vocabulary acquisition. Their accounts emphasized how specific cognitive and metacognitive strategies, including active recall, spaced repetition, progress monitoring, and self-paced review, contributed to improved retention and the establishment of consistent learning routines.

Participants described using app-based flashcards and spaced repetition tools to reinforce previously learned vocabulary, especially items they had previously gotten wrong. These tools allowed for focused repetition, supporting memory consolidation through self-testing. This is particularly important in Japanese vocabulary learning, where kanji characters require repeated exposure and active recall to achieve long-term retention. One participant explained, *“The flashcard review based on what I missed is the only reason I remember the kanji. It forces me to practice what I’ve planned to learn, so I don’t waste time on easy words.”* This approach reflects strong engagement with cognitive SRL strategies, especially error-based rehearsal.

Several participants also mentioned how mobile accessibility allowed them to integrate vocabulary practice into their daily routines, increasing frequency and efficiency. As one noted, *“The mobile app helps me study during my commute. I can learn five new words in ten minutes, which is something I couldn’t do with a textbook. It’s the convenience and efficiency that makes my self-regulation work.”*

Metacognitive strategies such as progress tracking also played an important role in enhancing motivation. Visible progress data gave students a sense of achievement, which in turn encouraged continued effort and routine maintenance. One participant remarked, *“Seeing the total number of words I learned on the dashboard makes me feel successful, and that positive feeling makes me keep coming back every day. It is addicting in a good way.”* This type of motivational feedback loop, where visible improvement strengthens commitment to learning, was echoed in several interviews. Another student added, *“When I see the bar go up or reach a streak milestone, it pushes me to keep going. It makes me want to reach the next level.”*

2.2 Listening Development

Perceptions of self-regulated learning (SRL) effectiveness in developing listening skills were more varied. While they appreciated the control that mobile applications offered for structured listening practice, many questioned the extent to which this practice could transfer to real-world listening situations.

Participants reported that metacognitive strategies such as pausing, replaying, and adjusting playback speed helped them isolate difficult phrases and better understand pronunciation features. One participant commented, *“Being able to replay a sentence ten times when I do not understand it is the best part of the app for listening practice. It breaks down the speed barrier.”* Another participant added, *“I can easily rewind and check the script inside the app if I need to. This allows me to regulate the difficulty, starting slow until I feel ready for faster audio.”*

These features enabled learners to scaffold their listening comprehension, gradually adjusting the difficulty based on their own readiness. This reflects a form of adaptive metacognitive regulation, in which learners monitor their

progress and manage cognitive load by controlling input conditions. However, this controlled listening environment may not fully reflect the characteristics of natural spoken Japanese, which often includes reduced forms, rapid speech, and contextual variability.

Despite these benefits, participants frequently reported a perceived gap between their performance on app-based listening tasks and their ability to comprehend natural Japanese in everyday contexts. Although mobile applications were described as helpful for controlled listening practice, the audio content was often viewed as overly simplified and lacking in natural variation. As one participant explained, *“I can nail the listening quizzes inside the app, but when I try to watch a Japanese drama, I understand almost nothing. The app audio is too clean; it does not prepare me for real-life speed and mumbling.”* Another participant remarked, *“Apps are good for beginner listening, but once I move to native content, I still struggle to keep up.”*

This perceived gap suggests that while SRL strategies can enhance analytical listening in mobile environments, additional pedagogical support may be required to facilitate the transfer of these skills to authentic listening situations. This finding highlights a key limitation of app-based listening input, suggesting that overly controlled audio may reduce learners’ readiness for real-world communication.

3. Challenges Encountered in Self-Regulated Mobile Learning

Based on qualitative data from interviews and open-ended questionnaire responses, two main themes emerged: distraction from digital environments and the lack of structured guidance for strategic learning. These factors disrupted both behavioral regulation and metacognitive planning, limiting the effectiveness of students’ self-regulated learning efforts.

3.1 Distraction from Digital Environments and Difficulty with Commitment Regulation

The most common behavioral challenge reported was the struggle to maintain attention and commitment during mobile learning sessions. Although many participants attempted to structure their study environment by selecting quiet places and consistent study times, the mobile device itself introduced significant distractions that undermined this effort.

