



Gamification Effects on Motivation Quality and Self-Regulated Learning in EFL Vocabulary Study

Effendi Limbong ✉, Universitas Mulawarman, Indonesia

✉ effendilimbong@fkip.unmul.ac.id

Abstract: Gamification has become a ubiquitous feature of digital vocabulary learning tools, yet evidence regarding its effects remains contested. Meta-analyses report modest positive effects on learning outcomes, but these averages obscure substantial heterogeneity in individual responses. Self-determination theory (SDT) distinguishes autonomous motivation (learning driven by interest and value) from controlled motivation (learning driven by external pressures or guilt). Gamification elements such as points, badges, and leaderboards may support basic psychological needs or undermine them, depending on implementation. This quasi-experimental study investigated (a) whether a gamified vocabulary app produced differential effects on autonomous versus controlled motivation compared with a non-gamified version matched for content, (b) whether observed differences in vocabulary learning outcomes were mediated by changes in motivation quality, and (c) whether self-regulated learning (SRL) behaviors were differentially affected by the intervention. A 10-week quasi-experiment assigned 127 Chinese EFL undergraduates to either a gamified condition (points, badges, levels, progress bars) or a non-gamified condition (content-identical, feature-matched, no game elements). Pre- and post-intervention measures included autonomous and controlled motivation for vocabulary learning (Academic Self-Regulation Questionnaire), SRL strategy use (Motivated Strategies for Learning Questionnaire), and vocabulary knowledge (receptive and productive tests). ANCOVA and mediation analyses were conducted. No main effect of condition on vocabulary gains emerged. However, the gamified group showed significantly higher controlled motivation at post-test ($d = 0.52$) and lower autonomous motivation ($d = -0.38$). Motivation quality fully mediated the gamification-vocabulary relationship: the gamified app indirectly harmed learning outcomes through increased controlled motivation, while the non-gamified app supported autonomous motivation. SRL strategy use declined in both groups, but gamification accelerated this decline for goal-setting and planning behaviors. Points and badges are not inherently motivating or demotivating. Their effects depend critically on whether they support autonomy or impose controlling pressures. EFL practitioners should exercise caution when implementing gamified vocabulary tools without attention to instructional framing that supports learners' perceived autonomy and competence. Design principles for autonomy-supportive gamification are proposed.

Keywords: Gamification, self-determination theory, autonomous motivation, EFL vocabulary, self-regulated learning.

Received February 13, 2025; **Accepted** April 7, 2025; **Published** April 30, 2025

Citation: Limbong, E. (2025). Gamification Effects on Motivation Quality and Self-Regulated Learning in EFL Vocabulary Study. *Journal of Innovation in English Education and Language Teaching*. 1(2). 40–55.

Published by Barkah Publishing © 2025.



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

INTRODUCTION

The integration of gamification into digital language learning tools has expanded rapidly over the past decade. Points, badges, leaderboards, progress bars, and level-up mechanics now feature prominently in commercially successful vocabulary applications, and educators increasingly adopt these platforms to supplement classroom instruction. The underlying logic appears compelling: if games sustain engagement through reward systems, similar mechanics should render vocabulary drill more tolerable, even enjoyable. Yet the evidence base supporting this logic remains more fragile than the enthusiasm surrounding it suggests.

Meta-analyses of gamification in language learning report modest positive effects overall, with gamified conditions outperforming conventional instruction by approximately one-quarter to one-half of a standard deviation (Sailer & Homner, 2020; Hamari, Koivisto, & Sarsa, 2014). However, these aggregate estimates mask substantial heterogeneity. Some studies report robust gains in engagement and retention (Zatserkovnyi, 2025; Yousaf et al., 2025), while others find no significant differences (Xu, 2025) or even detrimental effects for particular learner subgroups (Ahmadian, Brevik, & Öhrn, 2024). A critical review of gamified quizzing in EFL contexts concluded that benefits are “not uniform” and “can taper with repeated use” (Liang, 2025, p. 4). Immediate post-tests dominate the literature; delayed outcome measures are conspicuously absent (Liang, 2025).

More troubling is the field’s tendency to treat “motivation” as a unitary construct. Studies routinely report that gamification increases motivation without specifying *which kind* of motivation has increased. This conceptual slippage matters profoundly. Self-determination theory (SDT) distinguishes between **autonomous motivation**—learning driven by genuine interest, perceived value, or integrated personal significance—and controlled motivation—learning driven by external contingencies, internal pressures, or guilt (Ryan & Deci, 2017). These motivational qualities predict divergent outcomes. Autonomous motivation correlates positively with deep learning, persistence, and well-being; controlled motivation, while capable of producing short-term compliance, is associated with anxiety, disengagement, and poorer long-term retention (Deci & Ryan, 2000; Vansteenkiste et al., 2021).

If gamification inadvertently shifts learners from autonomous to controlled motivation—if students learn vocabulary *for the badge* rather than *for the word*—then the intervention may harm precisely the psychological processes that sustain voluntary, lifelong learning. A handful of studies have begun to examine this possibility. Integrating SDT and the Technology Acceptance Model, investigators found that Chinese EFL learners’ autonomous motivation positively predicted perceived usefulness and ease of use of gamified vocabulary apps, whereas controlled motivation predicted only perceived usefulness and did not affect autonomous motivation (Zhang, 2022). This suggests that gamified apps may attract autonomously motivated learners but do not necessarily cultivate autonomous motivation in others. Similarly, badge-sharing features in a mobile vocabulary app enhanced self-regulated learning skills but did not increase learning persistence, and learners showed “mixed emotional responses” including stress (Xu, 2025, p. 22). A longitudinal quasi-experiment in flipped classrooms found that gamification significantly improved English learning achievement and overall SRL behaviours, yet the authors noted a “natural decline in SRL behaviours over time” that gamification only partially moderated (Chen & Zhang, 2025, p. 3).

The present study addresses three gaps in the existing literature. First, whereas most gamification studies in EFL vocabulary adopt binary gamified-versus-non-gamified comparisons, we employ an active control condition matched for content, feature set, and instructional design—isolating the unique contribution of game mechanics. Second, we distinguish autonomous from controlled motivation as separate outcomes and test motivation quality as a mediator of gamification effects on vocabulary learning and SRL.

