

Exploring Teachers' Experiences in Integrating SAMR-Based Adaptive Technology in Primary English Reading-Writing Instruction

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Abstract

The implementation of educational technology often remains at the level of substituting conventional media, rather than reflecting a deeper understanding of adaptive technology and its potential to transform learning processes. This qualitative descriptive study employed an exploratory approach to investigate English teachers' experiences and perceptions regarding the integration of SAMR-based adaptive technology in integrated reading-writing instruction at the primary level. Data were collected through semi-structured interviews, classroom observations, and document analysis involving primary school English teachers and were analyzed using the interactive model proposed by Miles, Huberman, and Saldana. The findings reveal that technology integration predominantly occurs at the Substitution (S) and Augmentation (A) levels of the SAMR framework, with limited evidence of modification or redefinition in instructional practices. This indicates that the transformative potential of SAMR-based adaptive technology has not yet been optimally realized in integrated primary literacy instruction. Strengthening teachers' digital pedagogical competencies and reconceptualizing technology integration as a means of restructuring learning processes are therefore essential to support more meaningful, contextually relevant literacy learning aligned with 21st-century educational demands.

Article Information:

Received October 21, 2025

Revised November 28, 2025

Accepted December 15, 2025

Keywords: *SAMR Model, adaptive educational technology, integrated reading-writing instruction, primary English language teaching, digital pedagogy*

INTRODUCTION

The development of digital technology has brought significant changes to the process of English language learning at the elementary school level, particularly for Phase C students (sixth grade). However, the use of technology in the classroom has not yet fully reflected a proper understanding of the nature of Adaptive Technology. According to Shiu (2025), many teachers still interpret technology integration merely as replacing conventional media with modern devices, such as the use of smartboards or transferring assignment instructions to digital platforms, without making

How to cite:

Syukran, R., Adriansyah, A., Alimir, I. J., Syafitri, W., Sesmiarni, Z. Bayu, E. P. (2025). Exploring Teachers' Experiences in Integrating SAMR-Based Adaptive Technology in Primary English Reading-Writing Instruction. *El-Rusyd*, 10(2), 330-339.

E-ISSN:

2580-0256

Published by:

The Institute for Research and Community Service

fundamental changes to the learning design. In fact, as emphasized by Ahmada & Rizkiyah (2025), the primary purpose of using Adaptive Technology is to provide learning experiences tailored to the abilities, needs, and learning pace of each student. Furthermore, Krisbiantoro & Ashari (2024) highlight that the appropriate use of technology holds great potential to encourage a shift in pedagogical approaches from conventional learning models toward digitalization that is more responsive to the development of 21st-century competencies.

In the context of English language learning, the SAMR (Substitution, Augmentation, Modification, Redefinition) framework developed by Tan et al., (2025) can be used to assess and design technology integration more systematically. This model allows teachers to understand the extent to which technology not only serves as a substitute for traditional tools, but also as an instrument that can modify and even reconstruct the learning experience (Paisun et al., 2024). Romrell et al (2014) argue that the SAMR framework provides educators with a structured way to evaluate mobile learning activities, ensuring that technology use moves beyond simple substitution toward transformative practices. Similarly, Wahyuni et al (2020) highlight that technology integration in English instruction contributes to enhanced retention and engagement, though its effectiveness depends on how teachers situate tasks within the SAMR levels. Nuraeni et al (2025) further emphasize that purposeful integration of SAMR-based technology can increase student engagement and deepen learning outcomes, especially when aligned with pedagogical goals. This is particularly relevant to the teaching of integrated reading-writing skills in grade 6, which requires the ability to understand texts, identify main ideas, draw inferences, and produce structured and revised summaries based on feedback. Thus, SAMR-based technology integration has the potential to support reading activities as a source of ideas and writing as a form of production and response to texts.

The Previous researches show that technology integration in the classroom is still at a basic stage within the SAMR framework. Cáceres-Nakiche et al (2024) reports that the use of technology in reading learning is still limited to the Substitution stage, where digital media only replaces textbooks or blackboards without enhancing learning activities or interactions. In writing learning, most of the technology used only reached the Substitution stage and a small portion reached the Augmentation stage. These findings are in line with the results of Fathurohman & Rahmawan (2021) research, which identified that the use of applications such as MS Word, Adobe Reader, and MS PowerPoint was at the Augmentation level because teachers utilized additional features such as spell-check and editing tools, but did not significantly change the form of learning activities. The results of Ahmada & Rizkiyah (2025) research also show that technology integration is still limited to Substitution and Augmentation, and no teachers have implemented Modification or Redefinition, which have the potential to bring about innovative and transformative learning.

