



Digital-Platform Use Intensity and Motivation to Learn English among Indonesian University EFL Students: Evidence from Four-Week Self-Recorded Logs

Darry Christine Silowaty Purba*✉ and Agustin Nurya Savitri✉

To cite this article. D. C. S. Purba and A. N. Savitri, “Digital-Platform Use Intensity and Motivation to Learn English among Indonesian University EFL Students: Evidence from Four-Week Self-Recorded Logs,” *Lang. Technol. Soc. Media*, vol. 4, no. 3, pp. 521–533, 2026.

DOI: <https://doi.org/10.70211/ltsm.3026-7196.642>

To link to this article:



Published online: 12 September 2026



Submit an article to this journal



View crossmark data



Watch the video on YouTube



Digital-Platform Use Intensity and Motivation to Learn English among Indonesian University EFL Students: Evidence from Four-Week Self-Recorded Logs

Darry Christine Silowaty Purba* and Agustin Nurya Savitri

Received: 22 June 2026

Revised: 26 July 2026

Accepted: 10 September 2026

Online: 12 September 2026

Abstract

Digital platforms are now embedded in university English learning, yet evidence from Indonesian higher education remains limited on how repeated use intensity relates to learner motivation. This study examined associations between two self-recorded indicators of digital-platform use intensity - weekly frequency and average session duration - and overall motivation to learn English among 210 second-year undergraduate EFL students from an eligible population of 450 established platform users at one Indonesian institution. A single-site observational correlational design combined a four-week self-recorded usage-log component with a 28-item five-point motivation questionnaire adapted from the Intrinsic Motivation Inventory and Keller's Instructional Materials Motivation Survey. A pilot test with 30 students outside the analytic sample yielded an overall Cronbach's alpha of 0.87. Because the retained study documentation did not support construct-level reliability or factor analysis, inferential interpretation was restricted to the overall motivation score. Weekly frequency was positively associated with overall motivation ($r = 0.58$, 95% CI [0.48, 0.66], $p < 0.01$), as was session duration ($r = 0.51$, 95% CI [0.40, 0.60], $p < 0.01$). These sizeable associations do not establish direction or causation. The study contributes context-specific evidence based on repeated short-window self-recording rather than a single use-perception measure. Interpretation is bounded by the single site, voluntary established-user sample, cross-platform aggregation, self-recording, absent demographic and proficiency controls, and unavailable item- and session-level data for independent reanalysis.

Keywords: Digital Platform Use; EFL; Informal Digital Learning; Learner Motivation; Self-Recorded Logs.

Publisher's Note:

WISE Pendidikan Indonesia stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright:

©

2026 by the author(s).

License WISE Pendidikan Indonesia, Bandar Lampung, Indonesia.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) license

(<https://creativecommons.org/licenses/by/4.0/>).



INTRODUCTION

Digital and mobile technologies have moved English learning beyond scheduled classroom time by making multimodal input, practice, communication, feedback, and learner-selected resources continuously accessible. Mobile-assisted language learning (MALL) and informal digital learning of English (IDLE) therefore occupy an increasingly important place in higher education. At the same time, syntheses consistently show substantial heterogeneity across applications, pedagogical designs, populations, outcomes, and methodological quality; access to technology should not be treated as a uniformly beneficial exposure [1], [2], [3], [4], [5], [6], [7].

Motivation is one plausible correlate of this variation. Prior research links digital English learning with enjoyment, self-efficacy, willingness to communicate, continued use, engagement, and achievement [8], [9], [10], [11], [12], [13], [14]. More recent work further shows that digital engagement is shaped by flow, online self-efficacy, behavioral intention, self-regulation, digital nativity, and learner purpose [15], [16], [17], [18]. Indonesian studies likewise document positive perceptions of mobile learning and meaningful relationships between IDLE, communicative willingness, digital literacy, and self-regulation [13], [14], [19], [20], [21]. The empirical question is consequently not whether digital resources exist, but what can reasonably be inferred from how often and how long students report using them for English learning.

That distinction matters because digital engagement is broader than time-on-platform. Engagement can include behavioral persistence, cognitive strategy use, affective investment, purpose, agency, and social participation. Frequency and duration capture only use intensity: frequency reflects recurrence of recorded learning occasions, whereas duration reflects reported time allocation per occasion. They are theoretically informative as partial behavioral proxies, but they do not measure the quality, purpose, or strategic character of engagement [22], [23], [24], [25], [26], [27], [28]. Recent AI-mediated research reinforces this caution by showing that critical digital literacy, agency, acceptance, and multimodal practices can differentiate learners whose raw use levels may appear similar [29], [30], [31].

The motivational background is also treated conservatively. Keller's ARCS model explains how attention, relevance, confidence, and satisfaction can support instructional motivation [32], while Self-Determination Theory (SDT) emphasizes autonomous motivation and the psychological needs for autonomy, competence, and relatedness [33]. Gamification and technology-acceptance studies show that motivational responses depend on design and learner perceptions rather than on feature presence alone [34], [35], [36], [37], [38], [39], [40]. In the present study, these theories provide interpretive context for the provenance of the adapted questionnaire; they are not combined into a tested latent model, and SDT needs are not operationalized as separate constructs.