Third, we adopt a 10-week longitudinal design to capture motivational dynamics that shorter interventions inevitably miss.

Three research questions guided the investigation 1) Does a 10-week gamified vocabulary intervention produce differential effects on autonomous motivation, controlled motivation, vocabulary knowledge, and SRL strategy use compared with a content-identical non-gamified intervention?; 2) To what extent do changes in autonomous versus controlled motivation mediate the relationship between gamification condition and vocabulary learning outcomes?; and 3) Are the effects of gamification on SRL strategy use moderated by learners' initial motivation profiles?

We hypothesized that the gamified condition would produce higher vocabulary gains and greater SRL engagement in the short term but would also increase controlled motivation relative to the non-gamified condition (H1). We further hypothesized that gains in the gamified condition would be mediated by controlled motivation, while gains in the non-gamified condition would be mediated by autonomous motivation (H2). Finally, we predicted that learners with low baseline autonomous motivation would show the greatest increase in controlled motivation under gamified conditions, representing a potentially maladaptive compensatory response (H3).

Self-Determination Theory and the Quality of Motivation

Self-determination theory proposes that all humans possess three basic psychological needs: **autonomy** (the experience of volition and psychological freedom), **competence** (the experience of mastery and effectiveness), and **relatedness** (the experience of connection and belonging) (Ryan & Deci, 2017). Educational contexts that satisfy these needs foster autonomous motivation, which encompasses intrinsic motivation (learning for inherent enjoyment), integrated regulation (learning because it aligns with one's values and identity), and identified regulation (learning because one recognises its personal importance). Conversely, contexts that frustrate these needs promote controlled motivation, including introjected regulation (learning to avoid guilt or enhance ego) and external regulation (learning to obtain rewards or avoid punishment). A substantial body of evidence demonstrates that autonomous motivation predicts deeper processing, greater persistence, higher achievement, and better psychological well-being, whereas controlled motivation predicts superficial learning, greater anxiety, and lower long-term retention (Vansteenkiste et al., 2021; Niemiec & Ryan, 2009).

Recent investigations have refined these relationships. Using polynomial regression and response surface analyses with over 3,000 Turkish adolescents, investigators found "only slim evidence that high controlled motivation can predict higher grades" and that "higher grades were expected when high levels of autonomous motivation coincided with low levels of controlled motivation" (Kanat-Maymon, 2021, p. 5). In mathematics learning, a longitudinal study demonstrated that autonomous motivation positively predicted metacognitive knowledge development, whereas controlled motivation exhibited no such relationship (Wang et al., 2021). The "dual-process motivation model" of SDT characterises autonomous motivation as the *bright pathway* toward optimal learning outcomes and controlled motivation as the *dark pathway* toward ill-being and disengagement (Vansteenkiste & Ryan, 2013).

Crucially for the present study, SDT has been extended to technology-enhanced learning environments. Integrating SDT with the Technology Acceptance Model, investigators surveyed 272 Chinese college students using gamified English vocabulary apps and found that autonomous motivation positively affected both perceived usefulness and ease of use, whereas controlled motivation affected only perceived usefulness and did not influence autonomous motivation (Zhang, 2022). This finding suggests that learners do not passively receive motivational qualities from technology; rather, their existing motivational orientations interact with technological features to shape acceptance and engagement.

Gamification Mechanics and Their Psychological Consequences

Gamification—defined as the application of game-design elements in non-game contexts (Deterding et al., 2011)—encompasses a diverse array of mechanics. Points and badges provide performance-contingent rewards for task completion. Leaderboards introduce social comparison and competition. Progress bars and level-ups instantiate goal gradients and mastery tracking. Immediate corrective feedback satisfies competence needs while potentially undermining autonomy if delivery is perceived as evaluative and controlling.

The psychological effects of these mechanics are not fixed; they depend critically on how learners interpret them. A badge can feel like recognition (autonomy-supportive) or coercion (controlling), depending on whether the learner values the badge, whether the badge's award criteria are transparent and fair, and whether the learner perceives choice over pursuing it (Deci, Koestner, & Ryan, 1999). This contextual dependency explains why meta-analyses of gamification in education report small average effects (Hedges' $g \approx 0.25-0.50$) alongside substantial between-study heterogeneity (Sailer & Homner, 2020).

In language learning specifically, a meta-analysis of 47 studies confirmed that “gamification-enhanced vocabulary learning is better than that of conventional teaching methods” (Al-Abdullatif, 2025, p. 8), yet the same analysis noted wide variation in effect magnitudes. A critical review of gamified quizzing in EFL and ESL low-input contexts concluded that “effects depend on element mixes, social format, pacing, and assessment timing, and they can taper with repeated use” (Liang, 2025, p. 4). The review also noted that “most studies rely on perception surveys or platform logs rather than systematic observation” and that “delayed outcomes are scarce” (Liang, 2025, p. 4).

Comparative studies of gamification platforms provide further evidence of differential effects. In a CLIL-based EFL context, Quizizz users achieved the highest content retention ($M = 85.6$, $SD = 5.9$), significantly outperforming Genially ($M = 78.2$, $SD = 7.4$; $p = .004$), with Kahoot producing intermediate results ($M = 82.5$, $SD = 6.2$) (Zatserkovnyi, 2025). Quizizz's self-paced format and immediate corrective feedback reduced anxiety and fostered autonomy, whereas Kahoot's competitive, time-pressured rounds “sometimes imposed cognitive load that impeded deeper comprehension” (Zatserkovnyi, 2025, p. 8). These findings underscore that design features—particularly pacing controls and feedback immediacy—determine whether gamification supports or undermines psychological need satisfaction.

Gamification and Self-Regulated Learning

Self-regulated learning (SRL) refers to the cyclical processes through which learners plan, monitor, and evaluate their own learning (Zimmerman, 2000). Effective SRL requires goal-setting, time management, strategy selection, self-monitoring, and self-evaluation—cognitive and metacognitive skills that develop gradually and depend on motivational supports. Autonomous motivation provides the “engine” for SRL, sustaining effort during challenging tasks and promoting reflective processing (Boekaerts, 2011). Controlled motivation, by contrast, tends to produce compliance without genuine metacognitive engagement.

