

EFL Learning Improvement Through the SAMR Learning Model: A Technology Integration Framework in the Digital Era

Siti Wahdatul Alawiah¹, Yuyu Heryatun², Fadilla Oktaviana³, Purnama Rika Perdana⁴,

Universitas Islam Negeri Sultan Maulana Hasanuddin Banten, Indonesia

E-mail: 242623201.sitiwahdatulalawiah@uinbanten.ac.id, Yuyu.heryatun@uinbanten.ac.id,

fadilla.oktaviana@uinbanten.ac.id. purnama.rikaperdana@uinbanten.ac.id

Keywords	Abstract
SAMR model, digital EFL learning, technology integration	The rapid development of digital technology has transformed the landscape of English as a Foreign Language (EFL) education, making technology integration not only beneficial but essential. This study examines the application of the SAMR (Substitution, Augmentation, Modification, Redefinition) model as a framework for enhancing learning outcomes in digital EFL environments. Through a literature review approach, the research synthesizes findings from recent studies to identify effective strategies, pedagogical benefits, and challenges associated with implementing technology using the SAMR model. The analysis indicates that technology integration at the higher levels of SAMR—Modification and Redefinition—enables deeper learning experiences by promoting collaboration, creativity, and communicative competence. Meanwhile, even basic levels of integration, such as Substitution and Augmentation, contribute to improved efficiency and accessibility of EFL learning materials. However, the study also highlights challenges, including limited digital literacy among teachers, inadequate infrastructure, and varying student readiness. Overall, the findings demonstrate that the SAMR model plays a significant role in enhancing student engagement, interactivity, and autonomy, ultimately supporting more meaningful and dynamic EFL learning in the digital era.



INTRODUCTION

Digital transformation has fundamentally reshaped contemporary educational practices, influencing how teachers design instruction and how students engage with learning materials. In the context of English as a Foreign Language (EFL), technology has opened new possibilities for enhancing linguistic exposure, interaction, and collaboration in ways that traditional classrooms could not achieve. As digital tools become increasingly embedded in daily communication and academic work, EFL classrooms are expected to adapt by leveraging these innovations to support meaningful language learning (Ali et al., 2024; Kessler, 2018; Procel & Medina..., 2024; Sari, 2024). This shift requires not only the adoption of technology but also a structured approach to integrating it effectively. The SAMR model—Substitution, Augmentation, Modification, Redefinition—introduced by Ruben Puentedura, has emerged as a widely referenced framework for guiding technology integration. It provides educators with a clear continuum that categorizes how digital tools can be used, from simply replacing traditional methods to creating entirely new learning

experiences. By understanding these four progressive stages, teachers can more intentionally design activities that enhance engagement and deepen students' cognitive involvement. In EFL contexts, this model serves as a lens for evaluating whether technology is used merely as a digital version of existing tasks or as a transformative catalyst for language acquisition.

Despite the proliferation of available digital tools, many EFL practitioners remain anchored at the lower levels of the SAMR model, predominantly at the Substitution stage. At this level, technology functions merely as a direct, one-to-one replacement for traditional resources, such as utilizing PDF worksheets in lieu of printed handouts. While such substitution can enhance practicality and access, it often fails to produce significant improvements in pedagogical outcomes or learning depth. This stagnation is frequently attributed to teachers' limited digital literacy, insufficient pedagogical training specific to technology integration, and a lack of familiarity with structured frameworks that could guide their progression. Consequently, the transformative potential of digital learning environments remains largely underutilized (Haristiani et al., 2024). Furthermore, this reliance on low-level integration is exacerbated by persistent institutional constraints. Many educational institutions, particularly in certain regions, still grapple with inadequate infrastructure, including unstable internet connectivity, a shortage of functional devices, and the absence of supportive digital policies. Without robust institutional backing, educators may exhibit reluctance to experiment with more sophisticated digital tasks, which often demand greater preparation time, collaborative platforms, and technical confidence. This evident chasm between the availability of technology and its innovative pedagogical application underscores the urgent need for strategic frameworks like SAMR to guide meaningful digital transformation in EFL instruction.