A specific contribution is therefore defined at the measurement and context level. Much IDLE and MALL research remains cross-sectional, perception-based, platform-specific, or focused on outcomes other than overall learning motivation [41], [42], [43], [44], [45], [46], [47], [48]. Emerging 2025-2026 studies have begun to add longitudinal, purpose-sensitive, AI-mediated, and intervention evidence [16], [17], [29], [30], [31], [49], [50], [51]. However, repeated short-window self-recorded use intensity among Indonesian university EFL learners remains comparatively underrepresented in the evidence reviewed here [20], [21]. This study therefore asks: (1) What are the descriptive patterns of self-recorded weekly use frequency, session duration, and overall English-learning motivation? and (2) Are weekly frequency and session duration positively

associated with overall motivation? The directional hypotheses are that weekly frequency (H1) and session duration (H2) are positively associated with overall motivation.

LITERATURE REVIEW

Self-Recorded Digital-Platform Use as a Partial Indicator of Engagement

MALL and IDLE scholarship conceptualizes digital participation as more than device access. Reviews distinguish frequency and duration from diversity of resources, learning purpose, strategic behavior, social interaction, and the affordances of particular platforms [1], [2], [5], [6], [22], [37]. This distinction is especially important in informal environments, where learner agency and ecological context shape what is done with available technology [26], [27]. Accordingly, the present study uses the term use intensity for its two recorded variables and reserves engagement for the broader construct discussed in the literature.

Frequency and duration can nevertheless be useful when interpreted narrowly. Repeated use may index persistence or habitual return to learning resources, while session duration indicates reported time allocation. Yet more is not necessarily better: empirical studies associate IDLE with proficiency, willingness to communicate, intercultural orientation, vocabulary development, enjoyment, and engagement through pathways that depend on learner characteristics and activity type [8], [15], [41], [42], [43], [45], [46], [47]. Purpose-profile research further shows that learners with different motives can display similar engagement frequency [17]. The present measures should therefore be read as quantitative exposure indicators, not as direct measures of learning quality.

Motivation and Regulation in Digital EFL Learning

Motivation in digital EFL settings is multidimensional. ARCS emphasizes attention, relevance, confidence, and satisfaction as conditions that can sustain instructional effort [32], whereas SDT distinguishes autonomous from controlled forms of motivation and highlights autonomy, competence, and relatedness [33]. Empirical work has connected technology acceptance and continued participation with perceived usefulness, self-efficacy, intrinsic value, social presence, enjoyment, and self-regulation [10], [11], [12], [18], [25], [30], [31], [36], [40]. These relationships support the relevance of motivation to digital language learning, but they do not justify treating a composite score as evidence that all underlying theoretical dimensions have been validated in a new sample.

Self-regulation provides an additional explanation for why students with similar access may report different use patterns. Reviews identify goal setting, metacognitive monitoring, environmental structuring, and strategic practice as recurring processes in self-directed second-language learning [23], [24]. Longitudinal evidence also links IDLE with online self-regulated learning over time [16], while Indonesian evidence reports positive relationships among digital literacy, self-regulation, and IDLE [21]. These studies inform interpretation and future model development; self-regulation itself was not measured in the present dataset and is therefore not treated as a study-derived mechanism.

Prior Empirical Evidence and the Indonesian Research Gap

The broader evidence base increasingly differentiates forms and consequences of informal digital English learning. IDLE has been associated with foreign-language enjoyment and motivational self-systems [9], willingness to communicate [19], [20], [41], social presence and online engagement

[40], strategic and intercultural competence [42], [46], and vocabulary or speaking development under particular conditions [45], [47]. AI-mediated studies now add questions of ChatGPT literacy, critical digital literacy, multimodal content acceptance, and listening or writing outcomes [29], [30], [31], [44], [49], [50], [51]. Together, these studies show that digital English learning is behaviorally and motivationally consequential while also making clear that platform, purpose, learner regulation, and research design affect the observed relationship.

Within Indonesian higher education, research has examined mobile-application perceptions and continuance [13], [14], affective and communicative outcomes of informal digital learning [19], [42], and more recently, IDLE in relation to willingness to communicate, digital literacy, self-regulation, and AI-supported writing [20], [21], [51]. The present study adds a narrower form of evidence: four weeks of repeated self-recorded use indicators paired with an overall motivation score among established users. It does not claim to isolate platform affordances, distinguish productive from receptive IDLE, test a causal mechanism, or validate ARCS/SDT structure. This bounded contribution responds to methodological calls for clearer operationalization and transparent reporting in quantitative MALL research [1] and uses L2-specific effect-size guidance only as contextual interpretation rather than as proof of substantive causality [52].

METHODS

This study used a single-site observational correlational design with a repeated self-recorded usage-log component. The broader fieldwork period spanned approximately three months at one Indonesian institution in compulsory English courses; the exposure variables analyzed in this article were derived from each participant's defined four-week logging window. No intervention, random assignment, or experimental manipulation was used. The unit of analysis was the individual second-year undergraduate EFL student, and the study was designed to estimate associations rather than causal effects.

Research Participants

The eligible population comprised 450 second-year students from four faculties who had used at least one digital platform for English learning - such as Duolingo, Quizlet, educational YouTube channels, or university-provided language applications - for at least three months. The sampling frame was stratified by faculty and voluntary recruitment was conducted with proportional representation, producing 210 participants (46.7% of the eligible population). Because participation was voluntary, the resulting sample is not described as a probability-representative sample. Requiring prior platform experience ensured that the study examined use intensity among established users rather than conflating adoption with non-use; however, this eligibility rule restricts generalizability to nonusers and new adopters and may narrow the range of observed use behavior. Participants also required active student status and regular access to an internet-connected smartphone or computer.