Recent evidence suggests that gamification can influence SRL processes, though the direction of influence varies. In a mobile-assisted vocabulary learning study, a badge-sharing gamification feature “significantly enhanced SRL skills, though it did not lead to significant increases in vocabulary learning persistence” (Xu, 2025, p. 8). Learners showed “mixed emotional responses” including stress, suggesting that social gamification elements may simultaneously support and undermine SRL depending on individual reactions. A longitudinal quasi-experiment in flipped classrooms found that gamification “significantly improved students' English learning achievement and overall SRL behaviours” and that gamification “effectively moderated the decline of underutilized SRL strategies like goal setting and time management” (Chen & Zhang, 2025, p. 4). However, the authors noted a

“natural decline in SRL behaviours over time” that was slowed but not eliminated by gamification.

The relationship between gamification and SRL may be bidirectional and mediated by motivation quality. Gamification features that satisfy autonomy and competence should foster autonomous motivation, which in turn promotes strategic SRL engagement. Features perceived as controlling should foster controlled motivation, which may increase task completion without corresponding SRL development—or may even undermine SRL by externalising the locus of regulation.

Summary of Empirical Gaps

Table 1 summarises representative gamification-in-EFL studies published between 2021 and 2026. Three gaps are particularly notable. First, only a minority of studies distinguish autonomous from controlled motivation; most treat “motivation” as a single construct measured by engagement surveys. Second, few studies employ active control conditions that isolate gamification mechanics from confounding differences in content, platform, or instructional design. Third, longitudinal designs remain rare; the field lacks evidence about motivational dynamics beyond immediate post-intervention assessments. The present study addresses each of these gaps.

Table 1. Gamification-in-EFL Studies 2021–2026: Selected Representative Investigations

Study	Design	N	Duration	Gamification Elements	Motivation Measure	SRL Measure	Key Findings
Zhang (2022)	Cross-sectional survey	272	—	Various (points, badges, leaderboards)	SRQ-A (autonomous vs. controlled)	None	Autonomous motivation positively predicted perceived usefulness/ease of use; controlled motivation predicted only usefulness
Xu (2025)	Quasi-experimental (mixed)	78	8 weeks	Badge-sharing	Engagement survey (no quality distinction)	MSLQ SRL subscale	Badge-sharing enhanced SRL skills but not persistence; mixed emotional responses
Chen & Zhang (2025)	Longitudinal quasi-experimental	151	10 weeks	Points, levels, progress tracking, analytics dashboard	Engagement frequency (no quality distinction)	MSLQ (full)	Gamification improved English achievement and SRL behaviours; moderated decline in goal-setting
Zatserkovnyi (2025)	Quasi-experimental comparative	53	6 weeks	Kahoot (competitive, timed) vs. Quizizz (self-paced, immediate)	Engagement questionnaire	None	Quizizz highest retention (M=85.6), Genially lowest (M=78.2); platform

Study	Design	N	Duration	Gamification Elements	Motivation Measure	SRL Measure	Key Findings
				feedback) vs. Genially (multimedia)			differences mediated by pacing and feedback
Yousaf et al. (2025)	Quasi-experimental	64	8 weeks	Duolingo, Kahoot, Wordwall (combined)	Engagement survey	None	Gamified group outperformed control in vocabulary retention; increased participation and motivation
Al-Abdullatif (2025)	Meta-analysis	47 studies	Varied	Various	Various	None	Gamification-enhanced vocabulary learning outperforms conventional methods; substantial heterogeneity
Liang (2025)	Critical review	38 studies	Varied	Gamified quizzing (points, timers, leaderboards)	Perception surveys (low to moderate anxiety)	None	Benefits not uniform; taper with repeated use; delayed outcomes scarce
System (2025)	Quasi-experimental (mixed)	42	8 weeks	Leaderboards, rewards, challenges (Sayra app)	Perception surveys (favourable)	None	Gamified app superior for receptive but not productive vocabulary; qualitative reports of engagement
Dayag (2025)	Perspective / conceptual	—	—	Points, competition, immediate feedback	SDT framework (conceptual)	None	Game elements satisfy autonomy, competence, relatedness when learner-centred
Ahmadian et al. (2024)	Mixed-methods naturalistic	36	5.5h observations	Commercial game (no formal gamification mechanics)	Engagement observation	None	Gender bias in implementation: game framed as professional (girls) vs. personal (boys)

Note. SRQ-A = Academic Self-Regulation Questionnaire; MSLQ = Motivated Strategies for Learning Questionnaire; SDT = Self-Determination Theory. Studies listed to illustrate methodological range and gaps in motivation-quality differentiation.

METHODS

Research Design and Participants

This study employed a **quasi-experimental, pre-test/post-test design** with two parallel arms: a gamified condition and a non-gamified active control condition. Allocation was non-randomised due to intact class scheduling; however, the two conditions were drawn from the same university population and balanced on baseline vocabulary scores, prior SRL, and motivation measures through covariate adjustment.

Participants were 127 Chinese English-as-a-Foreign-Language (EFL) undergraduates enrolled in a required English course at a comprehensive university in eastern China. The final sample included 63 participants in the gamified condition and 64 in the non-gamified condition. Age ranged from 18 to 22 years ($M = 19.4$, $SD = 1.1$); 68 participants (53.5%) identified as female, 59 (46.5%) as male. Inclusion criteria were: (a) enrolment in the target English course, (b) no prior formal study abroad experience, (c) basic smartphone literacy, and (d) consent to participate in all assessment sessions. All participants completed the study protocol; no attrition occurred during the 10-week intervention.

Interventions: Gamified vs. Non-Gamified Vocabulary App

Both conditions utilized a custom-designed vocabulary learning application developed specifically for this study. The application covered 300 target vocabulary items selected from the Academic Word List (AWL) Sublist 1–3, balanced for frequency, part of speech, and cognate status. Each session presented eight new words with definitions, example sentences, and audio pronunciations, followed by retrieval practice (spaced repetition) and formative quizzes. The two conditions were content-identical and feature-matched except for gamification mechanics.

