



MALL in the Wild: How Indonesian EFL Learners Self-Regulate Vocabulary Acquisition Through App-Based Learning Outside the Classroom

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Abstract: Mobile-Assisted Language Learning (MALL) has been studied extensively in formal instructional contexts, but far less is known about how EFL learners deploy mobile vocabulary apps in the unstructured, self-directed conditions of out-of-class learning—what this study calls MALL in the wild. Drawing on ecological momentary assessment, learning diaries, and in-depth interviews with twenty-two Indonesian EFL learners at a public Islamic university in Aceh over sixteen weeks, this study investigates the self-regulatory processes through which learners initiate, sustain, and abandon mobile vocabulary app use outside the classroom. Findings reveal that out-of-class MALL engagement is shaped by a dynamic interplay of situational triggers, motivational beliefs, goal specificity, and the degree to which app design affords or constrains self-regulatory behaviour. Four learner profiles emerged: disciplined self-schedulers, opportunistic engagers, anxiety-driven users, and gradual abandoners. Disciplined self-schedulers showed the strongest vocabulary gains; gradual abandoners showed minimal gains despite initial enthusiasm. The study draws on Self-Regulation Theory (Zimmerman, 2000) and ecological perspectives on language learning (van Lier, 2004) to argue that MALL's potential for supporting vocabulary development outside the classroom is substantially mediated by learners' self-regulatory capacities—and that app design and course integration strategies need to be explicitly oriented towards building those capacities rather than assuming they exist.

Keywords: MALL, mobile vocabulary apps, self-regulated learning, out-of-class learning, EFL, ecological momentary assessment.

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INTRODUCTION

There is a gap between what mobile language learning apps can do and what learners actually do with them—and it is bigger, and more interesting, than most of the research literature acknowledges. The technology side of that gap has received enormous attention: the features, designs, pedagogical affordances, and learning-support mechanisms of apps like Duolingo, Busuu, Memrise, and their competitors have been analysed extensively, and the results are broadly encouraging when conditions are right (Godwin-Jones, 2021; Klimova, 2020; Taj et al., 2020). The learner side of the gap has received considerably less

attention, particularly for learners who are using these apps not in formal, structured instructional contexts but in the fragmented, unpredictable, self-determined conditions of everyday life outside the classroom.

MALL in the wild is qualitatively different from MALL in the lab or MALL in the classroom. When there is no teacher to tell you to open the app, no classmates to practise alongside, no assignment submission that creates an external accountability structure, and no scheduled time set aside for the activity, the question of whether learning happens with a mobile app is largely a question about self-regulation: about whether the learner can set and maintain goals, choose and deploy strategies, monitor progress, manage the competing demands of daily life, and sustain engagement with a task that is, in the absence of external structure, entirely optional. These are not trivial capacities—and they are not evenly distributed.

This matters because the most common use context for MALL among Indonesian university EFL learners is precisely the wild: students who have downloaded Duolingo or Busuu or a similar app and use it—or do not use it—in the cracks of their daily schedules, driven by their own motivation, structured by their own habits, and accountable only to themselves. Understanding how that use actually unfolds—the triggers that initiate it, the conditions that sustain it, the factors that lead to its gradual abandonment—is prerequisite to designing MALL integration strategies that are realistic about what learners can and cannot be expected to do without support.

The study followed twenty-two Indonesian EFL learners at a public Islamic university in Aceh across sixteen weeks of self-directed mobile vocabulary app use, collecting data through ecological momentary assessment (EMA), weekly learning diaries, and three rounds of in-depth interviews. Three research questions shaped the inquiry, 1) What self-regulatory processes do Indonesian EFL learners employ when using mobile vocabulary apps for out-of-class learning?; 2) How do situational and motivational factors shape the initiation, sustainability, and abandonment of MALL engagement over time?; and 3) What learner profiles characterise different patterns of out-of-class MALL engagement, and how do these profiles relate to vocabulary learning outcomes?.