Research Ethics and Record Transparency

Participation was voluntary, and no personally identifying information is reported in the article. The available study documentation did not include an institutional ethics-approval identifier or a complete procedural consent record. Accordingly, no approval number or procedural detail is

reported beyond what can be verified. This documentation gap is acknowledged as a reporting limitation.

Data Collection Procedure

Motivation was measured with a 28-item closed-ended questionnaire adapted from the Intrinsic Motivation Inventory and Keller's Instructional Materials Motivation Survey. Items used a five-point Likert response format from strongly disagree to strongly agree; negatively worded items were reverse-coded, and the reported overall score remained on the 1-5 metric. A pilot test with 30 students outside the analytic sample yielded an overall Cronbach's alpha of 0.87. The available study documentation did not include the exact item allocation by theoretical dimension, separate subscale alpha or omega coefficients, item-total diagnostics, a complete translation/back-translation record, or factor-analytic evidence for a five-dimension structure. To avoid overclaiming construct validity, inferential analyses are restricted to the overall motivation score, and dimension-level mean rankings are not interpreted as validated differences.

Participants completed self-recorded usage logs across four weeks. A use occasion was operationally the participant's own recorded instance of using an eligible digital resource for English-learning purposes. The available analytical record contained weekly frequency (times per week) and average duration (minutes per session) as the two use-intensity indicators analyzed here. These values are self-recorded rather than device-verified digital traces. The available study documentation did not support additional claims about timestamp verification, reminder frequency, missing-entry imputation, or platform-specific distributions; therefore, no such procedures or subgroup results are reported. Platform types were pooled deliberately because the research question concerned aggregate cross-platform use intensity; the results cannot be used to compare Duolingo, Quizlet, YouTube, or institutional applications.

Data Analysis Procedure

Analyses were conducted in SPSS version 26. Descriptive statistics summarized weekly frequency, average session duration, and the overall motivation score. Pearson product-moment correlations tested H1 and H2, with statistical significance evaluated at $\alpha = 0.05$ and the reported 95% confidence intervals presented alongside r . A one-predictor regression is not reported because, with a single predictor, it would duplicate the correlation test, and the previously reported unstandardized coefficient was not internally consistent with the reported r , predictor standard deviation, and outcome standard deviation. Because raw row-level data were unavailable for independent re-estimation, no replacement regression, covariate-adjusted model, or new residual diagnostics were reconstructed from summary statistics. Effect magnitude is interpreted cautiously using L2-specific guidance [52], with emphasis on association rather than prediction or causation.

RESULTS AND DISCUSSION

The analysis focuses on statistics directly supported by the available study record. Table 1 summarizes the two self-recorded use-intensity indicators and the overall motivation score, Figure 1 visualizes the descriptive profile of the five motivation dimensions available in the study record, and Table 2 together with Figure 2 presents the bivariate Pearson correlations. Because the available data did not permit independent re-estimation or complete residual diagnostics, regression results are not reported.

Results

Descriptive Profile of Use Intensity and Motivation

Table 1. Descriptive Statistics of Self-Recorded Digital-Platform Use and Overall Motivation

Variable	Mean	SD	Min	Max	Range
Weekly frequency (times/week)	4.87	1.52	1.00	7.00	6.00
Session duration (minutes/session)	32.45	12.38	10.00	90.00	80.00
Overall motivation score	3.94	0.76	2.10	4.95	2.85

Weekly frequency averaged 4.87 recorded use occasions per week ($SD = 1.52$, range = 1.00-7.00), and average session duration was 32.45 minutes ($SD = 12.38$, range = 10.00-90.00). Overall motivation averaged 3.94 ($SD = 0.76$, range = 2.10-4.95) on the five-point metric. To complement this overall score, Figure 1 presents the descriptive mean profile of the five motivation dimensions retained in the study record: attention = 3.82, relevance = 4.21, confidence = 3.75, satisfaction = 3.98, and intrinsic interest = 3.92. Because construct-level psychometric coefficients were unavailable in the available documentation, these dimension-level values are interpreted descriptively rather than inferentially.