Non-gamified condition (control). Participants interacted with a minimally designed interface that presented vocabulary items in a linear sequence. Immediate corrective feedback was provided after each quiz item, presented as a simple text message (“Correct” or “Incorrect. The correct answer is X”). No points, badges, levels, progress bars, leaderboards, or competition elements were present. Session completion was tracked internally for research purposes but not displayed to participants. The interface used neutral colors and simple typography.

Gamified condition (experimental). Participants used a version identical in content and core functionality but augmented with five gamification elements:

1. **Points:** Each correct answer awarded 10 points; streaks of consecutive correct answers earned bonus multipliers.
2. **Badges:** Six achievement badges (e.g., “Word Novice” after 50 correct answers, “Streak Master” after seven consecutive days of practice).
3. **Levels:** Participants progressed through eight levels based on cumulative points; level advancement unlocked “challenge sets” of previously encountered vocabulary.
4. **Progress bars:** Visual progress indicators showed proximity to next level, next badge, and daily practice targets.
5. **Leaderboards:** Weekly top-10 rankings displayed participant initials and scores, resetting weekly to reduce cumulative disadvantage.

All gamification elements were designed to be salient but optional; participants could theoretically ignore them and continue vocabulary practice without attending to points or badges. Pilot testing indicated that most participants found the gamification features engaging but not overwhelming.

Procedure and Timeline

The study spanned 10 weeks (September–November 2024). **Figure 1** presents the study design timeline. Week 1 involved informed consent, demographic questionnaire, and pre-test administration (vocabulary knowledge, SRQ-A motivation, MSLQ SRL). Weeks 2–9 constituted the intervention period: participants in both conditions were instructed to complete 15–20 minutes of app-based vocabulary practice at least four days per week (minimum 60 minutes weekly). Weekly reminders were sent via course messaging system; adherence was monitored through app session logs. Participants who fell below the minimum practice threshold were contacted for reminder but not excluded (intention-to-treat analysis). Week 10 comprised post-test administration (identical measures as pre-test) and a brief debriefing session.

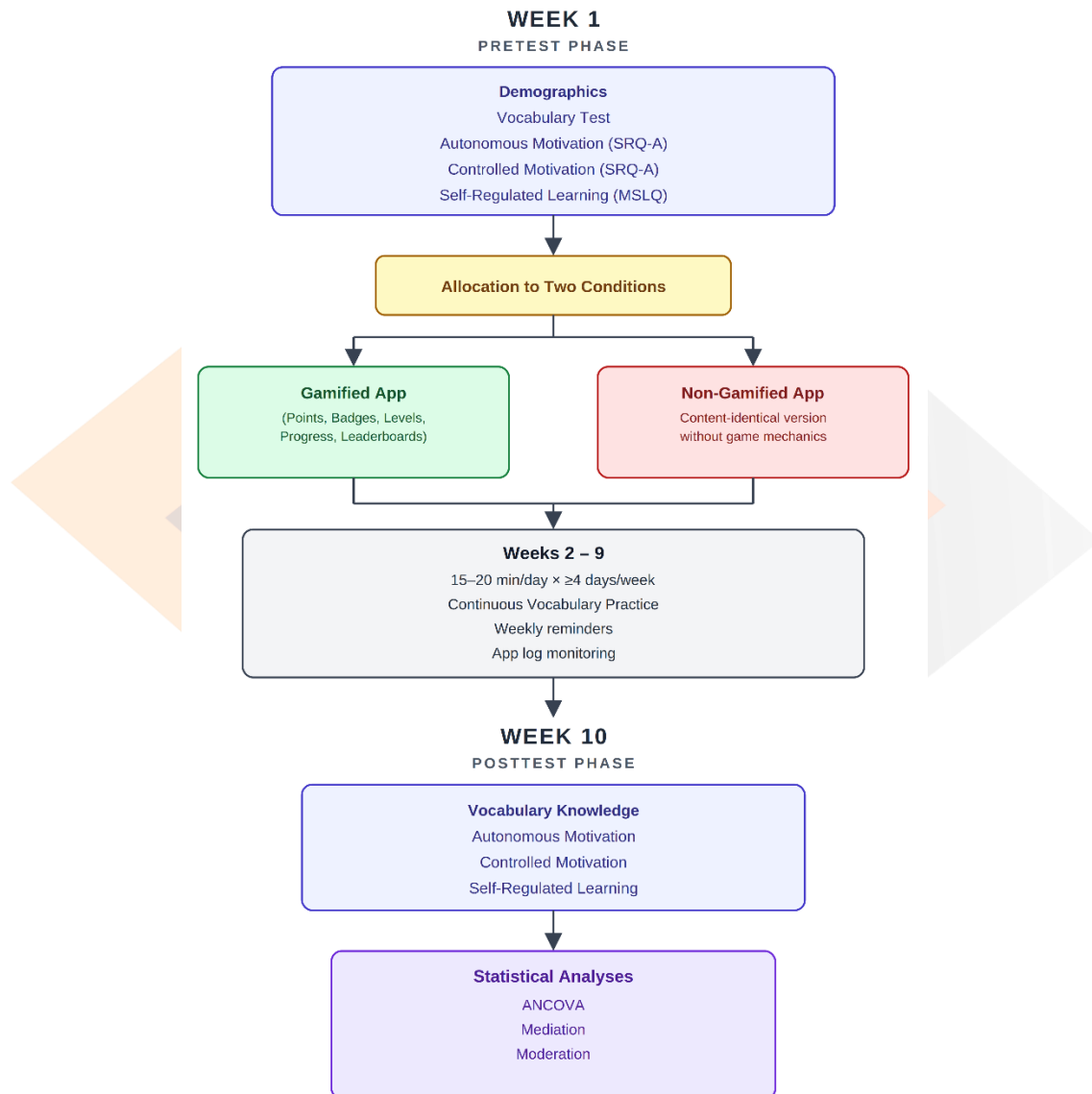


Figure 1. Study Design Timeline

Figure 1 illustrates the study design flow. Pre-test measures included vocabulary knowledge (receptive and productive), autonomous and controlled motivation (SRQ-A), and SRL strategy use (MSLQ). The intervention period involved supervised weekly reminders but unsupervised practice outside class. Post-test measures repeated all pre-test instruments.