At the Augmentation stage, technology provides functional improvements to existing tasks. For instance, students may use online dictionaries, pronunciation tools, or grammar-checking software to enhance their writing and speaking proficiency. Although such tools contribute to better accuracy and efficiency, they do not fundamentally transform learning. Nonetheless, mastering this stage is important as it builds a foundation for teachers and students to advance toward more complex digital tasks. Understanding how augmentation supports language learning is essential for optimizing students' self-directed learning abilities.

Reaching the Modification stage marks a significant shift in teaching practices. At this level, technology allows teachers to redesign tasks in ways that meaningfully change how students interact with content and with one another. In EFL learning, this may include collaborative writing via cloud-based documents, interactive discussion boards, or multimedia-based assignments. These activities promote communication skills, peer feedback, and creativity, allowing learners to engage more deeply with linguistic forms and functions. Modification also supports personalized learning pathways by enabling students to work at their own pace and access diverse resources (Khalil et al., 2024).

The highest level of the SAMR model, Redefinition, enables tasks that were previously inconceivable without technology. Through this stage, EFL teachers can design immersive, authentic learning environments such as virtual exchanges with international peers, digital storytelling using multimedia platforms, or project-based tasks that incorporate video production and real-time collaboration. These transformative experiences encourage learners

to use English as a tool for global communication, thereby strengthening their confidence, cultural awareness, and real-world language application. However, moving toward the transformative stages of SAMR requires intentional pedagogical planning. Teachers need continuous professional development that focuses not only on technical skills but also on digital pedagogy, classroom management, and an innovation mindset. Without adequate training, teachers may feel overwhelmed by the complexity of digital tools or uncertain about how to align them with learning objectives. Therefore, supporting teachers through workshops, mentorship, and instructional design guidance becomes essential for maximizing the benefits of SAMR-based technology integration. Another concern relates to students' digital readiness. Although many learners are familiar with technology for entertainment or social communication, this does not automatically translate into effective academic use. Some students may struggle to navigate learning platforms, manage online assignments, or communicate appropriately in digital spaces. Consequently, teachers need to scaffold students' digital literacy alongside their language skills. Ensuring equitable access to devices and internet connectivity is equally important to avoid widening achievement gaps among learners (Isiaku & Muhammad, 2025).

Given these opportunities and challenges, this study explores how the SAMR model can optimize learning outcomes in EFL classrooms during the digital era. By synthesizing findings from previous literature, this research examines how different levels of SAMR influence student engagement, autonomy, and language performance. The aim is to provide a deeper understanding of how educators can strategically integrate technology to move beyond substitution and toward transformative teaching practices. Ultimately, this study highlights the role of the SAMR model as a guiding framework that supports more innovative, interactive, and meaningful EFL learning experiences.

RESEARCH METHODS

This study employed a systematic literature review approach to examine how the SAMR model is applied in English as a Foreign Language (EFL) instruction within the context of digital learning. The systematic review method allows for a structured, transparent, and replicable process of gathering and analyzing existing research. A comprehensive search was conducted across reputable academic databases, focusing on peer-reviewed journals in the fields of EFL and educational technology published between 2020 and 2025. Inclusion criteria required that the selected studies discuss technology integration, digital tools, or pedagogical frameworks related to EFL learning. This method ensures that the review captures current trends, innovations, and empirical findings relevant to digital transformation in language education. Data from the selected studies were analyzed using thematic coding, which involves identifying recurring patterns, themes, and concepts related to technology integration and learning improvement within the SAMR framework. The coding process included categorizing data according to enhancement-level practices (Substitution and Augmentation) and transformation-level practices (Modification and Redefinition), as well as examining reported impacts on student engagement, autonomy, and language performance. Through thematic analysis, the study systematically synthesizes evidence to reveal how digital tools, pedagogical strategies, and teacher readiness influence learning outcomes. This

method also supports the identification of gaps, challenges, and opportunities for advancing technology-enhanced EFL instruction in the digital era (Liu et al., 2025).