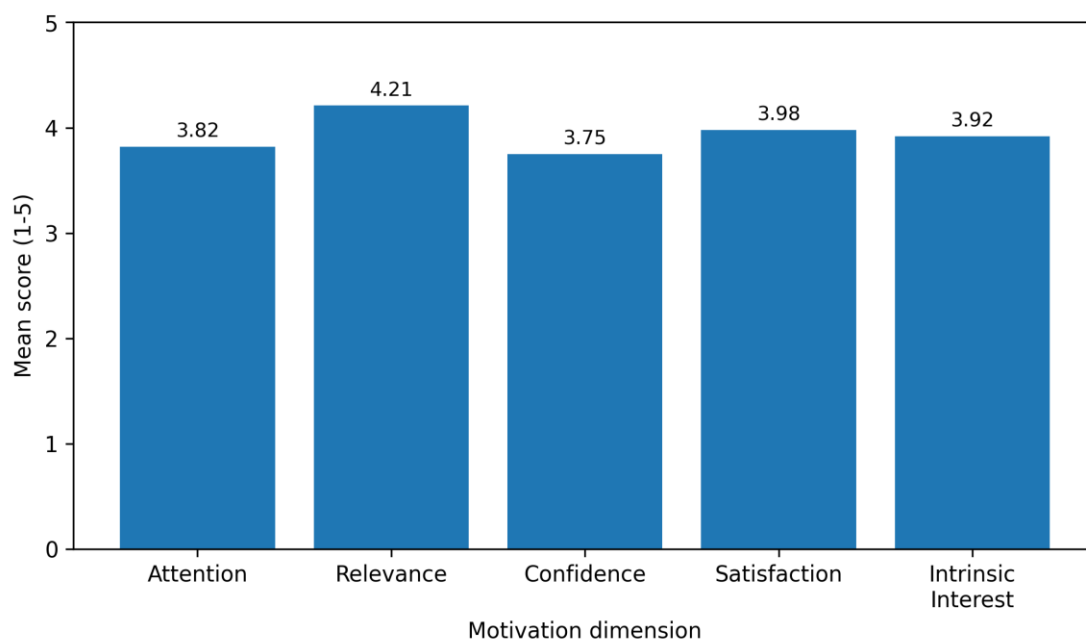


Figure 1. Descriptive Mean Scores across the Five Motivation Dimensions

Associations between Use Intensity and Overall Motivation

Both use-intensity indicators were positively associated with overall motivation. Weekly frequency correlated with overall motivation at $r = 0.58$ (95% CI [0.48, 0.66], $p < 0.01$), while session duration correlated at $r = 0.51$ (95% CI [0.40, 0.60], $p < 0.01$). Thus, H1 and H2 were supported as directional association hypotheses in this sample. Figure 2 visually summarizes the magnitude and confidence

intervals of these two correlations. The coefficients do not identify temporal direction, causal influence, or the contribution of unmeasured covariates.

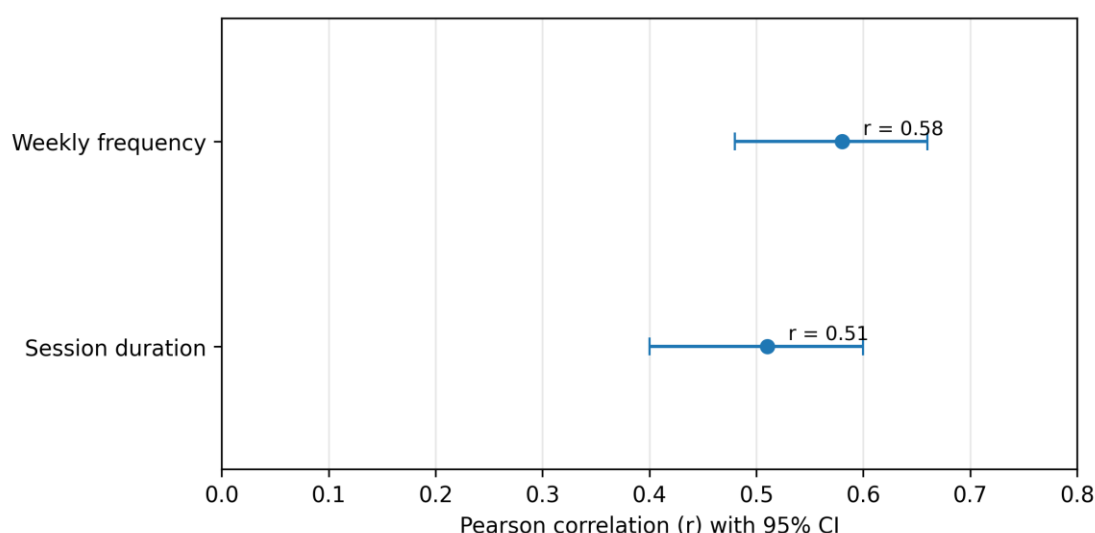


Figure 2. Pearson Correlations (r) with 95% Confidence Intervals

Table 2. Pearson Correlations between Self-Recorded Use Indicators and Overall Motivation

Use-intensity indicator	r	95% CI	p	N
Weekly frequency (times/week)	0.58	[0.48, 0.66]	< 0.01	210
Session duration (minutes/session)	0.51	[0.40, 0.60]	< 0.01	210

Discussion

Magnitude and Interpretation of the Associations

The central result is a positive association between self-recorded digital-platform use intensity and overall English-learning motivation. The frequency coefficient ($r = 0.58$) and duration coefficient ($r = 0.51$) fall in the moderate-to-large region when considered against distributional benchmarks commonly used in L2 research [52]. Their magnitude is notable, but it should not be translated into a claim that more platform use produces higher motivation. More motivated learners may choose to use digital resources more frequently or for longer sessions; use may also reinforce motivation; or both may reflect third variables such as proficiency, prior digital experience, course demands, or self-regulation.

The direction of association is broadly consistent with studies linking mobile and informal digital English learning with enjoyment, self-motivation, self-efficacy, engagement, and continued participation [9], [10], [11], [12], [15], [25], [40], [43]. Longitudinal work also reports positive relations between IDLE and online self-regulated learning across repeated measurement points [16], and newer AI-mediated research shows that motivational and acceptance processes remain salient as learners adopt generative and multimodal tools [18], [30], [31]. These studies provide convergent context rather than direct replications because they differ in platform, construct definition, sampling, measurement, and temporal design.