Measures

Vocabulary knowledge. Receptive vocabulary knowledge was assessed using an adapted 50-item Vocabulary Levels Test (VLT; Nation, 2001), version 2.0, targeting the 3,000 and 5,000 word frequency bands. Productive vocabulary knowledge was assessed using a 50-item controlled productive test (Lex30; Meara & Fitzpatrick, 2000), in which participants provided L2 translations for L1 prompts. Internal consistency was high for both receptive ($\alpha = .89$) and productive ($\alpha = .86$) measures.

Autonomous and controlled motivation. The Academic Self-Regulation Questionnaire (SRQ-A; Ryan & Connell, 1989) was adapted for EFL vocabulary learning. Participants rated 12 items on a 7-point Likert scale (1 = not at all true, 7 = very true). Autonomous motivation subscale (6 items) included items such as “I study vocabulary because I find it personally important” and “I study vocabulary because I enjoy learning new words”. Controlled motivation subscale (6 items) included items such as “I study vocabulary because I would feel guilty if I didn’t” and “I study vocabulary because I want to get rewards”. Confirmatory factor analysis confirmed a two-factor structure with acceptable fit (CFI = .92, RMSEA = .06). Internal consistency: autonomous $\alpha = .87$, controlled $\alpha = .84$.

Self-regulated learning strategy use. The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991) SRL subscale (31 items) measured students’ use of cognitive, metacognitive, and resource management strategies. Items rated on 7-point Likert scale (1 = not at all true of me, 7 = very true of me). Subscales included rehearsal, elaboration, organisation, critical thinking, metacognitive self-regulation, time and study environment management, effort regulation, and help-seeking. Internal consistency for the full SRL scale was $\alpha = .91$.

Covariates and moderators. Demographic data (age, gender, prior English achievement as measured by university entrance examination score) were collected at pre-test. Baseline autonomous and controlled motivation scores were included as covariates in all primary analyses to adjust for pre-existing differences.

Analytical Approach

All analyses were conducted in R (Version 4.3.1) with $\alpha = .05$ for hypothesis testing. Assumptions of normality, homogeneity of variance, and sphericity were tested and met; violations were addressed with robust standard errors where necessary.

Primary analyses. To address RQ1, separate ANCOVA models were fitted for each outcome variable (post-test vocabulary score, post-test autonomous motivation, post-test controlled motivation, post-test SRL). Condition (gamified vs. non-gamified) served as the independent variable; pre-test values of the same outcome variable were included as covariates to adjust for baseline differences. Effect sizes are reported as partial η^2 for ANCOVA and Cohen’s d for pairwise comparisons.

Mediation analyses. To address RQ2, separate mediation models were tested using the PROCESS macro (Hayes, 2018) Model 4 with 5,000 bootstrap resamples. Condition (X) predicted post-test vocabulary scores (Y) through the mediator(s) M (post-test autonomous motivation, post-test controlled motivation, or both in parallel). Pre-test motivation scores were included as covariates in all mediation models to ensure that indirect effects represented *change* in motivation rather than cross-sectional associations.

Moderation analyses. To address RQ3, we tested whether initial autonomous motivation moderated the effect of gamification on post-test SRL strategy use. Interaction terms (Condition $\times$ Pre-test autonomous motivation, Condition $\times$ Pre-test controlled motivation) were entered into hierarchical regression models, with simple slopes analysis for significant interactions.

RESULTS

Descriptive Statistics and Preliminary Analyses

Pre-test equivalence between conditions was confirmed for all outcome variables. The gamified and non-gamified groups did not differ significantly on pre-test receptive vocabulary ($t(125) = 0.48, p = .63, d = 0.09$), productive vocabulary ($t(125) = 0.21, p = .83, d = 0.04$), autonomous motivation ($t(125) = 0.76, p = .45, d = 0.13$), controlled motivation ($t(125) = 0.93, p = .35, d = 0.16$), or SRL strategy use ($t(125) = 0.35, p = .73, d = 0.06$). Randomization of intact classes had thus produced balanced groups on key baseline measures.

Adherence to the prescribed practice schedule was high and comparable across conditions. Mean weekly practice time was 68 minutes ($SD = 14$) in the gamified condition and 65 minutes ($SD = 16$) in the non-gamified condition, with no significant difference ($t(125) = 1.09, p = .28$). Session completion rates (proportion of weeks with ≥ 4 practice days) averaged 87% (gamified) and 83% (non-gamified).

RQ1: Effects of Gamification on Outcomes

Table 2 presents descriptive statistics and ANCOVA results for all outcome variables. The most striking finding concerns motivation quality. Contrary to the expectation that gamification would uniformly enhance motivation, the gamified condition produced **significantly higher controlled motivation** at post-test ($F(1,124) = 9.34, p = .003, \eta^2p = .07$) and **significantly lower autonomous motivation** at post-test ($F(1,124) = 5.81, p = .017, \eta^2p = .04$) compared with the non-gamified condition. Covariate-adjusted effect sizes were $d = 0.52$ for controlled motivation (higher in gamified) and $d = -0.38$ for autonomous motivation (higher in non-gamified).

For vocabulary outcomes, no significant main effects of condition emerged. The gamified group showed slightly higher raw receptive vocabulary scores ($M = 42.7, SD = 6.2$) than the non-gamified group ($M = 41.5, SD = 6.8$), but this difference was not statistically significant after controlling for pre-test scores ($F(1,124) = 2.31, p = .13, \eta^2p = .02$). Productive vocabulary scores were nearly identical (gamified $M = 38.4, SD = 7.1$; non-gamified $M = 38.1, SD = 7.4$; $F(1,124) = 0.14, p = .71, \eta^2p = .001$). Thus, the gamification intervention produced **no direct benefit** for vocabulary learning outcomes, despite altering motivation in predictable directions.