RESULTS AND DISCUSSION

Substitution tools (PDF, digital worksheets) increase learning access

At the Substitution level, technology primarily functions as a direct replacement for traditional learning materials, yet it significantly improves student access. PDF documents and digital worksheets allow learners to access lessons anytime and anywhere, removing dependency on printed materials. This enhanced availability supports continuous learning and benefits students who need flexible schedules or repeated exposure to English content to achieve mastery. Digital files also simplify the distribution process. Teachers no longer need to print, photocopy, or manually distribute worksheets, which reduces classroom preparation time and operational constraints. This efficiency ensures that all students receive materials simultaneously, preventing delays that may disrupt the learning flow. As a result, Substitution tools contribute to smoother instructional management. In addition, digital worksheets help students organize their learning materials more effectively. Files can be stored, labeled, and sorted by topic or difficulty level, allowing learners to build their own digital archives. This supports learners' autonomy and develops digital literacy skills, which are essential for navigating modern academic environments (Marzuki, 2025). Compared to paper-based worksheets, digital formats promote better long-term organization. Accessibility is another major advantage. PDF files can be opened across various devices, including smartphones, making them more inclusive for learners with limited technological resources. This reduces inequities in access and ensures that learning is not hindered by a lack of devices. In resource-limited contexts, Substitution tools become a crucial foundation for digital inclusion. Moreover, digital tools offer features that printed materials cannot provide. Students can zoom in to improve readability, highlight text, and use search functions to locate keywords. These functions help learners engage with content more deeply and at their own pace. Such flexibility is especially valuable for English learners who may need additional time or support to comprehend complex texts. Although Substitution tools do not transform pedagogy, the findings indicate that this level establishes essential groundwork for higher-level digital integration. It strengthens access, builds routine digital usage, and prepares both teachers and students for more interactive and transformative technology use in later stages of the SAMR model (Agirre & Arias-Hermoso, 2025).

Augmentation tools (Google Classroom, Grammarly) increase learning effectiveness

At the Augmentation level, technology not only replaces traditional tools but also enhances them with added functionalities that improve learning effectiveness. Google Classroom, for example, streamlines assignment distribution, facilitates communication, and organizes classroom activities more efficiently than conventional systems. This enhanced structure helps students stay on track with deadlines and course requirements. Grammarly plays a notable role in strengthening writing proficiency. Unlike a simple spell-checker, it provides immediate, detailed feedback on grammar, vocabulary choice, and writing style. This instant correction process allows students to revise their work independently and develop greater linguistic awareness. The automated feedback supports reflective learning, a key component of EFL writing improvement. Augmentation tools also help learners manage

their tasks more consistently. With digital reminders, integrated calendars, and notification systems, students are less likely to forget assignments or miss deadlines. This leads to better academic discipline and ultimately contributes to improved language performance. The organization facilitated by these tools supports learners who struggle with self-management. For teachers, Augmentation tools offer valuable insights into student performance (Drugova et al., 2021). Features such as automatic grading, progress tracking, and activity logs allow educators to identify learning gaps more quickly. This data-driven approach enables timely interventions and personalized support, which are critical in EFL instruction where learners progress at different paces. Moreover, Grammarly encourages iterative learning by allowing students to make revisions repeatedly until they achieve improved linguistic accuracy. This reduces learners' reliance on teacher feedback and fosters autonomy. Students become more proactive in monitoring their language development, which enhances both confidence and competence. Overall, Augmentation tools significantly enhance the efficiency, precision, and structure of EFL learning. While they do not fully transform pedagogical design, their added functional improvements create a more effective and supportive environment that prepares learners for more collaborative and transformative digital activities at the Modification and Redefinition levels (Alareeni & Hamdan, 2025).

Modification tools (Padlet, collaborative writing tools) increase interactivity

At the Modification level, technology begins to redesign learning tasks in ways that dramatically increase interactivity. Tools like Padlet allow students to engage in collective brainstorming, upload multimedia content, and respond to classmates' posts in real time. This shared digital space transforms the classroom into an interactive learning community where ideas circulate openly and constructively. Collaborative writing tools such as Google Docs enable students to write simultaneously, exchange feedback, and revise content together. This real-time collaboration fosters negotiation of meaning, peer scaffolding, and social interaction—all of which are essential for developing communicative competence in EFL learning. Writing becomes a social process rather than an isolated task. Modification tools also cultivate a greater sense of responsibility and accountability among students. When learners contribute to a shared project, their involvement directly influences the overall quality of the output. This sense of ownership motivates students to participate actively and ensures that collaborative tasks are meaningful and productive. Project-based learning becomes more feasible at this level. With tools that support continuous editing, multimedia integration, and shared access, students can work on extended projects such as group reports, digital posters, or collaborative narratives (Blundell et al., 2022). These tasks mirror real-world communication practices and improve functional language skills in authentic contexts. In addition to boosting interactivity, Modification tools stimulate critical thinking and creativity. Students must make decisions about structure, content, and design while evaluating the contributions of peers. This multidimensional process strengthens both language proficiency and higher-order thinking skills, which are essential for advanced EFL learners. The findings reveal that Modification tools significantly transform student engagement by enabling richer collaboration and deeper interaction. This level marks a shift from teacher-centered instruction to student-driven learning, making it a crucial stage in achieving meaningful digital transformation in EFL classrooms (Alshammary & Alhalafawy, 2023).

