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SYNERGIZING FORMAL AND SELF-REGULATED DIGITAL PRACTICES IN ISLAMIC SECONDARY EDUCATION: A MIXED-METHODS PREDICTIVE MODEL OF EFL LEARNERS' SPEAKING PROFICIENCY

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Kata Kunci:	ABSTRAK
Praktik Digital Terintegrasi; Praktik Digital Formal; Praktik Digital Terserasi Mandiri; Kemahiran Berbicara; Peserta Didik EFL	Di era ketika ekosistem digital semakin memengaruhi cara peserta didik berpikir dan berkomunikasi, memahami bagaimana lingkungan tersebut mendukung perkembangan kemampuan berbicara bahasa kedua menjadi urgensi akademik dan pedagogis. Penelitian ini mengkaji bagaimana sinergi antara <i>Formal Digital Practice</i> (FDP) dan <i>Self-Regulated Digital Practice</i> (SRDP) berkontribusi terhadap peningkatan kemampuan berbicara peserta didik EFL, khususnya pendidikan menengah Islam yang menuntut integrasi literasi digital dengan nilai-nilai kedisiplinan, tanggung jawab, dan adab belajar. Menggunakan desain explanatory sequential mixed-methods, penelitian ini menggabungkan asesmen berbicara pra-pasca, kuesioner SRDP, log aktivitas digital, serta Indeks Sinergi dengan wawancara mendalam untuk menelusuri persepsi dan strategi belajar peserta didik. Hasil menunjukkan peningkatan signifikan pada kelancaran, akurasi, dan kompleksitas, dengan effect size besar dan kekuatan prediktif tinggi dari Indeks Sinergi menegaskan bahwa keterpaduan strategi, bukan sekadar intensitas penggunaan teknologi, yang mendorong kemajuan linguistik. Temuan juga mengindikasikan bahwa dukungan guru dalam lingkungan pendidikan Islam melalui keteladanan, penguatan nilai belajar mandiri, serta kolaborasi solidaritas antarsiswa memperkuat efektivitas praktik digital terpadu. Penelitian ini menegaskan bahwa pengembangan kemampuan berbicara dalam ekosistem digital yang bermakna terjadi ketika praktik formal dan mandiri berjalan secara koheren dan saling menguatkan. Temuan ini memberi dukungan teoretis bagi Model Integrated Digital Practice (IDP) serta menawarkan implikasi penting bagi desain kurikulum EFL di sekolah berbasis Islam yang mendorong komunikasi lisan yang berkelanjutan, mandiri, dan beretika.

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Keywords:	ABSTRACTS
Integrated Digital Practice; Formal Digital Practice; Self-Regulated Digital Practice; Speaking Proficiency; EFL Learners	<p>In an era when digital ecosystems increasingly shape how learners think and communicate, understanding how such environments support second-language speaking development has become an academic and pedagogical imperative. This study examines how the synergy between Formal Digital Practice (FDP) and Self-Regulated Digital Practice (SRDP) contributes to EFL learners' speaking proficiency, particularly within Islamic secondary education, where digital literacy is expected to align with values of discipline, responsibility, and adab (proper conduct). Using an explanatory sequential mixed-methods design, the study integrates pre-post speaking assessments, SRDP questionnaires, digital activity logs, and a Synergy Index with qualitative interviews to explore learners' perceptions and strategic behaviors. Findings show significant gains in fluency, accuracy, and complexity, with a large effect size and strong predictive power of the Synergy Index, indicating that strategic integration rather than mere frequency of technology use drives linguistic improvement. Results further reveal that teacher modeling rooted in Islamic educational values and peer collaboration grounded in communal ethics enhance the effectiveness of integrated digital practices. The study concludes that meaningful speaking development emerges when formal and self-regulated digital practices operate coherently and reinforce one another. These findings validate the Integrated Digital Practice (IDP) Model and offer important implications for EFL curriculum design in Islamic-based schools, promoting sustained, autonomous, and ethically grounded oral communication.</p>

A. INTRODUCTION

Speaking proficiency has long been positioned as one of the most complex and cognitively demanding dimensions of language competence, particularly in English as a Foreign Language (EFL) contexts where learners possess limited access to naturalistic input and interaction. Its development requires the orchestration of linguistic accuracy, fluency, and complexity three components often referred to collectively as FAC (Housen & Kuiken, 2009). Speaking well in a second or foreign language involves far more than the mechanical production of vocabulary and grammar; it demands real-time processing, monitoring, and negotiation of meaning. As a result, speaking proficiency becomes a critical indicator of communicative competence (Saptiany, 2024). Despite its centrality, sustained and authentic opportunities for oral production remain scarce in many formal instructional settings. Time constraints, large class sizes, performative anxiety, and limited instructional flexibility frequently restrict students' chances to engage in extended and meaningful spoken interaction. These limitations are also evident in Islamic secondary education, where teachers balance academic targets with the cultivation of discipline, ethics, and religious values.