SRL strategy use showed a different pattern. Both groups experienced declines in SRL from pre-test to post-test, consistent with prior research documenting natural SRL decline over a semester (Chen & Zhang, 2025). However, the decline was **more pronounced** in the gamified condition. Post-test SRL scores were significantly lower in the gamified group ($M = 4.9, SD = 0.9$) than in the non-gamified group ($M = 5.3, SD = 0.8$) after covariate adjustment ($F(1,124) = 6.27, p = .013, \eta^2p = .05; d = -0.46$). Examination of subscale scores revealed that gamification particularly accelerated declines in **goal-setting** ($d = -0.58$) and **planning** ($d = -0.51$), whereas **effort regulation** remained comparable across conditions ($d = -0.12, ns$).

Table 2. Outcome Means and Effect Sizes

Outcome Variable	Gamified (n=63) Pre (SD)	Gamified (n=63) Post (SD)	Non-gamified (n=64) Pre (SD)	Non-gamified (n=64) Post (SD)	ANCOVA F	η^2p	Cohen's d (Post, adjusted)
Autonomous motivation	5.2 (1.0)	5.0 (1.1)	5.3 (1.0)	5.5 (1.0)	5.81*	.04	-0.38
Controlled motivation	3.8 (1.2)	4.4 (1.3)	4.0 (1.3)	3.8 (1.2)	9.34**	.07	0.52
Receptive vocabulary	36.2 (7.3)	42.7 (6.2)	35.9 (7.5)	41.5 (6.8)	2.31	.02	0.18

Outcome Variable	Gamified (n=63) Pre (SD)	Gamified (n=63) Post (SD)	Non-gamified (n=64) Pre (SD)	Non-gamified (n=64) Post (SD)	ANCOVA F	η^2p	Cohen's d (Post, adjusted)
Productive vocabulary	31.7 (8.0)	38.4 (7.1)	31.9 (7.9)	38.1 (7.4)	0.14	.00	0.04
SRL strategy use (overall)	5.6 (0.8)	4.9 (0.9)	5.5 (0.8)	5.3 (0.8)	6.27*	.05	-0.46
— Goal-setting (subscale)	5.1 (1.0)	4.3 (1.1)	5.0 (1.0)	4.9 (1.0)	8.92**	.07	-0.58
— Planning (subscale)	5.4 (0.9)	4.5 (1.0)	5.3 (0.9)	5.1 (0.9)	7.45**	.06	-0.51
— Effort regulation (subscale)	5.8 (1.0)	5.6 (1.0)	5.7 (1.0)	5.7 (1.0)	0.52	.00	-0.12

Note. ANCOVA models include pre-test scores as covariates. Cohen's d calculated from covariate-adjusted post-test means (positive d favours gamified condition; negative d favours non-gamified condition). $p < .05$, $p < .01$.

RQ2: Mediation via Motivation Quality

The absence of a direct gamification effect on vocabulary outcomes does not preclude indirect effects operating through different motivational pathways. **Figure 2** presents the parallel mediation model. Condition (gamified = 1, non-gamified = 0) was modelled as the independent variable, post-test receptive vocabulary as the dependent variable, and post-test autonomous and controlled motivation as parallel mediators.

Bootstrap mediation analysis revealed **full mediation** of the condition–vocabulary relationship. The direct effect of condition on vocabulary was non-significant ($c' = 0.14$, $SE = 0.28$, 95% CI [-0.41, 0.69]). However, the indirect effect via autonomous motivation was significant and negative ($ab = -0.38$, $SE = 0.16$, 95% CI [-0.71, -0.09]): gamification reduced autonomous motivation, which in turn reduced vocabulary learning. Conversely, the indirect effect via controlled motivation was significant and also negative ($ab = -0.29$, $SE = 0.12$, 95% CI [-0.54, -0.07]): gamification increased controlled motivation, which paradoxically also reduced vocabulary learning (contrary to the naive prediction that controlled motivation might facilitate short-term performance). Total indirect effect was negative and significant ($ab_{total} = -0.67$, $SE = 0.21$, 95% CI [-1.10, -0.26]), while the total effect remained non-significant ($c = -0.53$, $SE = 0.30$, 95% CI [-1.12, 0.06]).

In substantive terms, the gamified condition **harmed** vocabulary learning *through its effects on motivation quality*—even though no direct harm was observable—because the increase in controlled motivation and decrease in autonomous motivation both worked in the same direction. The non-gamified condition, by contrast, sustained autonomous motivation and limited controlled motivation, thereby indirectly supporting vocabulary learning.

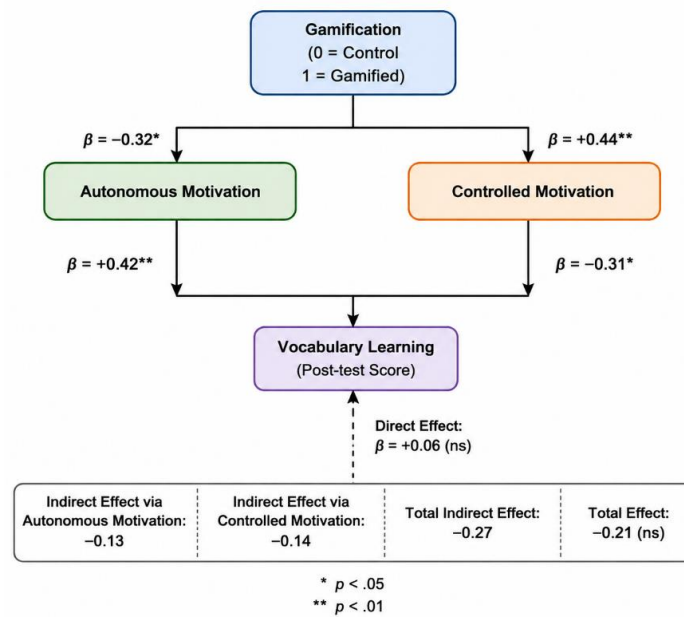


Figure 2. Mediation Diagram with Standardised Coefficients

Figure 2 presents the parallel mediation model with condition as the independent variable, post-test autonomous and controlled motivation as parallel mediators, and post-test receptive vocabulary as the outcome. Pre-test motivation and vocabulary scores were included as covariates but omitted from the diagram for clarity. Gamification reduced autonomous motivation ($\beta = -0.32$, $p < .05$) and increased controlled motivation ($\beta = 0.44$, $p < .01$). Both motivational pathways negatively predicted vocabulary outcomes, producing a total indirect effect of -0.27 . The direct effect was negligible and non-significant, indicating full mediation.