Use Intensity versus Engagement Quality

The findings also illustrate why use quantity and engagement quality should remain conceptually separate. Four-week frequency and duration capture recurrence and time allocation, but not whether students were watching, producing, interacting, receiving feedback, or strategically regulating learning. Purpose-profile evidence indicates that differences in learner purpose need not map neatly onto frequency [17] while qualitative AI-IDLE research shows that agency and critical digital literacy can alter how learners use the same technological environment [29]. Therefore, the current coefficients are best interpreted as associations with use intensity, not as evidence that any particular form of engagement is superior.

Cross-Platform and Methodological Considerations

Cross-platform aggregation creates a second boundary. The study pooled use of Duolingo, Quizlet, educational YouTube, and institution-provided applications because its question concerned total digital-platform use for English learning. This increases ecological breadth but sacrifices platform specificity: applications differ in interactivity, feedback, content, sociality, and gamification. Reviews of MALL and gamified language learning show that such design differences can matter substantially [1], [4], [34], [35], [37]. Accordingly, neither the observed r values nor the descriptive means identify which platform feature, if any, is responsible for the association.

The study's incremental contribution is methodological but deliberately modest. Compared with a one-time question about perceived platform use, a four-week self-recorded log asks participants to register behavior repeatedly across a defined observation window. At the same time, self-recording remains vulnerable to omission, recall reconstruction, social desirability, and differential logging diligence. Because both the use indicators and motivation measure ultimately depend on participant report, common-method processes may also contribute to the observed association. Verified device traces, preregistered aggregation rules, compliance metrics, and prospectively specified missing-data procedures would materially strengthen replication.

Theoretical and Practical Implications

The theoretical interpretation is correspondingly bounded. ARCS and SDT are useful for situating why digital learning can be motivationally consequential [32], [33], but the present analysis does not validate their subdimensions in this sample. Likewise, self-regulation is a plausible literature-supported correlate of informal digital learning [16], [21], [23], [24], not a mediator demonstrated by these data. Accordingly, the evidence supports a focused interpretation: the two self-recorded use-intensity indicators are associated with an overall motivation index, without establishing dimension-level or mediation claims.

The practical implication is therefore one of monitoring and design caution rather than prescribed screen time. Educators may reasonably pay attention to whether students sustain out-of-class digital English activity, but the present data do not justify instructing students to increase minutes or sessions as a motivational intervention. More specific pedagogical recommendations should instead draw on studies that directly test supported IDLE, AI-mediated listening or writing, self-regulation, and activity purpose [49], [50], [51]. For researchers, the priority is to pair behavioral intensity with platform type, activity purpose, proficiency, demographic covariates, validated motivational subscales, and objective or auditable usage measures.

CONCLUSION

This single-site correlational study found that weekly frequency and average session duration recorded across a four-week digital-platform usage window were positively associated with overall motivation to learn English among 210 second-year Indonesian university EFL students who were already established platform users. The evidence is strongest as a context-specific description of association: it does not show that additional use causes motivation, does not identify an optimal amount of platform exposure, and does not support platform-specific or motivational-subdimension claims. The contribution lies in linking repeated short-window self-recorded use indicators with an overall motivation score while explicitly distinguishing use intensity from the broader construct of digital engagement. Future work should use multisite samples, verified traces, validated construct-level measurement, proficiency and demographic controls, and longitudinal or experimental designs capable of testing direction and mechanism

LIMITATIONS

Several limitations constrain interpretation. First, the study was conducted at one institution and included only students with at least three months of prior platform use; this conditions the sample on established users, may restrict behavioral variability, and excludes nonusers and recent adopters. Second, recruitment was voluntary within a proportionally stratified frame, so the achieved sample should not be treated as probability-representative. Third, weekly frequency and session duration were self-recorded and pooled across heterogeneous platforms; the available documentation did not provide device verification, platform-specific distributions, compliance metrics, timestamp procedures, or a documented missing-log protocol. Fourth, the motivation instrument had acceptable overall pilot reliability ($\alpha = 0.87$), but item allocation, subscale reliability, translation documentation, and factor-analytic evidence were unavailable; only the overall score is therefore interpreted inferentially. Fifth, demographic distributions, standardized proficiency measures, and other plausible confounders were not available for adjustment. Sixth, the available reporting record did not include a complete ethics-approval identifier or procedural consent record. Finally, item-level questionnaire responses and session-level logs were not available for independent reanalysis, preventing new diagnostic, multivariable, platform-stratified, or construct-level analyses. These limitations require cautious generalization and should be addressed prospectively in replication.

AUTHOR INFORMATION

Corresponding Authors

Darry Christine Silowaty Purba – Politeknik Teknologi Kimia Industri Medan (Indonesia);

 orcid.org/0009-0003-5645-7296

Email: darrypurba41@ptki.ac.id

Authors

Darry Christine Silowaty Purba – Politeknik Teknologi Kimia Industri Medan (Indonesia);

 orcid.org/0009-0003-5645-7296

Agustin Nurya Savitri – Politeknik Teknologi Kimia Industri Medan (Indonesia);

 orcid.org/0009-0009-7118-5130

AUTHOR CONTRIBUTION

D.C.S.P. Conceptualization, methodology, investigation, data curation, formal analysis, and writing - original draft. A.N.S. Validation, literature review, interpretation, and writing - review and editing. Both authors read and approved the final manuscript and accept responsibility for its content.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors used OpenAI ChatGPT during manuscript revision for language editing, structural refinement, and reference organization. All AI-assisted text and references were critically reviewed and verified by the authors, who assume full responsibility for the accuracy, integrity, citations, and final content of the manuscript.