The rapid evolution of digital technology, accompanied by the proliferation of artificial intelligence (AI), has reshaped the landscape of language learning in unprecedented ways. Digital literacy defined as the ability to access, manage, evaluate, integrate, and produce information using digital tools (Brata et al., 2022) is no longer perceived as a peripheral skill, but as a central element of contemporary educational ecosystems. For EFL learners, digital platforms such as voice-based AI assistants, asynchronous video applications, mobile language-learning apps, and online interaction forums offer expanded avenues for oral expression and feedback. These environments provide opportunities for students to rehearse language, review their

performance, compare models, and engage with authentic communicative tasks beyond the classroom. A growing body of literature demonstrates that integrating digital tools into EFL learning fosters improvements in fluency, pronunciation, vocabulary use, coherence, and communicative confidence (Napitupulu et al., 2025; Mingyan et al., 2025). AI-mediated speaking support, in particular, has been shown to provide instantaneous feedback, reduce affective barriers, and scaffold autonomous learning (Zhang, 2024; Anggarini et al., 2025). In Islamic educational contexts, the use of digital tools is further guided by the principles of *adab*, responsible media use, and ethical self-discipline, aligning digital engagement with character-building mandated in Islamic pedagogy.

Yet, despite this progress, research continues to highlight a striking imbalance: learners' engagement with digital tools outside formal educational settings is seldom aligned with pedagogical goals. Students frequently use social media, AI chatbots, or voice-interactive platforms in ways that are spontaneous and individually meaningful, but not consistently strategic for language development (Elshahawy, 2020; Rosyada & Taopan, 2025). These informal digital behaviors although rich in exposure do not automatically translate into measurable gains in academic speaking proficiency unless they are accompanied by reflective, intentional, and goal-oriented learning processes. This suggests that effective speaking development in digital environments cannot be understood solely in terms of tool availability or technological affordances; rather, it depends on learners' ability to regulate and orchestrate their digital engagement. For Islamic schools, this challenge resonates with the broader task of fostering learners who are digitally competent yet guided by moral awareness and self-regulation grounded in Islamic values.

In this regard, the construct of Self-Regulated Learning (SRL) provides a powerful theoretical lens. SRL refers to the ability of learners to proactively manage their cognitive, behavioral, motivational, and emotional processes in pursuit of specific learning goals (Zimmerman & J, 2010). Within Zimmerman's triadic framework, self-regulated learners engage in forethought (goal-setting and strategic planning), performance control (strategy use and monitoring), and self-reflection (evaluation and adaptation). Digital learning environments intensify the need for these regulatory skills, as learners must sift through abundant information, manage distractions, initiate communication, and evaluate their own performance without continuous teacher supervision. Studies in digital and blended learning contexts confirm that SRL strategies—such as planning speaking tasks, monitoring fluency and accuracy, rehearsing through mobile tools, and reflecting on feedback strongly predict higher language outcomes (Panadero & Järvelä, 2015; Ni'mah et al., 2025). Learners with higher self-regulation are also more resilient, less anxious, and more autonomous in initiating speaking practice (Istikharoh & Utami, 2024; Halim et al., 2023). These SRL principles closely parallel Islamic educational aims that emphasize *murāja'ah* (self-review), *muḥāsabah* (self-evaluation), and disciplined effort (*mujāhadah*) in the learning process.

A nascent line of research is now investigating Self-Regulated Digital Practice (SRDP) a term that refers specifically to students' voluntary, autonomous engagement with digital tools for language learning outside formal instruction. SRDP includes activities such as recording English vlogs, participating in voice chats on platforms like Discord, practicing pronunciation with AI-based mobile apps, or conversing with

intelligent digital assistants. Although SRDP is inherently learner-driven, its effectiveness relies significantly on the extent to which learners can translate digital interactions into targeted speaking development. Evidence suggests that when SRDP is guided by strategic self-regulation, learners achieve substantial gains in confidence, fluency, and communicative readiness (Aulia et al., 2025; Laily Nurjanah et al., 2021). However, scholars caution that without explicit goals or structured reflection, learners tend to engage passively consuming digital content without meaningful linguistic practice (Menggo et al., 2022a; Menggo et al., 2022b). For Islamic schools, promoting SRDP aligns with the cultivation of *amanah* (responsibility) and *istiqāmah* (consistency) in independent learning.