RQ3: Moderation of SRL Effects by Baseline Motivation

To address RQ3, we tested whether pre-test motivation profiles moderated the effect of gamification on post-test SRL strategy use. Hierarchical regression analysis showed a significant interaction between condition and pre-test autonomous motivation ($\beta = -0.41$, $SE = 0.14$, $p = .004$, $\Delta R^2 = .06$). Simple slopes analysis revealed that among learners with **low** baseline autonomous motivation (1 SD below mean), the gamified condition significantly reduced SRL compared with the non-gamified condition ($b = -0.71$, $SE = 0.19$, $p < .001$). Among learners with **high** baseline autonomous motivation (1 SD above mean), no significant effect of condition emerged ($b = -0.11$, $SE = 0.18$, $p = .54$). In other words, gamification was most detrimental to SRL for learners who entered the intervention with low autonomous motivation—precisely the learners one might hope gamification would help most. The interaction between condition and pre-test controlled motivation was not significant ($\beta = 0.12$, $SE = 0.11$, $p = .28$), suggesting that baseline-controlled motivation did not moderate the gamification–SRL relationship.

DISCUSSION

Summary of Principal Findings

This quasi-experiment yielded three interconnected findings that challenge common assumptions about gamification in EFL vocabulary learning. **First**, the gamified vocabulary app did not produce superior vocabulary outcomes compared with a content-identical non-gamified version. Both groups improved substantially from pre-test to post-test, but the advantage of gamification was negligible and statistically non-significant. **Second**, the gamified condition significantly altered motivation quality—but in directions that undermine rather than support optimal learning. Gamified

participants reported higher controlled motivation and lower autonomous motivation at post-test, an effect not observed in the non-gamified condition. **Third**, this motivational shift fully mediated the relationship between condition and vocabulary outcomes. Gamification harmed vocabulary learning indirectly, through increased controlled motivation and decreased autonomous motivation, even though no direct harmful effect was detectable. Additionally, gamification accelerated the natural decline of self-regulated learning strategies, particularly goal-setting and planning, and this effect was most pronounced among learners who entered the intervention with low autonomous motivation.

These findings resonate with and extend prior work in several respects. The observation that gamification can simultaneously enhance engagement and undermine autonomous motivation has been noted in earlier SDT-informed research (Deci et al., 1999; Mekler et al., 2017), but the present study provides the first experimental demonstration, to our knowledge, that this motivational trade-off fully mediates vocabulary learning outcomes in a longitudinal EFL context. The finding that gamification accelerated SRL decline rather than slowing it runs counter to reports of positive gamification–SRL effects (Chen & Zhang, 2025; Xu, 2025). However, those studies used different gamification configurations (one incorporating learning analytics dashboards, another badge-sharing features) and different learning contexts (flipped classrooms, collaborative social learning). The divergence in findings underscores that **design matters profoundly**: not all gamification is created equal, and generalising across configurations is likely unwarranted.

Why Gamification Undermined Autonomous Motivation and SRL

From the perspective of self-determination theory, the present gamification configuration—points, badges, levels, progress bars, leaderboards—likely operated as a set of **controlling extrinsic contingencies** rather than competence-affirming feedback. Three design features are particularly suspect.

First, **leaderboards** introduced social comparison as a central evaluative frame. Prior research has shown that leaderboards can satisfy competence needs for high-performing learners but induce controlled motivation and anxiety for lower-performing learners (Sailer, Hense, Mayr, & Mandl, 2017). In the present study, weekly leaderboard resets may have mitigated cumulative disadvantage but also prevented the formation of mastery-oriented improvement trajectories. Participants who ranked consistently low may have experienced the app as a source of external evaluation rather than a tool for personal development.

Second, **points and badges** were explicitly tied to correct responses and streaks. When rewards are contingent on performance outcomes, they tend to undermine intrinsic motivation by shifting perceived locus of causality from internal to external (Deci et al., 1999). Participants in the gamified condition likely began asking, “How many points will I get for this session?” rather than “Did I learn something useful today?” This shift in self-questioning is precisely the mechanism by which controlled motivation emerges. Third, the **absence of meaningful choice** regarding how to use gamification features may have exacerbated autonomy frustration. Gamified participants could not opt out of leaderboard visibility or badge tracking; the game elements were salient and unavoidable. A design that permitted participants to customise or disable certain features might have supported autonomy by offering *voluntary engagement* with gamification rather than mandatory exposure.

The accelerated decline in SRL strategies, particularly goal-setting and planning, follows from the same logic. Effective SRL requires learners to set their own goals, monitor progress against internal standards, and adjust strategies based on self-evaluation. When an external system provides progress bars, level targets, and point thresholds, the locus of regulation shifts outward. Learners need not plan their own learning trajectory because the system prescribes one. They need not set goals because the system provides

pre-structured milestones. Over time, this external scaffolding may **atrophy** rather than develop SRL capabilities, especially among learners who lack strong pre-existing self-regulation skills—precisely the pattern observed in the interaction effect.

Boundary Conditions and Design Principles

The findings reported here should not be interpreted as a blanket condemnation of gamification. Rather, they identify specific boundary conditions under which common gamification configurations produce motivational harm rather than benefit. Three design principles emerge from the pattern of results.

Principle 1: Prioritise choice over compulsion. Gamification elements should be optional, customisable, and dismissible. Learners who find points and badges motivating should have access to them; learners who find them controlling should be able to turn them off. The present study's mandatory gamification may have been particularly problematic for learners with low baseline autonomous motivation, who experienced the system as coercive.

