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Enhancing skd readiness in peripheral regions: A visual-digital approach and public speaking pedagogy to achieve performance equity in kupang city

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Abstract

Persistent educational inequality in peripheral regions continues to undermine students' competitiveness in high-stakes standardized assessments, particularly when instructional practices remain misaligned with the cognitive and affective demands of such tests. Addressing this gap, this study investigates the effectiveness of an integrated visual-digital and public speaking pedagogical model in enhancing students' readiness for the Basic Competency Test (SKD) in Kupang City, Indonesia. Employing a mixed-methods quasi-experimental design with a pretest–posttest structure, the study involved 60 senior high school students selected through purposive sampling. The intervention combined multimedia-based instruction to strengthen analytical reasoning and general knowledge with public speaking training to develop confidence and situational judgment. Quantitative analysis using paired sample t-tests and effect size measures revealed statistically significant improvements across all domains, with large effects observed in cognitive outcomes and moderate yet meaningful gains in affective competencies. Qualitative findings further indicated increased engagement, motivation, and active participation as key mechanisms underlying these improvements. Importantly, the results demonstrate that pedagogical integration exerts a more decisive influence on learning outcomes than technological infrastructure alone, challenging dominant assumptions in digital education discourse. The study advances a novel dual-domain learning framework that explicitly integrates cognitive processing and affective readiness as interdependent drivers of performance. From a practical standpoint, the findings offer a scalable and context-sensitive instructional model for underserved regions. Ultimately, this research argues that achieving educational equity requires not merely expanding access to technology, but fundamentally reconfiguring pedagogy to align with the holistic learning needs of students in resource-constrained environments.

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INTRODUCTION

Educational inequality remains a persistent global concern, particularly in peripheral and low-resource regions where access to high-quality learning opportunities is structurally constrained. Despite rapid advancements in digital education, disparities in learning outcomes continue to widen

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between urban and rural populations, reflecting unequal access to infrastructure, technological resources, and pedagogical innovation (Nthambeleni & Motadi, 2025; Olanrewaju et al., 2021). In many developing contexts, including Indonesia, these disparities are not only material but also pedagogical, as traditional teaching approaches often fail to equip students with higher-order thinking and adaptive competencies. While digital transformation has been promoted as a pathway toward educational inclusion, its effectiveness is uneven and highly dependent on contextual readiness (Kaimara, 2026; Matsieli & Mutula, 2024). Consequently, the challenge of achieving equitable education extends beyond mere access to technology and requires the integration of context-sensitive instructional strategies. Without such integration, digital interventions risk reinforcing existing inequalities rather than alleviating them. This underscores the need for pedagogical models that are both technologically informed and socially responsive.

Empirical evidence from peripheral regions illustrates the complexity of these challenges, particularly in relation to standardized academic assessments. In Indonesia, the Basic Competency Test (Seleksi Kompetensi Dasar, SKD) serves as a critical gateway for educational and professional advancement, yet students from rural areas consistently underperform compared to their urban counterparts. This performance gap is closely associated with limited exposure to analytical problem-solving tasks, restricted access to updated learning materials, and insufficient opportunities for interactive learning (Huang et al., 2024; Naseer & Khawaja, 2025). In Kupang, East Nusa Tenggara, these constraints are intensified by infrastructural limitations and a continued reliance on teacher-centered instruction that emphasizes rote memorization. As a result, students often struggle to develop the cognitive flexibility and situational judgment required in the SKD framework. Moreover, low levels of academic confidence further inhibit students' ability to perform optimally under assessment conditions. These interconnected factors create a systemic disadvantage that limits students' long-term educational mobility. Addressing this issue requires interventions that simultaneously target cognitive competence and affective readiness.