Redefinition tools (VR, AI language tutors) create new learning experiences

At the Redefinition level, technology allows teachers to design learning experiences that were previously impossible. Virtual Reality (VR) immerses students in authentic language environments such as virtual marketplaces, museums, or city tours. This immersion enhances contextual learning and exposes students to real-life vocabulary, cultural elements, and communication situations. VR simulations also provide risk-free opportunities for practicing speaking skills. Students can interact with virtual characters, respond to situational prompts, and rehearse practical conversations without fear of embarrassment. This reduces anxiety—a common barrier in EFL speaking—and boosts learners' confidence and fluency. AI language tutors further personalize the learning process by offering tailored exercises, adaptive feedback, and continuous performance tracking. These systems diagnose individual weaknesses and provide specific interventions in areas such as grammar, pronunciation, listening comprehension, and vocabulary acquisition. Such personalized support is difficult to achieve in large classrooms. AI also provides unlimited speaking practice through conversational agents that simulate human dialogue. Learners can practice anytime and receive instant feedback on pronunciation, intonation, and grammar (Bui, 2022). This constant availability makes language practice more frequent and independent from classroom constraints. Furthermore, Redefinition tools empower students to engage in innovative digital projects such as VR storytelling, avatar-based dialogues, or AI-supported presentations. These activities combine language learning with creativity, problem-solving, and advanced digital literacy—competencies essential for 21st-century learners. Overall, Redefinition tools revolutionize the EFL learning experience by enabling immersive, personalized, and interactive environments that cannot be replicated with conventional teaching methods. This level demonstrates the full transformative potential of digital technology within the SAMR framework, offering new pathways for meaningful language acquisition (Long et al., 2025).

The implementation of the SAMR model in EFL classrooms demonstrates that technology integration is not merely about adopting digital tools but about transforming the overall pedagogical approach. Teachers who rely only on substitutive tools miss the deeper potential of digital learning, which lies in redesigning tasks and creating new learning experiences. This distinction underscores the central premise of SAMR: technology should enhance and transform learning, not simply digitize existing practices. Thus, effective use of the SAMR model requires educators to critically evaluate how each tool contributes to linguistic development, student interaction, and meaningful engagement. One of the central challenges in applying SAMR effectively is the technological competence of teachers. Many educators may be comfortable with basic digital functions but lack the skills necessary to leverage tools for Modification and Redefinition tasks (Kadluba et al., 2025). This gap often results in technology being used at the Substitution or Augmentation levels only. Professional development programs must therefore focus on digital pedagogy, instructional design, and the creation of transformative learning activities, not just technical training. Without adequate support, teachers may feel overwhelmed and revert to low-level integration. Infrastructure limitations also play a significant role in shaping technology implementation. Schools with unstable internet access, insufficient devices, or outdated software may find it difficult to

move beyond basic digital activities. These constraints hinder the feasibility of collaborative tools, VR-based activities, or AI-integrated learning systems that require stable connectivity. Consequently, institutional investment in technological infrastructure becomes essential for realizing the full potential of the SAMR model. Ensuring equitable technological access for all students is equally important to avoid widening learning gaps (Kamalov et al., 2023).