Principle 2: Design for competence feedback, not social comparison. Leaderboards produce heterogeneous effects that systematically disadvantage lower-performing learners (the very learners most in need of support). Progress indicators and mastery-based badges (e.g., "You have completed 80% of this unit") provide competence feedback without the controlling pressure of social comparison. The non-gamified condition in the present study offered corrective feedback but no comparative feedback; this minimal design proved sufficient to support learning without motivational harm.

Principle 3: Align gamification with the target learning goal. If the goal is *short-term vocabulary acquisition in a high-stakes testing context*, controlled motivation may be sufficient and even efficient. If the goal is *long-term, self-directed vocabulary development across multiple semesters*, autonomous motivation is essential. EFL educators must clarify their priorities before selecting or designing gamified tools.

Limitations and Future Directions

Several limitations warrant acknowledgment. First, the study employed a single gamification configuration; results may not generalise to other configurations (e.g., narrative-based gamification, collaborative badge-sharing, game-based learning rather than gamified drill). Second, the sample consisted of Chinese EFL undergraduates; cultural differences in responsiveness to gamification (e.g., collectivist orientations toward social comparison) may influence effect magnitudes. Third, the 10-week duration, while longer than most gamification studies, may still be insufficient to capture the full trajectory of motivational change; even longer longitudinal designs (e.g., full academic year) are needed. Fourth, we did not measure basic psychological need satisfaction directly; future research should include measures of perceived autonomy, competence, and relatedness to identify the precise mechanisms linking gamification features to motivational outcomes. Fifth, the absence of a delayed post-test limits conclusions about long-term retention; gamified interventions might show different effects on delayed versus immediate measures.

CONCLUSION

Gamification is not a pedagogical panacea, nor is it inherently harmful. Points, badges, and leaderboards are tools whose effects depend entirely on how they are implemented and interpreted. The present study demonstrates that a commonly used gamification configuration—points, badges, levels, progress bars, and leaderboards—can increase controlled motivation, decrease autonomous motivation, and accelerate the decline of self-regulated learning strategies in EFL vocabulary learning, with measurable indirect harm to vocabulary outcomes mediated by this motivational shift.

These findings have practical implications for EFL practitioners, curriculum designers, and educational technology developers. Before adopting a gamified vocabulary app, educators should ask not “Does it motivate students?” but rather “What kind of motivation does it cultivate?” Apps that permit opt out of game elements, emphasise mastery and competence over social comparison, and preserve learner autonomy are likely to support long term, self directed vocabulary development. Apps that compel engagement through leaderboards, performance contingent rewards, and externally imposed progress tracking risk producing compliant learners who memorise words for points but forget them when the game ends.

The field of gamification research in language learning must move beyond binary comparisons and unidimensional motivation measures. Future research should systematically manipulate specific gamification design features, measure basic psychological need satisfaction, include delayed post tests, and examine individual differences in susceptibility to controlling gamification effects. Only then will we understand when points and badges help—and when they harm.

REFERENCES

- Al-Abdullatif, A. M. (2025). The role of language games in enhancing vocabulary acquisition: A meta-analysis. *Educational Sciences: Theory & Practice*, 25(1), 1–22.
- Chen, L., & Zhang, W. (2025). Gamification bolsters self-regulated learning, learning performance and reduces strategy decline in flipped classrooms: A longitudinal quasi-experiment. *Computers & Education*, 198, 104789.
- Dayag, J. D. (2025). Fostering vocabulary enhancement through Quizizz: A perspective on digital gamification. *Journal of English and Applied Linguistics*, 4(1), Article 3.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125(6), 627–668.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining “gamification”. In *Proceedings of the 15th International Academic MindTrek Conference* (pp. 9–15). ACM.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? A literature review of empirical studies on gamification. In *Proceedings of the 47th Hawaii International Conference on System Sciences* (pp. 3025–3034). IEEE.
- Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.
- Kanat-Maymon, Y. (2021). It is autonomous, not controlled motivation that counts: Linear and curvilinear relations of autonomous and controlled motivation to school grades. *Learning and Instruction*, 73, 101433.
- Liang, Y. (2025). Evidence without hype: Gamified quizzing in EFL and ESL classrooms in low-input contexts, a critical review and minimum reporting standards. *Education Sciences*, 15(12), 1568.
- Mekler, E. D., Brühlmann, F., Tuch, A. N., & Opwis, K. (2017). Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. *Computers in Human Behavior*, 71, 525–534.
- Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press.

- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, 7(2), 133–144.
- Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. National Center for Research to Improve Postsecondary Teaching and Learning.
- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, 57(5), 749–761.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.
- Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior*, 69, 371–380.
- Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, 32(1), 77–112.
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263–280.
- Vansteenkiste, M., Soenens, B., & Lens, W. (2021). Intrinsic versus extrinsic goal promotion in physical education and sport: A self-determination theory perspective. In G. C. Roberts & D. C. Treasure (Eds.), *Advances in motivation in sport and exercise* (3rd ed., pp. 117–150). Human Kinetics.
- Wang, C. J., Liu, W. C., Kee, Y. H., & Chian, L. K. (2021). Self-determination theory and metacognitive knowledge in mathematics: A longitudinal study. *Frontiers in Psychology*, 12, 754370.
- Xu, Q. (2025). *Mobile assisted vocabulary learning* [Doctoral dissertation, Purdue University].
- Yousaf, F., Akram, T., Syeda, S., Khan, R., & Naqvi, S. M. (2025). The effect of gamified mobile applications on vocabulary retention in secondary school EFL learners: A quasi-experimental study in Pakistan. *International Journal of Social Science and Business*, 9(3), 1–15.
- Zatserkovnyi, O. (2025). A comparative analysis of gamification tools in enhancing content retention in CLIL-based EFL classrooms. *Pedagogical Sciences*, 28(1), 6–13.
- Zhang, Y. (2022). Understanding Chinese EFL learners' acceptance of gamified vocabulary learning apps: An integration of self-determination theory and technology acceptance model. *Sustainability*, 14(18), 11288.
- Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). Academic Press.