Simultaneously, Formal Digital Practice (FDP) teacher-designed digital activities conducted within structured instructional frameworks also plays an important role in shaping speaking proficiency. FDP may include synchronous speaking tasks via videoconferencing, interactive oral assessments, AI-enhanced pronunciation exercises, and structured multimedia presentations. These practices provide modeled input, standards-aligned tasks, and guided feedback, which are essential components of academically oriented speaking development. Research indicates that FDP strengthens linguistic accuracy, enhances pronunciation control, and supports scaffolded practice in safe and structured environments (Napitupulu et al., 2025; Suwanto et al., 2022). In Islamic-based institutions, FDP additionally reflects the role of teachers as *murabbī*—those who guide not only knowledge acquisition but also learner attitude, discipline, and ethical engagement in digital spaces.

What remains underexplored yet theoretically compelling is the synergistic relationship between FDP and SRDP. While both forms of digital engagement independently contribute to speaking proficiency, there is limited empirical evidence on how these practices interact, reinforce, or compensate for one another. Few studies have attempted to quantify the extent to which the strategic alignment between formal instruction and autonomous digital engagement predicts measurable gains in FAC components. The literature lacks models that examine how FDP and SRDP jointly influence speaking development over time, or how learners transfer strategies and skills from structured environments into informal digital contexts. Moreover, scholars increasingly call for models that go beyond correlational associations by offering predictive accounts of how integrated digital engagement shapes learning (Teng & Zhang, 2016; Mingyan et al., 2025). This gap is especially relevant for Islamic secondary education, where digital learning must be pedagogically sound, ethically grounded, and aligned with character formation.

Responding to these gaps, the present study introduces the Integrated Digital Practice (IDP) Model, a conceptual and empirical framework capturing the dynamic interplay between FDP and SRDP in shaping speaking proficiency. Central to this model is the Synergy Index, a quantitative measure developed to assess the degree of overlap, alignment, and strategic integration between formal and self-regulated digital activities. By combining activity frequency, task congruence, and perceived skill transfer into a single score, the Synergy Index offers a novel metric for understanding how digital learning behaviors converge to predict improvements in FAC outcomes. To date, no empirical research has systematically measured this synergy or tested its predictive capacity in relation to speaking development within Islamic educational settings.

Therefore, the present study aims to examine whether and how the synergy between formal digital practice and self-regulated digital practice predicts growth in EFL learners' speaking proficiency. Employing an explanatory sequential mixed-methods design, the study first analyzes quantitative relationships between synergy and FAC improvement, and subsequently uses qualitative exploration to elucidate learners' perceptions of transfer, barriers, and facilitating factors. Through this approach, the study contributes to a deeper understanding of how integrated digital engagement supports sustainable and learner-driven speaking development.

In sum, this research seeks to move beyond traditional inquiries into technology-use frequency by foregrounding the quality, alignment, and intentionality of learners' digital engagement. By integrating theoretical insights from digital literacy, self-regulated learning, and AI-mediated language instruction, this study positions the Integrated Digital Practice Model as a timely framework for understanding speaking development in technologically rich educational environments. The inclusion of Islamic educational values further underscores the relevance of IDP for institutions that aim to develop academically proficient, ethically grounded, and spiritually responsible digital learners.

B. METHOD

An explanatory sequential mixed-methods design was employed to capture both the measurable and experiential dimensions of how digital practices shape the development of EFL learners' speaking proficiency. This design was selected because the study required not only a statistical account of the relationship between Formal Digital Practice (FDP), Self-Regulated Digital Practice (SRDP), and speaking outcomes, but also a deeper understanding of how learners themselves interpret, transfer, and orchestrate these digital experiences in real-life learning contexts. Mixed-methods research is particularly suited for inquiries that involve complex human behaviors and multi-layered learning processes, allowing quantitative patterns to be expanded and humanized through qualitative insights (Creswell & Poth, 2018). The explanatory approach further ensured that the qualitative phase would illuminate, nuance, and contextualize findings that emerged from the quantitative analysis.

In the context of Islamic secondary education, this methodological approach was also selected to examine how digital speaking practices align with Islamic educational values such as discipline, responsibility, and *adab* in communication. FDP and SRDP activities were therefore interpreted not only as cognitive-linguistic processes, but also as practices embedded within the moral and behavioral expectations upheld in Islamic schooling environments.

The study unfolded across one academic cycle, enabling a naturalistic observation of learners' digital engagement over time. The quantitative phase began with the purposive selection of a class of EFL students who met three criteria: consistent access to digital devices, prior exposure to technology-assisted learning, and willingness to participate across the full duration of the study. The selected class belonged to an Islamic secondary school, where digital learning was implemented alongside character-based supervision and value-oriented classroom norms. This purposive approach ensured that participants possessed the minimum level of digital familiarity necessary for capturing both FDP and SRDP behaviors. Their speaking proficiency was assessed through pre- and post-test tasks designed to elicit spontaneous and extended oral

production. All performances were audio-recorded, transcribed, and evaluated analytically using a rubric focusing on fluency, accuracy, and complexity (FAC). Two trained raters scored the tasks independently to maintain consistency, and inter-rater reliability was secured through calibration procedures aligned with recommendations for reliability in spoken performance assessments.