The urgency of addressing this gap is heightened by the increasing role of standardized testing in shaping life opportunities in the Global South. Assessments such as the SKD are not merely evaluative tools but also gatekeeping mechanisms that determine access to higher education, employment, and social mobility. However, prevailing instructional practices in many rural schools remain misaligned with the multidimensional competencies assessed in such examinations. Recent research suggests that learning environments that integrate interactive, multimodal, and experiential elements are more effective in fostering deep understanding and transferable skills (Yeganeh et al., 2025; H. Zhou, 2025). Nevertheless, the adoption of such approaches remains limited in low-resource contexts due to infrastructural and pedagogical constraints. This disconnect between assessment demands and instructional practices exacerbates existing inequalities and undermines efforts toward inclusive education. Therefore, there is a pressing need for innovative pedagogical frameworks that can bridge this alignment gap. Such frameworks must be adaptable, scalable, and sensitive to contextual limitations.

In response to these challenges, multimedia learning and communication-based pedagogy have gained increasing attention as complementary approaches to enhance learning outcomes. Multimedia learning theory posits that individuals learn more effectively when information is presented through integrated visual and auditory channels, enabling deeper cognitive processing and reducing extraneous cognitive load (Mayer, 2024; Twabu, 2025). However, while this approach effectively supports knowledge acquisition, it does not inherently address affective dimensions such as confidence and decision-making. In contrast, public speaking pedagogy has been shown to strengthen self-efficacy, critical thinking, and situational awareness, all of which are essential for performance in real-world and assessment contexts (Ceylan, 2025; Zheng et al., 2025). Theoretically, these two approaches operate within distinct yet complementary domains: multimedia learning enhances cognitive processing, while communication training fosters affective and behavioral readiness. Integrating these domains offers a more holistic learning model that aligns with contemporary educational demands. Such integration is particularly relevant in contexts where both knowledge mastery and personal competence are critical for success. Therefore, a dual-domain pedagogical approach presents a promising avenue for addressing persistent learning disparities.

A substantial body of recent literature has explored the effectiveness of multimedia-based instruction and communication training in improving student outcomes. Studies consistently

demonstrate that multimedia learning enhances comprehension, retention, and analytical reasoning by leveraging dual-channel processing mechanisms (Çeken & Taşkın, 2022; Deng, 2026). In parallel, research on communication-based learning indicates significant improvements in students' confidence, engagement, and decision-making abilities (Jiao & Yu, 2026; Yi et al., 2024). Furthermore, investigations into digital learning environments highlight their potential to increase student motivation and participation, particularly when designed with interactive elements (Li et al., 2024; Yu, 2022). Evidence from developing regions also suggests that technology-enhanced learning can contribute to reducing educational disparities when supported by appropriate pedagogical strategies (Islam et al., 2024; Tang et al., 2024). Despite these promising findings, most studies have examined cognitive and affective interventions in isolation. Additionally, the majority of empirical work has been conducted in well-resourced or urban settings, limiting the generalizability of findings to peripheral contexts.

Notwithstanding these advances, critical gaps remain in the literature regarding the integration of cognitive and affective pedagogies in low-resource educational environments. Existing studies rarely investigate the combined effects of multimedia learning and communication training within a single instructional framework, particularly in relation to standardized assessment outcomes. Moreover, there is limited empirical evidence on how such integrated approaches perform under infrastructural constraints typical of peripheral regions. Previous research has also tended to overlook the contextual realities of rural learners, including digital access limitations and variations in pedagogical readiness. This creates a theoretical and empirical disconnect between established instructional models and their applicability in underserved settings. In addition, standardized assessments such as the SKD require a balance of analytical reasoning, general knowledge, and personal judgment, yet few studies address these dimensions simultaneously. This study responds to this gap by proposing and empirically testing a dual-domain instructional model that integrates cognitive and affective learning mechanisms. Such an approach offers a more comprehensive understanding of how learning interventions can be optimized for equity-oriented outcomes.

Based on these considerations, this study aims to examine the effectiveness of an integrated visual-digital and public speaking pedagogy in enhancing students' readiness for the SKD in peripheral regions. Specifically, the research investigates how multimedia learning contributes to improvements in analytical reasoning and general knowledge, while public speaking training enhances personal competence, including confidence and situational judgment. By employing a mixed-methods quasi-experimental design, this study provides robust empirical evidence on the impact of a dual-domain instructional approach in a low-resource context. Theoretically, the study advances the integration of multimedia learning theory and self-efficacy frameworks into a unified model applicable to rural education. Practically, it offers a scalable and context-sensitive pedagogical strategy for improving educational performance and equity. Ultimately, this research contributes to ongoing efforts to align instructional practices with assessment demands while addressing systemic disparities in education.