They frequently cited distractions from social media, messaging, and entertainment applications as major obstacles to focus. These interruptions disrupted their study flow and weakened their ability to regulate commitment to learning tasks. One participant explained, *“I try to choose a quiet time, but the minute I open my phone, I see a message from a friend, and the Japanese lesson is forgotten for an hour. My learning session just turns into social media checking.”*

Another recurring theme was the inherent difficulty in using a smartphone for focused academic tasks. They described the challenge of mentally separating the device's educational purpose from its entertainment and communication functions. One participant noted, *"It is hard to separate my phone as a fun or social device from a study device. I get restless and start wanting to check other things even if I put them on silent."* Another shared a similar concern: *"The phone is the problem itself. I will be in the middle of a lesson and just swipe out to check YouTube or Twitter without even thinking about it. It is a huge fight against myself to stay on task."*

These insights reflect the complex nature of behavioral regulation in mobile learning settings, where distractions are built into the very platform used for studying. This suggests that self-regulated learning in mobile contexts requires not only internal control strategies but also external regulation mechanisms to manage competing digital stimuli. In such environments, learners' ability to sustain attention is continuously challenged by the multifunctional nature of mobile devices, making commitment regulation more demanding than in traditional learning settings.

3.2 Lack of Structured Guidance for Strategic Learning

In addition to distraction, many participants reported difficulty in interpreting and applying the self-regulated learning data generated by the mobile applications. While the apps provided features such as error tracking and vocabulary analytics, they often struggled to use this information to plan future study actions or adjust strategies effectively.

They frequently mentioned that although they could access detailed performance feedback, they were unsure how to act on it. One participant said, *"The app shows me my error history, which is good, but then what? I need the teacher or the app to tell me, 'Since you missed these five words, you should do this exercise next,' not just leave it to me."* Another added, *"I often feel overwhelmed by all the features. Should I be focusing on grammar today, or more vocabulary? I wish the app had a study plan for today button that told me what to do next."*

These responses suggest a clear gap in metacognitive strategy application. They were aware of their performance but lacked the tools or support to make informed decisions about adapting their learning path. This indicates a disconnect between metacognitive awareness (knowing one's performance) and metacognitive control (knowing how to act on that information).

Participants with lower Japanese proficiency expressed particular difficulty in selecting suitable strategies or features within the app. They indicated that without additional support from instructors or more intuitive app guidance, they were unsure which learning actions would be most beneficial. This highlights the importance of providing scaffolded support for strategic decision-making, especially for learners in the early stages of language development. This finding suggests that effective SRL support in mobile learning should move beyond data presentation toward guided decision-making, particularly for lower-proficiency learners.

Discussion and Conclusion

This study examined how university students engage in self-regulated learning (SRL) strategies while using mobile applications to develop Japanese language skills. The findings revealed high levels of SRL engagement, particularly in strategies related to vocabulary acquisition. However, students also identified limitations in the transfer of listening skills and expressed a need for additional guidance in planning and evaluating their learning activities. These findings suggest that while mobile applications can effectively support certain phases of SRL, particularly performance, they may be less effective in supporting strategic planning and skill transfer to real-world contexts.

1. Strong Engagement in SRL Strategy Use

The quantitative findings demonstrated that students made extensive use of cognitive and motivational strategies, especially targeted review and commitment regulation. High mean scores in these areas reflected the routine use of app-based tools for spaced repetition, self-testing, and maintaining daily study goals.

These results confirm the foundational work of Zimmerman (2000), who emphasized that SRL involves active monitoring, goal setting, and reflection. Learners in this study appeared to engage most successfully in the performance phase of self-regulation, which involves executing study behaviors with sustained effort. Similar to the observations of Panadero (2017), students used cognitive strategies like rehearsal and retrieval practice to support memory retention. These behaviors were further supported by gamified features, such as progress tracking and achievement streaks, which contributed to motivation and effort regulation, as also highlighted in the work of Viberg (2023) and An and colleagues (2021). This study extends prior SRL research by highlighting that strong engagement in the performance phase does not necessarily lead to effective strategic adaptation in mobile-assisted learning contexts.

In terms of metacognitive engagement, the students reported frequent monitoring of performance and review of error history. These behaviors align with the monitoring and reflection components emphasized in the SRL frameworks discussed by Panadero (2017) and Viberg and Wasson (2020). However, a key challenge emerged in the transition from monitoring to adaptive planning, indicating that learners were more comfortable observing their performance than deciding what to do next based on that information. This finding reinforces the distinction between metacognitive monitoring and metacognitive control, suggesting that awareness of performance alone is insufficient for effective self-regulated learning.

2. Perceived Effectiveness for Vocabulary and Listening

Students perceived SRL strategies as effective in supporting vocabulary development. Cognitive behaviors such as targeted rehearsal and self-testing, alongside progress monitoring, were seen as central to retention and recall. These findings align with previous studies by Lei and colleagues (2022) and Chen and colleagues (2018), who reported that learners benefit from mobile tools that support repetitive and personalized vocabulary practice. In this study, students expressed satisfaction with the immediacy of feedback and the visibility of their progress, both of

which supported motivation and learning autonomy. This is particularly relevant in Japanese language learning, where kanji acquisition requires repeated exposure and active recall to support long-term retention.