In addition to the limitations of the level of technology integration, most research on SAMR has been conducted at the secondary education level. In fact, the characteristics of elementary school students differ from those of secondary school students in terms of cognitive development and learning needs. Most studies also still focus on the use of general applications such as Google Docs, PowerPoint, Kahoot, or other quiz platforms, so that technology integration tends to stop at the Substitution/Augmentation level without affecting the learning design more fundamentally.

This condition shows a gap between the practice of technology integration and the full potential of the SAMR framework in English learning in elementary schools. There has not been much research that specifically examines teachers' experiences and perceptions of the use of SAMR-based Adaptive Technology in integrated

Reading-Writing skills learning in Phase C. In addition, there has been no in-depth study of the extent to which the application of SAMR can contribute to improving students' literacy skills simultaneously. Thus, a study is needed to capture learning practices, obstacles, and the possibilities for transformation offered by adaptive technology through the SAMR approach.

Based on these gaps, this study aims to answer questions about teachers' experiences and perceptions in integrating SAMR-based Adaptive Technology in Reading-Writing learning in Phase C, as well as how its application affects students' reading and writing skills. This research is novel in its focus, which specifically explores the integration of Adaptive Technology in English learning in elementary schools through the SAMR framework, and provides new insights into the application of integrated Reading-Writing skills learning designed according to the needs of students in the digital age.

METHODS

This research adopts a qualitative design with an exploratory descriptive approach to gain an in-depth understanding of the practice of integrating SAMR-based Adaptive Technology in integrated Reading-Writing skills learning in Phase C Sixth Grade of Elementary School. A qualitative design was chosen because it allows researcher to obtain a comprehensive picture of teachers' experiences, patterns of technology use, and learning dynamics that cannot be explained through a quantitative approach. This approach is also relevant for examining the natural context of the classroom and teachers' responses to the process of learning digitization (J.C. et al., 2023; Markhmadova et al., 2025; Reis-Jorge et al., 2021; Zhang & Romos, 2023).

The research subjects consisted of English teachers who taught in Phase C at elementary schools that had implemented technology in learning. The subjects were selected purposively based on several criteria, namely that they had at least one year of experience using technology in learning, taught integrated reading and writing, and were willing to participate in the research process. In addition to the teachers, several learning documents such as lesson plans/teaching modules, digital teaching materials, and examples of student work were also used as additional sources of information to strengthen the research findings.

Data collection techniques were carried out through in-depth interviews, classroom observations, and document analysis. The interviews were semi-structured so that the researchers could explore the teachers' perceptions of the integration of Adaptive Technology and the application of the SAMR Model in Reading-Writing learning. Classroom observations were used to directly observe the use of technology, interaction patterns, and activities that arose during the learning process. Meanwhile, document analysis was used to assess the learning design, materials used, and the alignment between the learning plan and implementation. The research instruments were developed in the form of interview guidelines, observation sheets, and document analysis formats compiled based on the SAMR Model indicators and the characteristics of integrated skills learning (Brassler & Dettmers, 2017; Dahliana et al., 2024; Engkizar et al., 2023; Ismail et al., 2018).

The data obtained were analyzed by using Miles, Huberman, and Saldana's model, which includes three activity streams, namely: Data Reduction, Data Presentation, And Conclusion Drawing and Verification. Data reduction was carried out by sorting relevant information related to the use of technology, the Reading-Writing learning process, and teacher responses. Data presentation was carried out in the form of descriptive narratives that displayed patterns, categories, and key findings of the study. The final stage of drawing conclusions was carried out in stages by linking the findings that emerged with the SAMR theoretical framework and the

concept of Adaptive Technology. To ensure data validity, this study used source triangulation and method triangulation techniques.

RESULT AND DISCUSSION

This section is presented in a descriptive narrative based on the analysis of findings in the field. The results of the study show three major themes; i) patterns of technology integration and SAMR levels, ii) student responses and their impact on reading and writing skills, iii) factors supporting and inhibiting the implementation of Adaptive Technology.