Curriculum alignment is another factor that influences the success of SAMR integration. When curriculum standards remain rooted in traditional forms of assessment or focus heavily on rote learning, it becomes challenging to incorporate transformative tasks such as project-based learning, digital storytelling, or virtual exchanges. Teachers must balance curriculum expectations with the creativity and innovation required for higher-level SAMR integration. This tension reveals the need for curriculum reform that embraces digital competencies as core elements of language learning. Despite these challenges, evidence shows that when SAMR is applied thoughtfully, it significantly enhances student engagement (Schwartz et al., 2023). Digital tools, especially at the Modification and Redefinition levels, promote interactivity, collaboration, and creativity—elements that sustain learners' motivation. Engaged students are more likely to take risks in using English, participate in discussions, and take ownership of their learning processes. Increased engagement is particularly important in EFL contexts, where fear of making mistakes can inhibit communication. The SAMR model also supports improved learning outcomes by enabling students to access diverse forms of language input and produce richer language output. Through digital tools, learners interact with authentic materials, practice with AI-based tutors, and engage in real-time collaborative writing—all of which contribute to enhanced linguistic proficiency. Transformative digital tasks encourage deeper cognitive processing, which aids vocabulary retention, grammar understanding, and functional communication. Thus, technology becomes a vehicle for meaningful linguistic growth (Song et al., 2025).

Additionally, SAMR encourages learner autonomy by providing digital environments where students can practice independently and track their progress. Tools such as Grammarly, language-learning apps, and AI-based feedback systems empower learners to self-monitor, make corrections, and experiment with language outside classroom time. This shift from teacher-centered to learner-centered practices aligns with constructivist principles and prepares students for lifelong learning in digital environments. Another important implication of SAMR integration is its role in promoting digital literacy. As students use collaborative platforms, multimedia tools, and virtual learning environments, they develop skills beyond language acquisition—such as information management, communication technology proficiency, and digital citizenship (Adler et al., 2025). These competencies are increasingly important in academic and professional contexts, making SAMR-based instruction valuable not only for EFL learning but also for broader 21st-century skill development. However, successful SAMR implementation requires ongoing evaluation and reflection. Teachers must continuously assess whether their technology use truly enhances learning or simply adds digital complexity without pedagogical purpose. Reflective practice helps educators refine their digital strategies, identify emerging barriers, and adjust instruction to better meet student needs. Institutional support through peer collaboration, mentoring, and shared best practices is crucial in sustaining this reflective culture. In conclusion, while the SAMR model presents challenges related to teacher competence,

infrastructure, and curriculum constraints, its effective implementation can greatly transform EFL learning. When used beyond the Substitution level, SAMR enhances engagement, fosters collaboration, and supports improved language outcomes. By viewing technology as a pathway for pedagogical innovation rather than as an add-on, educators can create dynamic, interactive, and meaningful learning experiences that align with the realities of the digital era (Sailer et al., 2024).

CONCLUSION

The SAMR model offers a transformative framework for EFL learning, progressing educators from basic digital substitution to innovative, immersive experiences that boost student engagement, autonomy, and language proficiency. Its full potential hinges on comprehensive teacher training in technological and digital pedagogical skills, alongside investments in reliable infrastructure to enable interactive, collaborative, and AI-enhanced tools. For future research, studies could empirically test SAMR's impact across diverse EFL contexts—such as rural vs. urban schools in developing regions—using longitudinal designs to measure sustained gains in language outcomes and identify barriers to scaling higher-level implementation.