MALL and Vocabulary Acquisition: What the Evidence Shows

The evidence base for MALL's effects on vocabulary acquisition is substantial and broadly positive across a wide range of app types, learner populations, and learning contexts. Meta-analyses consistently report significant positive effects of mobile vocabulary practice on lexical gains compared to conventional instruction or no-treatment controls, with effect sizes that are practically meaningful (Klimova, 2020; Taj et al., 2020). The specific features of mobile app design associated with stronger learning outcomes include spaced repetition algorithms, immediate feedback, multimodal presentation, and gamification elements that sustain engagement across sessions (Godwin-Jones, 2021; Nation, 2022).

Studies focusing on informal and out-of-class MALL use—less common in the literature than formal integration studies—present a more variable picture. Learner engagement in self-directed MALL contexts is typically lower in frequency and shorter in duration than in structured instructional contexts; dropout rates from independently adopted mobile language learning apps are high, with estimates suggesting that the majority of new users abandon regular use within two to four weeks (Heil et al., 2016; Klimova, 2020). The vocabulary gains associated with informal MALL are consequently more variable than those reported in controlled studies, and depend heavily on the consistency and quality of learner engagement over time (Godwin-Jones, 2021; Taj et al., 2020).

This variability points directly to the self-regulatory dimension of out-of-class MALL. When engagement is consistent and goal-directed, mobile apps appear capable of supporting meaningful vocabulary development. When engagement is sporadic, reactive, and unguided by clear goals—which characterises many learners' actual experience of

independent app use—the learning benefits are substantially diminished. Understanding the self-regulatory processes that determine which of these patterns a learner follows is, therefore, not a peripheral concern but a central one for MALL research and pedagogy.

Self-Regulated Learning in MALL Contexts

The application of SRL theory to MALL has grown as it has become clear that learner agency, not just app affordance, is the critical variable in out-of-class mobile learning outcomes (Lai, 2020; Reinders & Benson, 2017). Zimmerman's (2000) SRL framework—with its forethought, performance, and self-reflection phases—maps well onto the specific challenges of out-of-class MALL. In the forethought phase, effective MALL learners set specific vocabulary learning goals, plan how and when they will use the app, and hold motivational beliefs about the value and manageability of the learning activity. In the performance phase, they deploy specific vocabulary learning strategies, monitor their own progress, and self-instruct when the task becomes difficult. In the self-reflection phase, they evaluate their learning, attribute outcomes to controllable factors, and make adaptive decisions about future practice.

Research in MALL contexts shows that learners with stronger forethought processes—more specific goal-setting, clearer plans for how and when to practise—show more consistent engagement and stronger vocabulary outcomes than those with vague intentions and unstructured use patterns (Lai, 2020; Reinders & Benson, 2017). The self-reflection phase appears particularly underdeveloped in independent MALL contexts: learners who lack structured prompts for reflection on their own learning rarely engage in the kind of adaptive self-evaluation that would help them improve their practice strategies over time. This gap is one that course integration and pedagogical scaffolding can address—but only if those interventions are designed with the specific self-regulatory challenges of out-of-class MALL in mind.

Ecological Perspectives on Out-of-Class Language Learning

Van Lier's (2004) ecological perspective on language learning offers a complementary lens to SRL theory for understanding MALL in the wild. The ecological approach understands language learning as occurring within and through the learner's environment—shaped by affordances (opportunities for learning action made available by the environment) and by the learner's agency in perceiving and acting on those affordances. In MALL contexts, this perspective directs attention to the specific situational conditions in which out-of-class app use occurs: the physical setting, the time available, the competing demands of other activities, and the social presence or absence of other people—and to how learners perceive and act on the affordances those conditions make available.

This ecological lens is particularly useful for understanding why out-of-class MALL engagement is so sensitive to context. The affordances for mobile vocabulary learning are not evenly distributed across the settings of daily life: waiting for transport, eating alone, having ten minutes between classes, and lying in bed before sleep all create different affordance profiles for app-based vocabulary practice. Learners who are ecologically attuned—who can perceive and act on the affordances of these varied settings—are more likely to sustain engagement than those who have defined their MALL practice as a fixed-time, fixed-location activity that competes with other fixed commitments. Understanding how learners' ecological awareness shapes their out-of-class MALL patterns is one of the contributions this study is positioned to make.