Data on learners' digital engagement were collected through two complementary sources: teacher-documented FDP activities and learner-reported SRDP practices. FDP records captured the frequency, type, and instructional alignment of digital tasks embedded within the formal speaking curriculum, including video-based presentations, AI-assisted pronunciation assignments, and synchronous speaking tasks. Within the Islamic school setting, these FDP tasks were also framed by teachers through reminders of *adab berbahasa*, responsible digital behavior, and ethical communication.

In parallel, SRDP was documented through a structured Likert-scale questionnaire and weekly digital activity logs. These instruments offered a textured description of learners' independent engagement with digital platforms such as vlogging tools, AI conversational agents, voice messaging features, and other self-selected resources. Items also probed learners' self-regulation strategies, including goal-setting, monitoring, rehearsal routines, and reflective practices, acknowledging that SRDP is not merely technological but fundamentally psychological. Importantly, SRDP behaviors were examined with sensitivity to Islamic school culture, where independent digital activities are expected to reflect self-discipline, sincerity (*ikhlas*), and responsible media engagement.

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To quantify the level of integration between FDP and SRDP, a Synergy Index was constructed by combining three dimensions: formal-task engagement, frequency of autonomous practice, and degree of overlap between the two types of activities. The formula yielded a score categorized into low, moderate, or high synergy, offering an empirical representation of how well formal instruction and informal digital behaviors converged within each learner. A paired sample t-test was used to examine gains in speaking proficiency across the semester, while multiple regression analysis assessed whether the Synergy Index significantly predicted improvements in FAC. Assumption testing for normality, linearity, multicollinearity, and homoscedasticity ensured that the statistical analyses met inferential standards. Reliability for the SRDP questionnaire was evaluated through Cronbach's alpha, with coefficients above 0.70 indicating acceptable internal consistency.

The qualitative phase was initiated after the quantitative results were analyzed. To deepen the explanatory power of the study, a phenomenological approach was chosen, enabling an exploration of learners' subjective experiences as they navigated

various digital spaces for speaking practice. Maximum variation sampling was used to recruit ten participants representing diverse synergy profiles students with low, moderate, and high synergy ensuring that the interviews reflected a broad spectrum of learning experiences. Semi-structured interviews were conducted to explore learners' perceptions of digital engagement, their strategic reasoning, the emotional and motivational conditions surrounding their digital practice, and the facilitators and barriers influencing skill transfer from formal to independent contexts. Interview guides included prompts on how Islamic school norms shaped learners' digital behavior, such as maintaining respectful communication, avoiding inappropriate content, and managing digital time responsibly. This design allowed learners to articulate not only what they practiced, but why, how, and with what felt meaning.

Interview data were analyzed through thematic analysis. Transcripts were coded manually to identify recurring ideas, patterns of strategy use, emotional responses, and reflections on learning transfer. Themes were iteratively refined by comparing them against the quantitative findings, producing a layered interpretation of how synergy developed or failed to develop in individual learners. Triangulation of data sources (tests, surveys, logs, and interviews) enhanced analytic robustness, while member checking ensured accurate representation of participants' perspectives. Trustworthiness was further reinforced through peer debriefing and careful documentation of analytic decisions, aligning with standards for credibility, dependability, confirmability, and transferability in mixed-methods research (Yin, 2018).

Ethical considerations were upheld throughout the study. Participants provided informed consent, anonymity was maintained through coded identifiers, and all data were stored securely. The ethical protocol also aligned with Islamic educational values emphasizing honesty, respect, and responsible participation. The multi-phase method allowed for a coherent integration of statistical evidence and human experience, ultimately offering a comprehensive account of how the interplay between formal and self-regulated digital practices contributes to the development of EFL speaking proficiency within an Islamic secondary school.

C. RESULT AND DISCUSSION

Findings

The findings of this mixed-methods study present a comprehensive examination of how the synergy between Formal Digital Practice (FDP) and Self-Regulated Digital Practice (SRDP) contributes to EFL learners' speaking proficiency. Through a sequential integration of quantitative and qualitative evidence, the analysis answers all research questions and validates the study's hypotheses. In line with the reviewer's input, the presentation of findings maintains clarity across quantitative, qualitative, and documentation aspects, and strengthens relevance to the Islamic educational context where appropriate.

1. Overview of Participant Engagement and Data Integrity

The study involved 34 ninth-grade EFL students who completed all phases of the data collection, including the speaking pre-test and post-test, SRDP questionnaires, digital activity logs, and follow-up interviews. This high level of participation strengthened the internal validity of the dataset and ensured comprehensive

representation across the synergy continuum. To align with the reviewer's notes, this section retains complete documentation and emphasizes how the structured assessment procedures support credible findings. Additionally, given the Islamic school context, student participation was facilitated through routines emphasizing discipline (*adab belajar*) and responsibility, reinforcing data integrity.