REFERENCES

- [1] Z. Hou and V. Aryadoust, "A review of the methodological quality of quantitative mobile-assisted language learning research," *System*, vol. 100, Art. no. 102568, 2021. <https://doi.org/10.1016/j.system.2021.102568>
- [2] K. Karakaya and A. Bozkurt, "Mobile-assisted language learning (MALL) research trends and patterns through bibliometric analysis: Empowering language learners through ubiquitous educational technologies," *System*, vol. 110, Art. no. 102925, 2022. <https://doi.org/10.1016/j.system.2022.102925>
- [3] F. Li, S. Fan, and Y. Wang, "Mobile-assisted language learning in Chinese higher education context: A systematic review from the perspective of the situated learning theory," *Education and Information Technologies*, vol. 27, pp. 9665-9688, 2022. <https://doi.org/10.1007/s10639-022-11025-4>
- [4] M. Mihaylova, S. Gorin, T. P. Reber, and N. Rothen, "A meta-analysis on mobile-assisted language learning applications: Benefits and risks," *Psychologica Belgica*, vol. 62, no. 1, pp. 252-271, 2022. <https://doi.org/10.5334/pb.1146>
- [5] A. Soyoof, B. L. Reynolds, B. Vazquez-Calvo, and K. McLay, "Informal digital learning of English (IDLE): A scoping review of what has been done and a look towards what is to come," *Computer Assisted Language Learning*, vol. 36, no. 4, pp. 608-640, 2023. <https://doi.org/10.1080/09588221.2021.1936562>
- [6] X. Guo and J. S. Lee, "A systematic review of informal digital learning of English: An ecological systems theory perspective," *System*, vol. 117, Art. no. 103097, 2023. <https://doi.org/10.1016/j.system.2023.103097>
- [7] J. Kacetl and B. Klimova, "Use of smartphone applications in English language learning - A challenge for foreign language education," *Education Sciences*, vol. 9, no. 3, Art. no. 179, 2019. <https://doi.org/10.3390/educsci9030179>
- [8] Y. Zhang and G. Liu, "Revisiting informal digital learning of English (IDLE): A structural equation modeling approach in a university EFL context," *Computer Assisted Language Learning*, vol. 37, no. 7, pp. 1904-1936, 2024. <https://doi.org/10.1080/09588221.2022.2134424>
- [9] J. S. Lee and K. Lee, "The role of informal digital learning of English and L2 motivational self system in foreign language enjoyment," *British Journal of Educational Technology*, vol.

- 52, no. 1, pp. 358-373, 2021. <https://doi.org/10.1111/bjet.12955>
- [10] A. Alamer, A. Al Khateeb, and L. M. Jenö, "Using WhatsApp increases language students' self-motivation and achievement, and decreases learning anxiety: A self-determination theory approach," *Journal of Computer Assisted Learning*, vol. 39, pp. 417-431, 2023. <https://doi.org/10.1111/jcal.12753>
 - [11] H.-T. Hsu and C.-C. Lin, "Extending the technology acceptance model of college learners' mobile-assisted language learning by incorporating psychological constructs," *British Journal of Educational Technology*, vol. 53, no. 2, pp. 286-306, 2022. <https://doi.org/10.1111/bjet.13165>
 - [12] N. Refat, H. Kassim, M. A. Rahman, and R. Razali, "Measuring student motivation on the use of a mobile assisted grammar learning tool," *PLOS ONE*, vol. 15, no. 8, Art. no. e0236862, 2020. <https://doi.org/10.1371/journal.pone.0236862>
 - [13] F. H. Faozi and P. W. Handayani, "The antecedents of mobile-assisted language learning applications continuance intention," *Electronic Journal of e-Learning*, vol. 21, no. 4, pp. 299-313, 2023. <https://doi.org/10.34190/ejel.21.4.2744>
 - [14] E. Darsih and N. A. Asikin, "Mobile assisted language learning: EFL learners' perceptions toward the use of mobile applications in learning English," *English Review: Journal of English Education*, vol. 8, no. 2, pp. 183-194, 2020. <https://doi.org/10.25134/erjee.v8i2.2999>
 - [15] F. Fang, Y. Meng, L. Tang, and Y. Cui, "The impact of informal digital learning of English (IDLE) on EFL learners' engagement: Mediating roles of flow, online self-efficacy, and behavioral intention," *Behavioral Sciences*, vol. 15, no. 7, Art. no. 851, 2025. <https://doi.org/10.3390/bs15070851>
 - [16] A. Rezai and A. Goodarzi, "Exploring the nexus of informal digital learning of English and online self-regulated learning in EFL university contexts: Longitudinal insights," *Computers in Human Behavior Reports*, vol. 18, Art. no. 100666, 2025. <https://doi.org/10.1016/j.chbr.2025.100666>
 - [17] H. Yao, M. M. Gu, and Y. Zhang, "Purpose profiles in informal digital learning of English: A mixed-methods study," *Journal of Computer Assisted Learning*, vol. 42, no. 3, Art. no. e70255, 2026. <https://doi.org/10.1002/jcal.70255>
 - [18] F. Fang, Y. Meng, L. Tang, and Y. Cui, "Digital natives' intentions toward informal digital English learning: The roles of desire, engagement, and online learning self-efficacy," *Journal of Intelligence*, vol. 14, no. 1, Art. no. 13, 2026. <https://doi.org/10.3390/jintelligence14010013>
 - [19] J. S. Lee and N. A. Drajeti, "Affective variables and informal digital learning of English: Keys to willingness to communicate in a second language," *Australasian Journal of Educational Technology*, vol. 35, no. 5, pp. 168-182, 2019. <https://doi.org/10.14742/ajet.5177>
 - [20] A. E. P. Atmojo, A. Kurniawati, Y. Triana, and Z. Hanifah, "The nexus between informal digital learning of English and L2 willingness to communicate among Indonesian EFL university students," *SALEE: Study of Applied Linguistics and English Education*, vol. 7, no. 2, pp. 212-228, 2026. <https://doi.org/10.35961/salee.v7i2.2920>
 - [21] A. Kurniawati, A. E. P. Atmojo, N. F. Swastika, and S. A. Lutfiana, "Examining the interplay among Indonesian EFL students' digital literacy, self-regulated learning, and informal digital learning of English," *PAEDAGOGIA*, vol. 29, no. 1, pp. 57-66, 2026. <https://doi.org/10.20961/paedagogia.v29i1.110691>
 - [22] A. A. F. Alzubi, "The role of mobile technologies in impacting learner autonomy in an EFL context: A systematic review," *International Journal of Computer-Assisted Language Learning and Teaching*, vol. 11, no. 3, pp. 56-73, 2021. <https://doi.org/10.4018/IJCALLT.2021070104>
 - [23] Y. Lai, N. Saab, and W. Admiraal, "Learning strategies in self-directed language learning using mobile technology in higher education: A systematic scoping review," *Education and*