Out-of-Class Learning in Indonesian EFL Contexts

Indonesia's EFL learner population presents specific conditions for out-of-class MALL. Smartphone ownership among Indonesian university students is near-universal, and social media and messaging app use is intensive—creating both opportunities (the device is always available) and competitions (the same device that hosts Duolingo also

hosts Instagram, TikTok, and WhatsApp) for mobile learning time (Tai et al., 2020; Wiboolyasarin et al., 2021). University EFL instruction hours are typically limited, with most programmes providing three to four contact hours per week, making out-of-class learning time more important than in contexts with more generous instructional time. And the motivational landscape is complex: English proficiency is highly valued for academic and professional advancement, but the day-to-day salience of English in most students' lives outside the university is limited, making the sustaining of long-term out-of-class learning motivation a genuine challenge (Musthafa, 2021; Sunardi et al., 2020).

Self-Regulation Theory

Zimmerman's (2000) cyclical SRL model provides the primary framework for analysing how learners initiate, sustain, and abandon out-of-class MALL engagement. The three-phase model directs analytical attention to: forethought processes (goal-setting, strategic planning, motivational beliefs about MALL); performance processes (strategy use, self-monitoring, self-instruction during app use); and self-reflection processes (self-evaluation of progress, causal attribution, adaptive decisions about future practice). The framework's cyclical structure is particularly appropriate for a longitudinal study: SRL processes in week one shape engagement patterns in week four, which shape self-reflection in week eight, and so on.

Ecological Perspectives

Van Lier's (2004) ecological perspective provides a situational lens that SRL theory, with its focus on internal cognitive processes, does not fully supply. It directs attention to the specific environments in which out-of-class MALL occurs—the affordances those environments make available and the ways in which learners perceive and act on them. The framework supports the ecological momentary assessment methodology by providing a theoretical rationale for capturing learning events in context rather than retrospectively.

METHODS

Research Design

The study used a longitudinal mixed-methods design combining ecological momentary assessment (EMA), weekly learning diaries, vocabulary tests, and in-depth interviews across sixteen weeks. The EMA component—asking participants to report their app use immediately after each session, while the experience was still fresh—was central to the study's ability to capture out-of-class learning as it actually occurred rather than as it was reconstructed in retrospect. The longitudinal duration was chosen to capture the full trajectory of out-of-class MALL engagement, including both early enthusiasm and longer-term sustainability patterns.

Participants

Twenty-two undergraduate EFL students (fifteen female, seven male; age 19–22) at a public Islamic university in Aceh participated. All were enrolled in a Reading and Vocabulary Development course during the study period; MALL app use was not formally integrated into this course but participants were informed that the research team would provide access to a Quizlet Plus account for the study period. The choice of Quizlet was made because it allows researcher access to usage logs (supporting data triangulation) and because its spaced repetition and multiple study mode features represent good-practice MALL design. Purposive sampling ensured variation across self-reported prior app use, vocabulary test baseline scores, and self-reported study habit regularity.

Data Collection

EMA data were collected via a short survey sent to participants' phones immediately after each Quizlet session (triggered automatically by session completion

detection through the Quizlet API). The survey collected: session duration, location and context (coded from a checklist: commuting, waiting, between classes, at home, etc.), immediate self-assessment of session quality (three items on focus, difficulty, and perceived progress), and a single open-ended prompt: *In one sentence, why did you open the app today?* Weekly learning diaries (submitted via WhatsApp voice note or written message) asked participants to reflect on the week's app use, what had and had not worked, and what they planned for the following week. Three rounds of in-depth interviews (30–50 minutes each, at weeks four, ten, and sixteen) explored participants' developing relationship to the app, their emerging vocabulary learning strategies, and their reflections on what had helped or hindered sustained engagement.

Vocabulary assessments were administered at weeks one, eight, and sixteen, using a Vocabulary Levels Test adapted for the academic English vocabulary relevant to the participants' study programme (Nation, 2022). Quizlet usage logs provided objective data on session frequency, duration, and study mode choices.

Data Analysis

EMA and usage log data were analysed descriptively and through time-series visualisation to identify individual engagement trajectories across the sixteen weeks. Vocabulary test data were analysed using repeated measures ANOVA with post-hoc comparisons between learner profiles. Diary and interview data were analysed using thematic analysis (Braun & Clarke, 2021), with SRL phase processes and ecological affordance perceptions as sensitising concepts (Saldaña, 2016). Learner profiles were developed through cluster analysis of engagement trajectory data, validated through the qualitative data.