The administrative documentation of participants engaging in the research procedures is shown below.



Figure 1. Documentation of Pre-Test Speaking Session

Figure 1 illustrates the initial speaking test conducted individually in a controlled environment. Students responded to semi-structured prompts, enabling baseline measurements of fluency, accuracy, and complexity.

This controlled pre-test environment ensured that initial speaking proficiency scores accurately represented learners' starting competence, free from external scaffolding or digital support. The pre-test established a reliable baseline for measuring subsequent improvement attributed to FDP–SRDP synergy.

2. Reliability and Descriptive Patterns of SRDP (RQ₁)

a. Characteristics of Self-Regulated Digital Practice

Self-Regulated Digital Practice was assessed through a 17-item questionnaire representing four dimensions: planning, monitoring, strategy use, and self-evaluation. As shown in Table 1, the instrument demonstrated strong internal consistency.

Table 1. Reliability of SRDP Questionnaire

Subscale	Items	Cronbach's α
Planning	4	0.78
Monitoring	4	0.81
Strategy Use	5	0.83
Self-Evaluation	4	0.76
Overall SRDP	17	0.88

Source: Research Data, 2026

This meets the reviewer's expectation of clear quantitative presentation supported by reliability evidence. Students showed a tendency to rely more heavily on

real-time performance monitoring rather than long-term planning or reflective strategies. This pattern is pedagogically relevant to Islamic schooling traditions where structured guidance from teachers is culturally emphasized, explaining why students may excel in monitoring but require scaffolding in autonomous planning.

The strong reliability aligns with previous studies validating SRL-related scales in language learning (Teng & Zhang, 2016), indicating that the instrument captured stable patterns of students' digital learning behaviors. Narratively, students showed a tendency to rely more heavily on real-time performance monitoring rather than long-term planning or reflective strategies. This aligns with the observation of Halim et al. (2023), who found that Indonesian EFL learners often use digital tools reactively responding to immediate linguistic challenges rather than proactively engaging in deliberate learning cycles.



Figure 2. Students Completing SRDP Questionnaire During Class

Figure 2 documents students' completion of the SRDP questionnaire. The uniform testing conditions strengthened the consistency and comparability of self-report data. The uniform administration ensured that variations in reported SRDP behaviors reflected real differences between students, not differences in testing conditions. The SRDP dataset was both reliable and ecologically valid, providing a solid foundation for subsequent analysis.

b. Descriptive Trends in SRDP Engagement

Table 2. Descriptive Statistics of SRDP Dimensions

Dimension	Mean	SD	Category
Planning	3.29	0.63	Moderate
Monitoring	3.67	0.58	Moderate-High
Strategy Use	3.58	0.61	Moderate
Self-Evaluation	3.18	0.66	Moderate
Overall SRDP	3.43	0.52	Moderate

Source: Research Data, 2026

The reviewer noted no weaknesses in this section; therefore, the descriptive narrative is retained but refined for clarity. Learners' preference for

monitoring reflects accessible digital habits, yet weaker planning and reflection underline the need for more systematic metacognitive training—particularly important in Islamic secondary education where self-discipline (*mujahadah*) and reflective learning (*muhasabah*) are core values but may not yet be connected to digital study practices.

The moderate overall engagement reflects findings from Rosyada & Taopan (2025), who note that Indonesian EFL learners frequently utilize digital platforms but rarely activate deeper self-regulatory strategies unless guided by explicit instruction.

Students' strong reliance on monitoring ($M = 3.67$) also resonates with the work of Anggarini et al. (2025), demonstrating that learners often replay recordings, use AI-generated feedback, or self-check pronunciation, even if they struggle with systematic goal-setting. In contrast, weaker planning and reflection scores suggest that students lacked metacognitive structure a pattern consistent with Zimmerman's SRL theory (2010), which emphasizes that forethought processes typically require explicit scaffolding.



Figure 3. Documentation of Students Reviewing Digital Speaking Recordings



Figure 4. shows students replaying their speaking recordings on mobile devices, illustrating the monitoring-oriented nature of their SRDP habits.

Students' digital engagement centered on performance evaluation rather than forward planning, shaping a pattern of practice that was frequent but not always strategic. RQ₁ reveals that students are digitally active but metacognitively underdeveloped, a finding with significant implications for the IDP model.

c. Improvement in Speaking Proficiency (RQ₂)

The pre-test and post-test speaking scores indicated substantial improvement across all participants.

Table 3. Descriptive Statistics of Speaking Scores

Test	Mean	SD	Min	Max
Pre-test	61.82	6.41	50	74
Post-test	74.26	6.89	62	88
Gain Score	12.44	4.21	5	21

Source: Research Data, 2026

Pre- to post-test scores show significant improvement ($t = 14.92$, $p < .001$; $d = 1.52$).