In contrast, the findings related to listening skills were more nuanced. While learners found playback controls helpful for slowing down input and practicing comprehension in a structured way, they expressed concern about the limited transfer of these skills to authentic listening situations. This concern echoes the findings of Çakmak (2021) and Yabukoshi (2022), who noted that mobile applications often lack natural speech features such as variation in pace, tone, and colloquial expressions. Students in this study reported a gap between their ability to succeed on in-app listening tasks and their ability to comprehend native-level speech in real contexts, such as television or conversation. Although their SRL strategies supported analytical listening, the limitations of the app content itself reduced the perceived applicability of those strategies outside of the learning environment. This finding highlights a key limitation of mobile-assisted listening design, suggesting that overly controlled audio input may hinder learners' ability to adapt to authentic speech in real-world contexts.

3. Obstacles to Self-Regulated Mobile Learning

Despite overall strong SRL engagement, students reported two recurring challenges: digital distraction and insufficient metacognitive scaffolding.

The challenge of distraction was particularly evident in the use of behavioral regulation strategies. While students attempted to structure their environment by selecting quiet times and spaces for study, many struggled to resist the pull of unrelated phone notifications and the temptation to switch between apps. This reflects earlier concerns raised by Bowles (2024), who found that the mobile context itself often disrupts sustained engagement due to its association with entertainment and communication. In this study, even when learners attempted to implement SRL strategies, their device's multifunctionality often undermined their focus. This suggests that effective self-regulated learning in mobile contexts requires not only internal control strategies but also external regulation mechanisms to manage competing digital stimuli.

The second challenge related to metacognitive planning. Although students actively monitored their progress using app dashboards and error logs, they expressed uncertainty about how to use that information to make learning decisions. This gap was especially pronounced when students tried to select appropriate follow-up activities or evaluate whether a specific feature was improving their performance. As noted by Viberg and Wasson (2020), the absence of built-in instructional support limits the effectiveness of digital learning environments, particularly for learners who lack confidence in independently evaluating their progress. Several students in this study voiced a need for clearer guidance or embedded prompts that would help them interpret their performance data and plan their next steps more effectively. This finding reinforces the distinction between metacognitive monitoring and metacognitive control, suggesting that access to performance data alone does not ensure effective self-regulated learning without guided strategy use.

Conclusion

This study provides evidence that mobile applications, when used independently, can successfully promote key SRL strategies such as rehearsal, monitoring, and effort regulation. Students were able to manage their vocabulary development through repeated practice and visible progress tracking, and they demonstrated strong engagement with features designed to support learning autonomy. However, listening comprehension proved more difficult to improve, partly due to the structured nature of app-based content that lacks real-world complexity. This finding highlights a key limitation of mobile-assisted listening, where overly controlled audio may not adequately prepare learners for authentic Japanese communication.

Furthermore, students continued to face challenges with distraction and strategic planning, suggesting that successful SRL in mobile contexts depends not only on learner motivation, but also on the design of the learning environment. The ability to monitor progress is insufficient unless learners also receive guidance on how to act on that information. Overall, this study suggests that effective SRL in mobile learning requires not only learner engagement but also structured support and more authentic input to facilitate skill transfer.

Recommendations

This study highlights several important directions for future research and pedagogical development in mobile-assisted language learning for Japanese. One of the most critical needs identified is the integration of metacognitive scaffolding within mobile learning environments. Although students demonstrated strong monitoring behaviors, many struggled with using performance data to make informed learning decisions. Future studies should explore how mobile applications can support learners through guided prompts, automated recommendations, or reflective feedback features that help them plan and adjust their study paths more effectively. Such features may bridge the gap between metacognitive monitoring and metacognitive control in mobile learning contexts.

In addition, the gap between in-app listening performance and real-world comprehension suggests a need for more authentic audio content in mobile tools. Researchers and developers should consider incorporating natural, unscripted speech with varying speeds and intonation patterns to improve learners' ability to transfer listening skills to real communication situations. In particular, exposure to reduced forms, fast-paced speech, and contextual variability may better prepare learners for authentic Japanese listening.

Another promising direction involves the development of self-regulated learning training modules that are embedded into language apps. These modules could offer structured guidance on goal setting, progress tracking, and strategic adaptation, particularly for lower-proficiency learners who may lack the experience to self-direct effectively. Embedding such guidance directly into app design may enhance learners' ability to engage in strategic decision-making during independent study.

Lastly, future research should adopt longitudinal designs to examine how self-regulation strategies evolve over time. Understanding how learners adapt and refine their strategies throughout a semester or academic year would provide deeper insight into how mobile tools can support sustained language development.

By addressing these areas, future work can build on the strengths of current mobile learning systems while also responding to the challenges that learners continue to face in applying self-regulation effectively across different language skills. This is particularly important in Japanese language learning, where vocabulary complexity and listening variability require sustained and adaptive learning strategies.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

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