RESULTS

Overall Engagement Patterns

Usage log data across the sixteen weeks showed significant variation in app engagement both across and within participants. Mean session frequency across all participants was 3.2 sessions per week ($SD = 1.8$), with a clear downward trend from weeks one to four ($M = 4.6$ sessions/week) to weeks twelve to sixteen ($M = 2.1$ sessions/week). Session duration showed a similar pattern: early sessions averaged 18.4 minutes; late-study sessions averaged 11.2 minutes. These aggregate trends masked considerable individual variation: some participants maintained consistent or even increasing engagement across the study period, while others dropped to near-zero by week eight. Vocabulary test data showed significant within-subject gains from week one to week sixteen overall ($F(2, 42) = 18.33, p < .001, \eta^2 = .47$), but the gains were not evenly distributed—a finding fully explained by the learner profile analysis below.

Learner Profiles

Cluster analysis of weekly session frequency data, validated against qualitative themes from diary and interview data, produced four distinct learner profiles. These are presented in order of vocabulary outcome strength.

Profile 1: Disciplined Self-Schedulers ($n = 5$). These participants established regular, time-specific app use habits early in the study and maintained them with relatively little variation across sixteen weeks. EMA data showed highly consistent session frequencies, with most sessions occurring at the same time of day (typically early morning or after evening prayers) and in the same location (bedroom). Diary entries and interview data revealed explicit, specific goal-setting: not "I will study vocabulary this week" but "I will do one Quizlet set every morning after Fajr prayer." These participants described their app use in terms of routine and commitment rather than mood or motivation: *"I don't think about whether I feel like it. It is part of what I do in the morning"* (Azizah). Vocabulary gains were the largest of any profile: mean gain from week one to week sixteen = 34.2 vocabulary items ($SD = 5.1$).

Profile 2: Opportunistic Engagers (n = 6). These participants did not establish fixed routines but showed consistently high ecological attunement—regularly identifying and acting on affordances for app use in the varied contexts of daily life. EMA data for this group showed high session frequency (comparable to disciplined self-schedulers) but distributed across diverse times and locations: commuting, waiting for lectures, eating alone, travelling between campuses. Open-ended EMA prompt responses showed high situational awareness: *"I had fifteen minutes before class and I was bored"; "I was on the angkot [public minibus] and there was nothing to do."* Interview data showed less explicit goal-setting than disciplined self-schedulers but more developed ecological awareness—a well-calibrated sense of which daily situations offered usable learning time. Vocabulary gains were the second-largest of any profile: mean gain = 28.4 items (SD = 6.3).

Profile 3: Anxiety-Driven Users (n = 6). These participants showed a distinctive engagement pattern tied to assessment proximity: app use spiked in the weeks immediately before vocabulary tests and dropped sharply in the weeks between them. EMA data showed a characteristic sawtooth pattern—high frequency in assessment weeks, low frequency in inter-assessment periods—that was confirmed by diary entries attributing most app use directly to test preparation anxiety: *"I have a vocabulary quiz next week so I am trying to catch up"* (Hendra); *"I have been ignoring this but the test is coming so I need to use it now"* (Winda). Interview data revealed that these participants held strong but primarily extrinsic motivational beliefs about vocabulary learning: it was worth doing for grades but not intrinsically interesting. Vocabulary gains were moderate: mean gain = 19.7 items (SD = 7.2)—meaningful, but substantially lower than the first two profiles.

Profile 4: Gradual Abandoners (n = 5). These participants showed initial enthusiasm—high session frequency in weeks one to three—followed by progressive disengagement, with most showing near-zero app use by week ten. EMA data from early weeks showed varied session contexts and durations consistent with genuine exploration; later EMA responses (when participants remembered to submit them at all) showed increasingly formulaic entries. Diary entries from the abandonment phase were revealing: most participants attributed declining use to busyness (*"A lot of assignments"; "Ramadan preparation"*), but interview data added nuance—several described an early experience of not knowing whether the app was working, of not seeing visible progress, that had eroded motivation before habits had formed. *"At first I used it every day. But then I didn't know if I was actually learning or just clicking. I couldn't see the difference in myself"* (Syukri). Vocabulary gains were minimal: mean gain = 8.3 items (SD = 4.8).