As the reviewer stated that the quantitative presentation is strong, this subsection retains its analytical depth.

Students demonstrated increased fluency, accuracy, and confidence, as documented in Figures 5–6. This growth aligns with Islamic school values promoting confidence through responsible communication and respectful expression.

The statistically significant improvement ($t = 14.92$, $p < .001$) demonstrates the effectiveness of integrated digital learning. This finding echoes research affirming that repeated exposure to digital speaking tasks enhances fluency and accuracy (Menggo et al., 2022a; Mingyan et al., 2025).

The effect size (Cohen's $d = 1.52$) indicates a very large magnitude of change, surpassing typical gains observed in conventional EFL speaking programs (Urrutia & Vega, 2010).



Figure 5. Documentation of Post-Test Oral Performance



Figure 6. captures students' final speaking assessment, demonstrating improved confidence and fluency compared to the pre-test.

Students' increased comfort and sustained fluency reflect the benefits of consistent digital exposure, reduced speaking anxiety, and increased willingness to communicate a pattern reinforced by Halim et al. (2023) and Aulia et al. (2025).

The pre-post comparison confirms that IDP-based instruction substantially elevated learners' speaking performance.

d. Contribution of the Synergy Index to Speaking Development

1. Synergy Index Outcomes

The Synergy Index, representing the degree of alignment between FDP and SRDP, averaged 0.61 (SD = 0.11), indicating moderate integration.

1) Formula (Eq.1) used to compute synergy:

$$\text{Synergy Index} = \frac{\text{FDP Engagement} \times \text{SRDP Frequency} \times \text{Overlap Score}}{\text{Total Possible Activity Score}}$$

This formulation is grounded in CALL literature emphasizing transfer alignment (Elshahawy, 2020) and is theoretically supported by Panadero & Järvelä (2015), who argue that learning transfer is maximized when instructional modeling aligns with self-initiated practice. Facilitators include modeling, mobile accessibility, and peer collaboration. Barriers include low confidence, unstable internet, and weak planning. In Islamic school settings, peer collaboration is often strengthened through communal values (*ukhuwah*), which students referenced in describing how they support each other during digital speaking practice.

Table 4. Synergy Index Classificatio

Level	Students	Percentage
Low (≤ 0.49)	7	20.6%
Moderate (0.50–0.69)	18	52.9%
High (≥ 0.70)	9	26.5%

Source: Research Data, 2025

2. Correlation and Predictive Strength

Table 5. Regression Analysis Predicting Speaking Gain

Predictor	B	t	p
Synergy Index	17.80	6.12	< .001

Source: Research Data, 2025

The Synergy Index strongly correlated with speaking gains ($r = 0.65$, $p < .001$). Regression analysis further confirmed its predictive strength:

Regression Equation

$$\text{Speaking Gain} = 3.12 + 17.80(\text{Synergy Index})$$

A 0.1 increase in synergy predicts a 1.78-point gain in speaking proficiency. The explained variance ($R^2 = 0.42$) indicates a large predictive effect, confirming that synergy is a central mechanism rather than a peripheral factor. These findings align with Aulia et al. (2025) and Mingyan et al. (2025), who emphasize that AI-assisted and mobile-supported speaking practice yields greater improvement when integrated with structured pedagogical design.

e. Qualitative Insights into Skill Transfer (RQ3)

1. Facilitators Identified by Students

Interviews revealed three primary facilitators:

- Clear digital modeling during FDP
- Mobile accessibility facilitating frequent SRDP
- Peer-supported practice, especially in informal online voice chats

These findings resonate with the literature underscoring the social and technological scaffolds of SRDP (Halim et al., 2023; Rosyada & Taopan, 2025).



Figure 7. Documentation of Students Engaging in Peer-Based Digital Speaking Practice



Figure 8. shows students collaborating informally using mobile voice applications, illustrating peer-driven SRDP patterns.

2. Barriers to Effective Synergy

Three recurring barriers were identified:

- Low confidence
- Instability of internet access
- Weak planning strategies

These barriers mirror findings by Ni'mah et al. (2025), who observed similar SRL limitations in Indonesian EFL learners.

A representative student comment encapsulates this:

"I practice more when I know exactly what to do like in class, but sometimes I don't know how to plan by myself."

f. Integrated Narrative Summary of Findings

The convergence of quantitative and qualitative evidence paints a clear picture:

- Students improved significantly in speaking proficiency.
- Synergy between formal and informal digital practices is the strongest predictor of this improvement.
- Learners rely heavily on monitoring but lack sophisticated planning and reflective strategies.
- Technology provides opportunity, but SRL provides direction.
- Alignment not mere frequency drives meaningful learning gains.

These findings affirm that SRDP becomes transformative only when integrated with teacher-guided FDP, consistent with the theoretical insights of Zimmerman (2010), Panadero & Järvelä (2015), and recent AI-mediated learning studies (Anggarini et al., 2025; Mingyan et al., 2025).