REFERENCES

- Adler, I., Montal, Y., & Soffer-Vital, S. (2025). Bridging culture and technology: Supporting teachers in developing culturally responsive pedagogies for technology integration. *Computers in Human Behavior Reports*, 20, 100840. <https://doi.org/10.1016/j.chbr.2025.100840>
- Agirre, A. I., & Arias-Hermoso, R. (2025). *Insights into disciplinary literacies: Multilingual perspectives across educational levels*. Channel View Publications.
- Alareeni, B., & Hamdan, A. (Eds.). (2025). *Leveraging advanced technologies: Business model innovation and the future (ICBT 2024, Vol. 3)*. Springer Nature Switzerland.
- Ali, O., Murray, P. A., Al-Ahmad, A., & Tahat, L. (2024). An integrated framework for addressing the challenges and strategies of technology adoption: A systematic review. *Emerging Science Journal*.
- Alshammary, F. M., & Alhalafawy, W. S. (2023). Digital platforms and the improvement of learning outcomes: Evidence extracted from meta-analysis.
- Blundell, C. N., Mukherjee, M., & Nykvist, S. (2022). A scoping review of the application of the SAMR model in research. *Computers and Education Open*, 3, 100093. <https://doi.org/10.1016/j.caeo.2022.100093>
- Bui, T. H. (2022). English teachers' integration of digital technologies in the classroom. *International Journal of Educational Research Open*, 3, 100204. <https://doi.org/10.1016/j.ijedro.2022.100204>
- Drugova, E., Zhuravleva, I., Aiusheeva, M., & Grits, D. (2021). Toward a model of learning innovation integration: TPACK-SAMR based analysis of the introduction of a digital learning environment in three Russian universities. *Education and Information Technologies*, 4925–4942. <https://doi.org/10.1007/s10639-021-10514-2>
- Haristiani, N., Yulianeta, Y., Wirza, Y., Gunawan, W., Danuwijaya, A. A., Kurniawan, E., Suharno, S., Nafisah, N., & Imperiani, E. D. A. (2024). *Proceedings of the 7th International Conference on Language, Literature, Culture, and Education (ICOLLITE 2023)*. Atlantis Press International BV.
- Isiaku, L., & Muhammad, A. S. (2025). Enhancing technological sustainability in academia:

- Leveraging ChatGPT for teaching, learning and evaluation. *Quality Assurance in Education*, 1(1), 385–416. <https://doi.org/10.1108/QEA-07-2024-0055>
- Kadluba, A., Reinhold, F., & Obersteiner, A. (2025). How do teachers use digital technology in classrooms? Characterizing mathematics teachers' teaching practices. *Computers and Education Open*, 9, 100310. <https://doi.org/10.1016/j.caeo.2025.100310>
- Kamalov, F., Calonge, D. S., & Gurrib, I. (2023). New era of artificial intelligence in education: Towards a sustainable multifaceted revolution.
- Kessler, G. (2018). *Technology and the future of language teaching*.
- Khalil, M., Saqr, M., López-Pernas, S., & Hilliger, I. (2024). *Education reimaged: The impact of advanced technologies on learning*. Frontiers Media SA.
- Liu, X., Alves, R. A., Aitken, A., & Schmied, J. (2025). *Demystifying academic writing in higher education: A process view on academic textual production*. Frontiers Media SA.
- Long, Q., Li, S., An, R., Yasmin, F., & Akbar, A. (2025). Deep learning as a bridge between intercultural sensitivity and learning outcomes: A comparative study of English-medium instruction delivery modes in Chinese higher education. *Acta Psychologica*, 259, 105410. <https://doi.org/10.1016/j.actpsy.2025.105410>
- Marzuki, A. G. (2025). Integrating generative AI as an adaptive learning tool in English language instruction in higher education. <https://doi.org/10.20944/preprints202508.0426.v1>
- Procel, G. J. O., & Medina, M. L. F. (2024). Using technology in English teaching.
- Sailer, M., Maier, R., Berger, S., Kastorff, T., & Stegmann, K. (2024). Learning activities in technology-enhanced learning: A systematic review of meta-analyses and second-order meta-analysis in higher education. *Learning and Individual Differences*, 112, 102446. <https://doi.org/10.1016/j.lindif.2024.102446>
- Sari, N. (2024). The role of technology in facilitating EFL learning: A case study approach. *Journal of Educational Research*.
- Schwartz, E., Shamir-Inbal, T., & Blau, I. (2023). Teacher prototypes in technology-enhanced instruction in elementary school second language acquisition: Comparing routine and emergency learning in different cultures. *Computers and Education Open*, 5, 100155. <https://doi.org/10.1016/j.caeo.2023.100155>
- Song, Z., Qin, J., Jin, F., Cheung, W. M., & Lin, C. (2025). A case study of teachers' generative artificial intelligence integration processes and factors influencing them. *Teaching and Teacher Education*, 165, 105157. <https://doi.org/10.1016/j.tate.2025.105157>
- Wang, Y., Pan, Z., & Wang, M. (2023). The moderating effect of participation in online learning activities and perceived importance of online learning on EFL teachers' teaching ability. *Heliyon*, 9(3), e13890. <https://doi.org/10.1016/j.heliyon.2023.e13890>