Patterns of Technology Integration and SAMR Levels

Observations and interviews showed that all three teachers had used various digital tools such as PowerPoint, Google Docs, instructional videos, and quiz applications, yet the integration was mostly still at the Substitution and Augmentation levels, which reflects findings that many educators remain at the lower tiers of the SAMR model rather than progressing toward modification or redefinition (Zamri & Mohamad, 2025). Teacher A, for instance, employs digital presentations to explain story elements and provide reading exercises, but student activities remain individual and do not involve changes in learning methods, a pattern consistent with research on Google Docs use in EFL writing where technology supports feedback but does not fundamentally alter classroom interaction (Wibowo, 2021). Similarly, Teacher B utilizes Google Forms for reading comprehension exercises, yet the technology only provides automatic feedback without transforming classroom dynamics, echoing broader challenges identified in adaptive learning technology studies where teachers emphasize both supporting and inhibiting factors in implementation (Simon & Zeng, 2024). In contrast, Teacher C shows a tendency toward the Modification level by implementing collaborative summary writing through Google Docs. Students work in pairs to summarize story texts, give each other comments, and make revisions based on peer feedback. This activity brings about significant changes because students can see their peers' thought processes in real time. However, there are no activities at the Redefinition level, such as digital storytelling or virtual tours, which allow for the exploration of new experiences in learning. These findings are in line with research by Cáceres-Nakiche et al (2024); Fathurohman & Rahmawan (2021), which shows that teachers generally still use technology as a tool rather than a means of reengineering learning activities.

Student Responses and Their Impact on Reading-writing Learning

Students show greater interest when technology is used in learning, especially when viewing story visualizations, listening to audio readings, or taking online quizzes. Technology helps them understand texts through illustrations and more engaging reading models. In Teacher C's class, where students collaborate using Google Docs, enthusiasm increases significantly because students feel directly involved in the writing and revision process.

In terms of ability, students experience an increase in identifying main ideas and implicit details when teachers provide exercises using the highlight feature on digital texts. In writing activities, students who use the spell-check and comment features produce texts with neater sentence structures and more appropriate vocabulary usage. However, this improvement is uneven, especially among students who experience digital literacy constraints or have limited access to personal devices.

Factors Supporting and Hindering the Implementation of Adaptive Technology

The main supporting factors include the availability of school internet, support from the principal, and the motivation of teachers to continue adapting. Teacher C mentioned that internal training on Google Workspace was very helpful in increasing their confidence in designing digital collaboration-based activities. However, several obstacles were also found. Teachers B and A admitted that they had difficulty

designing activities that met the Modification or Redefinition levels due to a lack of references and digital pedagogical skills. Limitations in student devices and unstable internet connections were also inhibiting factors. In addition, some teachers still felt that the use of technology required more preparation time than conventional methods.

The research findings confirm that the implementation of SAMR-based Adaptive Technology in Reading–Writing learning in Phase C is still in its early stages. This indicates the need to improve teachers' digital pedagogical competencies, as Puentedura argues that learning transformation can only be achieved if technology is used to modify or redefine learning activities (Fathurohman & Rahmawan, 2021; Nuraeni et al., 2025; Wahyuni et al., 2020). Students' positive responses to technology-based activities also reinforce the argument that technology has great potential to increase motivation and learning quality. However, without proper learning design, technology becomes merely an alternative medium rather than a pedagogical instrument that enriches the learning experience.

Overall, the results of this study provide a realistic picture of the complexity of learning digitization practices in elementary schools, which are not only related to infrastructure readiness but also to conceptual understanding, pedagogical creativity, and teachers' ability to operate technology strategically. This section comprehensively discusses the research findings by linking the results of observations, interviews, and document analysis on the practice of applying the SAMR model in integrated Reading–Writing skills learning in Phase C. The discussion emphasizes the analytical process, theoretical suitability, and empirical contributions to the development of technology-based pedagogy in the digital age. The results show that although teachers have used a variety of technologies, the approach still relies on the Enhancement level, particularly Substitution and Augmentation, so that learning transformation has not been fully optimized (Baroud et al., 2025; Rahman et al., 2025).

Analysis of the Implementation of the SAMR Model in Reading–Writing Learning

Overall, the implementation of the SAMR model in Reading–Writing learning in the elementary school where the research was conducted shows efforts to adapt digital technology, although the transformation has not yet reached the expected level. Teachers use tools such as Google Docs, Live Worksheets, and Padlet, but most of their use is still limited to replacing conventional methods. For example, reading exercises that were previously done through physical worksheets have been transferred to Google Forms, but they have not been accompanied by innovations such as real-time feedback, peer review, or collaborative drafting, which should be characteristics of the Modification stage (Mutiaramses et al., 2025).