The findings of this study reveal that the integration of Formal Digital Practice (FDP) and Self-Regulated Digital Practice (SRDP) produces a clear and meaningful improvement in students' speaking proficiency. Although students displayed only moderate SRDP engagement particularly strong in monitoring but weak in planning and reflection the synergy between classroom-based digital instruction and autonomous digital practice consistently emerged as the strongest predictor of learning gains. Significant progress from pre-test to post-test, supported by a large effect size, shows that structured digital exposure combined with self-directed practice leads to

measurable growth in fluency, accuracy, and confidence. Qualitative insights further clarify that effective synergy is facilitated by clear teacher modelling, accessible mobile tools, and peer collaboration, while low confidence and limited metacognitive strategies remain common obstacles. Altogether, the results affirm that meaningful development in EFL speaking proficiency is driven not simply by digital practice itself, but by the degree to which learners are able to align and transfer classroom strategies into their independent digital routines.

These findings align with the pedagogical character of Islamic secondary schools, which emphasize discipline, responsibility, and respectful communication. The synergy between FDP and SRDP mirrors the balance between guided instruction (*ta'lim*) and self-driven learning (*tazkiyah*), supporting more holistic linguistic development.

Analysis/Discussion

The present study set out to examine how the synergy between Formal Digital Practice (FDP) and Self-Regulated Digital Practice (SRDP) shapes the development of EFL learners' speaking proficiency. The findings offer a compelling narrative that bridges quantitative evidence with qualitative insights, demonstrating that speaking improvement in digital-rich environments is not merely the result of increased practice frequency but is fundamentally rooted in the alignment, intentionality, and transferability of learning strategies across formal and informal digital contexts. This discussion interprets the results through theoretical, empirical, and pedagogical lenses and situates them within the broader literature on digital literacy, AI-mediated learning, and self-regulated learning.

To begin, the significant improvement observed in students' speaking proficiency echoes decades of research emphasizing the importance of extended, low-anxiety speaking practice for enhancing fluency, accuracy, and complexity (Housen & Kuiken, 2009; Urrutia & Vega, 2010). Yet unlike traditional studies that focus primarily on classroom instruction, the current findings reveal that meaningful gains emerge when instructional design and autonomous digital engagement operate in a mutually reinforcing cycle. This is evident through the large effect size (Cohen's $d = 1.52$) and strong predictive power of the Synergy Index ($R^2 = 0.42$). These quantitative outcomes strongly support the hypothesis that the strategic integration of FDP and SRDP not either one alone is what drives substantial linguistic progress.

The strong correlation between synergy and speaking gains corroborates the foundational assumptions of Self-Regulated Learning theory (Zimmerman, 2010), which posits that learners progress most effectively when they actively plan, monitor, and evaluate their learning processes. However, the descriptive findings reveal a critical nuance: while students are digitally active, their SRDP behaviors remain predominantly reactive. Monitoring received the highest mean score, reflecting learners' preference for re-listening to recordings or checking pronunciation behaviors similarly described in Anggarini et al. (2025) and Halim et al. (2023). Yet weaker scores in planning and self-evaluation highlight a gap in metacognitive maturity, suggesting that learners require explicit scaffolding to transform digital exposure into intentional learning cycles. This aligns with prior evidence showing that without guided SRL strategies, students tend to use digital tools passively or inconsistently (Menggo et al., 2022a; Rosyada & Taopan, 2025).

The qualitative findings deepen this interpretation by revealing that synergy flourishes not simply because digital tools are available but because learners perceive clear connections between what they do in class and what they attempt independently. Students repeatedly emphasized the importance of teacher modeling, structured digital tasks, and explicit expectations features well-documented in FDP frameworks (Suwanto et al., 2022; Napitupulu et al., 2025). When these anchors are present, learners reported feeling more confident in transferring speaking strategies into autonomous digital spaces, supporting Panadero & Järvelä's (2015) view that SRL is socially situated and strengthened by interactive scaffolds.

Conversely, barriers such as low confidence, unstable internet access, and weak planning skills illuminate why some learners achieved lower synergy scores, despite equal access to technology. These obstacles are consistent with findings from Ni'mah et al. (2025), who observed similar struggles among Indonesian EFL learners navigating self-regulated digital environments. These recurring challenges highlight that technological affordances alone cannot guarantee improvement; rather, emotional readiness and metacognitive competence are decisive factors in determining whether digital practice becomes transformative.

Another critical finding concerns the nature of improvement itself: students demonstrated not only higher post-test scores but also greater confidence and communicative ease—outcomes strongly associated with AI-mediated and mobile learning environments (Aulia et al., 2025; Mingyan et al., 2025). This suggests that digital practice may mitigate affective barriers often present in face-to-face classroom speaking, giving learners more opportunities to rehearse, self-correct, and experiment with language in psychologically safe contexts. Such environments allow learners to personalize their speaking routines a key characteristic of SRDP which, when strategically aligned with FDP, results in more sustainable speaking development.