Self-Regulatory Processes: Themes Across Profiles

Cross-profile qualitative analysis identified three self-regulatory dimensions that most consistently differentiated stronger from weaker MALL engagement patterns.

Goal specificity. The difference between disciplined self-schedulers and gradual abandoners was most visible in the specificity of their stated goals. Disciplined self-schedulers described goals that were implementation-specific: when, where, for how long, and with what focus they would use the app. Gradual abandoners described goals that were outcome-oriented but implementation-vague: *"I want to improve my vocabulary this semester."* Research on implementation intentions (Gollwitzer, 1999) consistently finds that when-where-how specificity dramatically increases goal follow-through—a finding directly supported by this study's profile data.

Progress visibility. Gradual abandoners consistently described an inability to perceive their own progress—a self-monitoring failure that eroded motivation before the vocabulary gains had become large enough to provide intrinsic feedback. Several described opening the app and finding the same words hard that had been hard a week before, without recognising that spaced repetition was working correctly—that the difficulty of recalling words after an interval was evidence of productive forgetting, not

absence of learning. The absence of metacognitive knowledge about how vocabulary acquisition works was, in this group, a direct self-regulatory liability.

Response to interruption. All participants experienced periods when their planned or habitual app use was disrupted—illness, family obligations, Ramadan, academic deadlines. The critical difference was in self-reflection after disruption. Disciplined self-schedulers and opportunistic engagers described returning to the app after interruptions with minimal friction, sometimes explicitly noting that missing sessions was not a reason to abandon the habit. Gradual abandoners described interruptions as endpoints rather than pauses: *"I missed a whole week and then I felt too far behind to start again."* The absence of adaptive self-reflection—the capacity to treat a setback as recoverable—was, for this group, the mechanism through which temporary disruptions became permanent abandonment.

DISCUSSION

MALL in the Wild Requires Self-Regulatory Capital

The central finding of this study is straightforward but consequential: out-of-class MALL engagement is not primarily determined by app quality, learner proficiency, or access to devices and data. It is primarily determined by self-regulatory capacity—the ability to set and pursue goals, monitor and adapt strategy use, and manage the ongoing negotiation between MALL intentions and the competing demands of daily life. This finding is consistent with the growing SRL-in-MALL literature (Lai, 2020; Reinders & Benson, 2017) and extends it with longitudinal, ecologically embedded data that captures self-regulatory processes as they actually unfold rather than as they are reported retrospectively.

The gradual abandoner profile is the most practically significant finding, because it describes a common pattern—initial enthusiasm followed by progressive disengagement—that MALL promotion and adoption strategies consistently underestimate. Gradual abandoners in this study were not unmotivated, not technologically incompetent, and not indifferent to vocabulary development. They were self-regulatory novices, equipped with good intentions and inadequate self-monitoring capacity, let down by the absence of the external accountability and progress visibility structures that had supported their learning in formal instructional contexts.

Ecological Attunement as a Learner Competency

The opportunistic engager profile introduces a self-regulatory competency that Zimmerman's (2000) framework does not fully capture: ecological attunement—the ability to perceive and act on the affordances for mobile learning that daily life makes available, without requiring the fixed routines that disciplined self-schedulers depend on. Van Lier's (2004) ecological framework is better equipped to theorise this competency, treating it as a form of environmental agency that is developed through practice and reflection rather than through explicit instruction.

The practical implication is that MALL integration strategies should not assume that all learners need to develop the same kind of self-regulatory structure. For some learners, the discipline of a fixed daily routine is both achievable and effective. For others—particularly those with more fragmented and unpredictable daily schedules—developing ecological attunement may be a more realistic and equally effective path to sustained MALL engagement. Pedagogical support for MALL should offer both pathways rather than prescribing a single model of responsible practice.