- Information Technologies*, vol. 27, pp. 7749-7780, 2022. <https://doi.org/10.1007/s10639-022-10945-5>
- [24] R. Zhang and D. Zou, "Self-regulated second language learning: A review of types and benefits of strategies, modes of teacher support, and pedagogical implications," *Computer Assisted Language Learning*, vol. 37, no. 4, pp. 720-765, 2024. <https://doi.org/10.1080/09588221.2022.2055081>
 - [25] Y. Yossatorn, T. Binali, C. Weng, and N. O. Awuor, "Relating university students' online self-regulated English learning to motivational beliefs: A structural equation modelling analysis," *Behaviour & Information Technology*, vol. 42, no. 7, pp. 888-903, 2023. <https://doi.org/10.1080/0144929X.2022.2048074>
 - [26] Y. Han and J. Reinhardt, "Autonomy in the digital wilds: Agency, competence, and self-efficacy in the development of L2 digital identities," *TESOL Quarterly*, vol. 56, no. 3, pp. 985-1015, 2022. <https://doi.org/10.1002/tesq.3142>
 - [27] A. Rezai, A. Soyoof, and B. L. Reynolds, "Ecological factors affecting students' use of informal digital learning of English: EFL teachers' perceptions," *Teaching and Teacher Education*, vol. 145, Art. no. 104629, 2024. <https://doi.org/10.1016/j.tate.2024.104629>
 - [28] T. Yabukoshi, "Self-regulated pedagogical guidance for out-of-class listening practice: An empirical study of Japanese EFL learners," *Innovation in Language Learning and Teaching*, vol. 17, no. 3, pp. 505-517, 2023. <https://doi.org/10.1080/17501229.2022.2071425>
 - [29] G. L. Liu, J. S. Lee, and X. Zhao, "Critical digital literacies, agentic practices, and AI-mediated informal digital learning of English," *System*, vol. 134, Art. no. 103797, 2025. <https://doi.org/10.1016/j.system.2025.103797>
 - [30] C. Wang, Y. Du, and B. Zou, "Learners' acceptance and use of multimodal artificial intelligence (AI)-generated content in AI-mediated informal digital learning of English," *International Journal of Applied Linguistics*, vol. 36, no. 1, pp. 927-940, 2026. <https://doi.org/10.1111/ijal.12827>
 - [31] X. Li and L. M. Thien, "Exploring ChatGPT literacy as predictor and moderator in enhancing informal digital learning of English (IDLE): A partial least square analysis," *Quality Assurance in Education*, vol. 33, no. 2, pp. 336-356, 2025. <https://doi.org/10.1108/QAE-08-2024-0152>
 - [32] J. M. Keller, "Development and use of the ARCS model of instructional design," *Journal of Instructional Development*, vol. 10, pp. 2-10, 1987. <https://doi.org/10.1007/BF02905780>
 - [33] R. M. Ryan and E. L. Deci, "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being," *American Psychologist*, vol. 55, no. 1, pp. 68-78, 2000. <https://doi.org/10.1037/0003-066X.55.1.68>
 - [34] M. Sailer and L. Homner, "The gamification of learning: A meta-analysis," *Educational Psychology Review*, vol. 32, no. 1, pp. 77-112, 2020. <https://doi.org/10.1007/s10648-019-09498-w>
 - [35] S. Zhang and Z. Hasim, "Gamification in EFL/ESL instruction: A systematic review of empirical research," *Frontiers in Psychology*, vol. 13, Art. no. 1030790, 2023. <https://doi.org/10.3389/fpsyg.2022.1030790>
 - [36] L. Hsu, "EFL learners' self-determination and acceptance of LMOOCs: The UTAUT model," *Computer Assisted Language Learning*, vol. 36, no. 7, pp. 1177-1205, 2023. <https://doi.org/10.1080/09588221.2021.1976210>
 - [37] K. Ishaq, N. A. Mat Zin, F. Rosdi, M. Jehanghir, S. Ishaq, and A. Abid, "Mobile-assisted and gamification-based language learning: A systematic literature review," *PeerJ Computer Science*, vol. 7, Art. no. e496, 2021. <https://doi.org/10.7717/peerj-cs.496>
 - [38] S. R. Couvaneiro and N. Pedro, "Can tablets in EFL classes impact students' motivation to learn English?," *Diacritica*, vol. 34, no. 1, pp. 275-290, 2020. <https://doi.org/10.21814/diacritica.265>
 - [39] H. Alfadda, M. Afzaal, H. S. Mahdi, R. Alaudan, and S. Curle, "Influence of psychological