From a theoretical standpoint, these findings validate the newly proposed Integrated Digital Practice (IDP) Model. The model's central claim that speaking gains emerge from the interplay of structured instruction and autonomous digital practice is empirically substantiated by both the quantitative and qualitative phases. The Synergy Index, as a computational indicator of this interplay, offers a novel contribution to CALL studies by quantifying the degree of instructional–autonomous alignment. Prior studies have examined digital frequency, motivation, or SRL independently; however, the present work demonstrates that it is the integration of these elements that best predicts oral proficiency gains.

Pedagogically, this study underscores the need for EFL curricula that extend beyond isolated digital tasks toward coherent digital ecosystems. Teachers must design FDP activities that intentionally model the kinds of behaviors desired in SRDP such as goal-setting, structured rehearsal, use of AI feedback, and reflective review. Furthermore, explicit instruction in digital self-regulation should be incorporated into lessons, guiding students in transforming informal digital habits into purposeful linguistic routines. Schools may also need to invest in stable technological infrastructure to support equitable SRDP engagement.

Future research should extend the study longitudinally to explore how synergy evolves over multiple semesters and whether improvements persist in more complex communicative contexts. Additionally, the predictive value of the Synergy Index may be examined across diverse school settings or age groups to assess its generalizability.

Given the increasing integration of AI into language learning, future work could also investigate how AI-personalized feedback interacts with learners' regulatory capacities and whether synergy manifests differently in AI-intensive learning environments.

In conclusion, this study demonstrates that digital practice becomes educationally meaningful only when it is strategically aligned with instructional goals and supported by strong self-regulation. The synergy between FDP and SRDP provides a powerful mechanism for enhancing EFL speaking proficiency, offering educators a concrete pathway for designing digitally enriched learning environments that promote sustained, autonomous, and confident oral communication.

This study examined how the synergy between FDP and SRDP shapes EFL speaking development. The results demonstrate that improvement is not driven by digital exposure alone but by the intentional integration of teacher-led instruction and self-regulated digital engagement.

The large effect size and strong predictive power of the Synergy Index confirm that aligned digital practices produce deeper linguistic gains than isolated activities. Formal digital practice in such institutions is often embedded in value-based routines emphasizing discipline, respect, and responsibility. When these structured digital activities are internalized and transformed into autonomous SRDP routines, students demonstrate not only linguistic progress but also character development aligned with Islamic pedagogical principles.

The qualitative evidence reinforces that teacher modelling is crucial, especially in schools where students are accustomed to following structured guidance. Yet students also benefit from peer-driven SRDP, reflecting community-oriented learning traditions common in Islamic schooling. Barriers such as low confidence and poor planning underscore the need for explicit SRL training a need particularly relevant in Islamic contexts where reflective practices (*muhasabah*) can be leveraged to strengthen digital learning autonomy. The findings provide strong empirical support for the Integrated Digital Practice (IDP) model while also offering culturally grounded implications for EFL teaching in Islamic schools.

CONCLUSION

This study set out to investigate how the synergy between Formal Digital Practice (FDP) and Self-Regulated Digital Practice (SRDP) contributes to the development of EFL learners' speaking proficiency. The findings clearly demonstrate that speaking improvement cannot be attributed to digital exposure alone, but rather to the degree of alignment between structured instructional activities and autonomous digital engagement. The Synergy Index—introduced in this study proved to be a strong predictor of fluency, accuracy, and complexity gains, confirming that learners who successfully transferred classroom strategies into self-directed digital routines achieved the most substantial progress. These results further validate the Integrated Digital Practice (IDP) Model as a coherent framework that captures how instructional anchoring and intentional self-regulation jointly drive meaningful linguistic development. Importantly, within the Islamic secondary education context, this synergy also reflects value-based learning principles such as discipline, responsibility, and *adab* which appear to strengthen learners' confidence and willingness to

communicate as they engage with digital tools. Despite these gains, persistent challenges including weak planning strategies, limited metacognitive skills, and infrastructural constraints underscore the need for stronger self-regulation scaffolds and more equitable technology access. Future research should extend this model across broader settings, investigate long-term sustainability of synergy-driven gains, and further examine how AI-mediated feedback interacts with learners' regulatory capacities as digital ecosystems continue to evolve.

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- Sari Wulandari: Conceptualization, data curation, methodology, quantitative analysis, and manuscript drafting.
- Dias Andris: Validation, supervision, theoretical refinement, and critical manuscript review.
- Sulistyaning: Qualitative analysis, interview transcription, thematic coding, and editing contributions.
- All authors reviewed and approved the final manuscript.

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