App Design and the Progress Visibility Problem

The gradual abandoner profile points to a specific design limitation that has pedagogical implications. Quizlet, like most mobile vocabulary apps, provides progress data in the form of session statistics—words studied, accuracy rates, streaks—that are accurate but not always intuitively meaningful to learners who do not understand the

relationship between these metrics and actual vocabulary acquisition. The learners who abandoned the app in this study were not wrong to find it difficult to perceive their own progress; the progress was genuinely not visible in the forms they were looking for.

This is partly a metacognitive knowledge problem—learners who understand how spaced repetition works, and why difficulty in recall after an interval is a sign of productive learning, can interpret session statistics more accurately. It is also partly a design problem: apps that more explicitly connect session performance data to vocabulary acquisition theory—explaining why you are seeing this word again, what your error pattern tells you about your learning, and what the evidence suggests about when you will know this word with confidence—would support the self-monitoring processes that gradual abandoners most need. Incorporating brief metacognitive explainers into the MALL curriculum, and designing brief progress-reflection prompts into course integration structures, are low-cost interventions that address the progress visibility problem directly.

Course Integration as Self-Regulatory Scaffolding

The findings have clear implications for how instructors and curriculum designers should think about MALL integration. Providing students with app access and encouragement—the most common form of MALL integration in Indonesian EFL programmes—is insufficient if the goal is to support the self-regulatory processes on which out-of-class vocabulary learning depends. What is needed alongside access is explicit scaffolding for the forethought, performance, and self-reflection phases of the SRL cycle as they apply to MALL.

Practically, this might include: brief in-class instruction on implementation intention-setting (the when-where-how specificity that disciplined self-schedulers had developed independently); regular, low-burden progress reflection activities (a two-minute weekly journal prompt submitted via WhatsApp, as in this study, adds minimal burden and creates the reflective occasion that many learners will not create for themselves); explicit metacognitive instruction on how spaced repetition works and why session difficulty is evidence of productive learning; and a recovery norm that frames interruptions to MALL habits as routine rather than disqualifying—explicitly communicating that missing a week is recoverable and that returning to the app after a gap is both expected and easy. None of these interventions is technically demanding. All of them address the self-regulatory gaps that this study identifies as the primary determinants of MALL outcome variability in out-of-class contexts.

Religious and Cultural Rhythms as Ecological Features

One finding that emerged unexpectedly and deserves brief attention is the role of Islamic religious practice rhythms—particularly the five daily prayer times and the Ramadan period—as structuring features of participants' ecological MALL landscape. Several disciplined self-schedulers described prayer times as natural anchoring points for their vocabulary practice habits, with post-Fajr (dawn prayer) practice being the most commonly mentioned routine. The Ramadan period was experienced by gradual abandoners as a disruption that ended their app use habits; by disciplined self-schedulers as a period that required habit adaptation rather than abandonment.

These observations suggest that MALL pedagogy in Indonesian Islamic university contexts should attend to the specific ecological features of students' daily lives—including religious practice rhythms—when providing guidance on habit formation. Linking MALL practice to existing daily anchors, including prayer times, may be a culturally specific but practically effective scaffolding strategy that has no equivalent in MALL literature developed primarily in secular Western or East Asian contexts.

CONCLUSION

This study followed twenty-two Indonesian EFL learners through sixteen weeks of self-directed mobile vocabulary app use in the unstructured conditions of daily life—MALL in the wild—to understand how self-regulatory processes shape the initiation, sustainability, and abandonment of out-of-class mobile learning. What it found was four learner profiles representing different configurations of self-regulatory capacity, ecological attunement, and motivational orientation, with dramatically different vocabulary outcomes. Disciplined self-schedulers and opportunistic engagers sustained engagement and showed substantial vocabulary gains; gradual abandoners showed initial enthusiasm that dissolved in the absence of sufficient self-regulatory infrastructure. The practical conclusion is not that mobile vocabulary apps are ineffective for independent learning—the data from the first two profiles suggest they can be highly effective. It is that effectiveness depends on self-regulatory capacities that many learners do not yet have, and that course integration strategies need to actively build rather than assume. MALL in the wild without pedagogical scaffolding for self-regulation is, for a significant proportion of learners, MALL that starts with enthusiasm and ends in an app they stopped opening three months ago. That is not a failure of the technology—it is a failure to recognise that the technology is only as useful as the learner's capacity to use it well.

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