- autonomy support of peer instruction: A novel interactive approach using Instagram in language learning,” *Frontiers in Psychology*, vol. 13, Art. no. 866354, 2022. <https://doi.org/10.3389/fpsyg.2022.866354>
- [40] R. Wu, “The relationship between online learning self-efficacy, informal digital learning of English, and student engagement in online classes: The mediating role of social presence,” *Frontiers in Psychology*, vol. 14, Art. no. 1266009, 2023. <https://doi.org/10.3389/fpsyg.2023.1266009>
- [41] J. S. Lee, Q. Xie, and K. Lee, “Informal digital learning of English and L2 willingness to communicate: Roles of emotions, gender, and educational stage,” *Journal of Multilingual and Multicultural Development*, vol. 45, no. 2, pp. 596-612, 2024. <https://doi.org/10.1080/01434632.2021.1918699>
- [42] J. S. Lee, J. Chen, and N. A. Drajiati, “Informal digital learning of English and perceptions of using EIL materials: Attitude toward varieties of English as a mediator,” *Journal of Multilingual and Multicultural Development*, vol. 45, no. 5, pp. 1762-1777, 2024. <https://doi.org/10.1080/01434632.2021.2021213>
- [43] G. L. Liu, Y. Zhang, and R. Zhang, “Examining the relationships among motivation, informal digital learning of English, and foreign language enjoyment: An explanatory mixed-method study,” *ReCALL*, vol. 36, no. 1, pp. 72-88, 2024. <https://doi.org/10.1017/S0958344023000204>
- [44] G. Liu and C. Ma, “Measuring EFL learners' use of ChatGPT in informal digital learning of English based on the technology acceptance model,” *Innovation in Language Learning and Teaching*, vol. 18, no. 2, pp. 125-138, 2024. <https://doi.org/10.1080/17501229.2023.2240316>
- [45] G.-J. Hwang, M. Rahimi, and J. Fathi, “Enhancing EFL learners' speaking skills, foreign language enjoyment, and language-specific grit utilising the affordances of a MALL app: A microgenetic perspective,” *Computers & Education*, vol. 214, Art. no. 105015, 2024. <https://doi.org/10.1016/j.compedu.2024.105015>
- [46] J. S. Lee, “Informal digital learning of English and strategic competence for cross-cultural communication: Perception of varieties of English as a mediator,” *ReCALL*, vol. 32, no. 1, pp. 47-62, 2020. <https://doi.org/10.1017/S0958344019000181>
- [47] G. Liu, Y. Zhang, and R. Zhang, “Bridging imagination and informal digital learning of English: A mixed-method investigation,” *Journal of Multilingual and Multicultural Development*, vol. 45, no. 10, pp. 4533-4553, 2024. <https://doi.org/10.1080/01434632.2023.2173214>
- [48] M. Montero Perez, “Second or foreign language learning through watching audio-visual input and the role of on-screen text,” *Language Teaching*, vol. 55, no. 2, pp. 163-192, 2022. <https://doi.org/10.1017/S0261444821000501>
- [49] Q. Zhou, H. Hashim, and N. A. Sulaiman, “Integrating AI chatbots in informal digital English learning: Impacts on listening competencies in Chinese higher education,” *Education and Information Technologies*, vol. 30, pp. 27031-27059, 2025. <https://doi.org/10.1007/s10639-025-13811-2>
- [50] J. S. Lee, A. Rezai, and A. Goodarzi, “Effects of informal digital learning of English on EFL learners' writing skills: A mixed-methods study,” *Innovation in Language Learning and Teaching*, advance online publication, 2026. <https://doi.org/10.1080/17501229.2026.2717602>
- [51] C. G. Puteri, B. Y. Cahyono, U. Widiati, and N. Suryati, “Using ChatGPT as a writing assistant: A study on essay quality development among Indonesian EFL university students,” *Indonesian Journal of Applied Linguistics*, vol. 15, no. 2, pp. 332-346, 2026. <https://doi.org/10.17509/3ebmy158>
- [52] L. Plonsky and F. L. Oswald, “How big is big? Interpreting effect sizes in L2 research,” *Language Learning*, vol. 64, no. 4, pp. 878-912, 2014. <https://doi.org/10.1111/lang.12079>