These findings are in line with Tan et al (2025) theory, which asserts that technology does not automatically improve the quality of learning; improvement only occurs if the function of technology facilitates the restructuring of learning tasks. In this context, teachers are still dominated by teacher-centered characteristics, so that the Redefinition level transformation is not yet visible in classroom practice.

The Connection between Adaptive Technology and Student Needs

Analysis of observation data shows that technology actually opens up great opportunities for teachers to identify student needs. For example, the commenting feature in Google Docs provides instant information about students' language errors, sentence structure, and reading comprehension abilities. However, teachers have not optimally utilized this feature as an adaptive learning tool.

From interviews, teachers said that students' reading abilities are very heterogeneous, but technological adjustments have not been directed at providing differential support. In fact, adaptive technology is designed to provide different

personalized scaffolding for fast learners and students who still need intensive guidance. This shows a gap between the potential of technology and current learning practices. These findings support previous research by Ahmada & Rizkiyah (2025); Rohayati et al (2022); Shiu (2025), which states that the use of technology in integrated language learning will only have a significant impact if teachers integrate adaptive features to systematically map student competencies.

The Impact of SAMR Implementation on Student Literacy Skills

Analysis of student responses and assignment data shows that the use of technology does increase motivation and participation, especially when students interact with interactive platforms such as Padlet and Live Worksheet. They become more enthusiastic about writing because these media offer attractive visual displays, ease of editing, and automatic saving.

However, the increase in motivation is not entirely proportional to the improvement in reading comprehension and written production quality. The artifact data shows that many students still have difficulty developing paragraphs, determining the main idea, and formulating supporting details. This may be due to the lack of digital instructional scaffolds that should be part of Modification and Redefinition-based learning, such as the use of AI-based grammar checkers, collaborative outlines, or guided reading prompts (Engkizar et al., 2025).

Analysis of Teachers' Challenges in Digital Learning Transformation

The main challenges faced by teachers in implementing SAMR-based learning stem from two key factors: limitations in technopedagogical training and a lack of deep understanding of the role of technology in supporting cognitive learning processes. The findings indicate that the training provided to teachers tends to focus more on technical aspects, such as the use of Google Forms, rather than on pedagogical aspects, for example, how technology can substantively transform the processes of reading and writing instruction. As a result, teachers tend to utilize technology merely as a supporting tool rather than as an integrated learning strategy. These findings are consistent with the study by Moslimany et al (2024), which explains that teachers often experience technological confusion when they are required to restructure learning from simple activities to more complex ones through the integration of technology.

CONCLUSION

This study concludes that the implementation of the SAMR model in integrated reading-writing instruction at Phase C remains largely at the Enhancement stage, with learning practices predominantly situated at the Substitution and Augmentation levels. Although digital technologies such as Google Docs, Padlet, and Live Worksheet have been incorporated into classroom activities, their use is generally limited to replacing conventional learning tasks rather than transforming instructional design. Consequently, technology integration has not yet reached the Modification and Redefinition levels that enable a substantive restructuring of students' cognitive processes. The findings further reveal that the potential of adaptive technology to identify students' learning needs has not been optimally utilized. While features such as collaboration, real-time feedback, and progress monitoring offer opportunities to more accurately map students' reading and writing abilities, their implementation remains sporadic and unsystematic, indicating a gap between the pedagogical potential of technology and actual classroom practices.

Although the use of technology has contributed to increased student motivation and engagement, it has not produced a significant impact on reading comprehension and academic writing skills. This limitation is largely attributed to teachers' challenges in designing effective digital instructional scaffolding and the lack of technopedagogical training oriented toward transformational learning design.

Overall, the study affirms that the effectiveness of SAMR implementation is determined not merely by the availability of technology, but by teachers' understanding of how technology can reshape processes of thinking, collaboration, and knowledge creation in literacy learning. Therefore, a paradigm shift is required from viewing technology as a supplementary tool toward positioning it as a structure that fundamentally transforms learning.

To support this shift, the study recommends strengthening teachers' technological pedagogical reasoning through continuous professional development, fostering collaborative lesson design among teachers, and developing adaptive learning strategies that leverage personalized and collaborative digital features. These efforts are expected to advance integrated reading–writing instruction toward the Transformation level, thereby providing students with more meaningful, contextual, and relevant learning experiences aligned with the demands of 21st-century literacy. Moreover, this study contributes to the advancement of theory and practice in technology-enhanced learning and offers a foundation for future research exploring adaptive technology in greater depth, particularly within the context of elementary education in Indonesia, as well as for the formulation of educational policies that are more responsive to technological developments and students' learning needs.

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