METHOD

This study employed a mixed-methods approach using a quasi-experimental design with a pretest–posttest non-equivalent group structure, complemented by qualitative inquiry to capture participants' experiences. The selection of this design was driven by the need to measure the causal impact of an educational intervention while accommodating the practical constraints of real school settings where random assignment is not feasible (Keller & Branson, 2024; O'Garra et al., 2025). The quantitative component enabled the assessment of changes in students' performance across SKD domains, while the qualitative component provided contextual insights into engagement, motivation, and perceived learning benefits. The integration of both approaches allowed for methodological triangulation, thereby strengthening the validity and interpretability of the findings (Schlunegger et al., 2024). This design is particularly appropriate for evaluating pedagogical interventions in low-resource educational environments where controlled experimentation is limited but empirical rigor remains essential.

The study was conducted in Kupang City, East Nusa Tenggara, Indonesia, a region characterized by peripheral geographic conditions and limited access to digital educational resources. Four senior high schools representing diverse institutional contexts were purposively

selected to ensure variability in infrastructure and student backgrounds. The research was carried out over a three-month period, encompassing preparation, intervention implementation, and data collection phases. This temporal framework allowed sufficient exposure to the intervention while maintaining ecological validity within the academic calendar. The contextual selection of Kupang was based on its relevance as a representative setting of educational inequality in Indonesia, particularly in relation to access to digital learning and preparation for standardized assessments.

The target population consisted of senior high school students preparing for the Basic Competency Test (Seleksi Kompetensi Dasar, SKD). A total of 60 participants were selected using purposive sampling, with inclusion criteria including final-year status, willingness to participate in the full intervention cycle, and completion of both pretest and posttest assessments. Each school contributed 15 students to ensure balanced representation across sites. Although randomization was not applied, efforts were made to ensure comparability of baseline characteristics across groups. The sample size was deemed adequate for detecting medium effect sizes in quasi-experimental studies, as suggested in educational research standards (Doyle et al., 2022; Fayez et al., 2026). Participants who did not complete all stages of the intervention were excluded from the final analysis to maintain data integrity.

The intervention consisted of two integrated components: visual-digital (multimedia) learning modules and public speaking training. The multimedia component was designed based on principles of multimedia learning theory, incorporating video-based instruction, interactive slides, and digital quizzes aligned with SKD content domains, particularly analytical reasoning (TIU) and general knowledge (TWK) (Fayez et al., 2026). The public speaking component focused on enhancing communication skills, confidence, and situational judgment through structured activities such as speech practice, guided presentations, and scenario-based discussions, targeting competencies relevant to the personal characteristics test (TKP). The intervention was delivered over eight sessions, each lasting approximately 90 minutes, conducted twice a week. This structured instructional design ensured consistency of delivery while allowing sufficient engagement with both cognitive and affective learning dimensions.

Data were collected using multiple instruments to capture both quantitative and qualitative dimensions of learning outcomes. The primary quantitative instrument was a standardized SKD-based test, consisting of items measuring TIU, TWK, and TKP domains. The test included 30 items per domain, developed based on official SKD indicators to ensure content alignment. In addition, a student perception questionnaire was administered using a five-point Likert scale to measure engagement, motivation, and self-confidence. Qualitative data were obtained through semi-structured interviews, guided by open-ended questions exploring students' experiences with the intervention. The instruments were developed based on established theoretical frameworks, including multimedia learning theory Perez et al., (2023); Q. Zhou et al., (2024) and self-efficacy theory Hristov et al., (2023), ensuring conceptual alignment with the study objectives.

The validity and reliability of the instruments were rigorously established prior to data collection. Content validity was assessed through expert judgment involving three specialists in educational assessment and instructional design, who evaluated the relevance and clarity of each item. Construct validity was examined using item-total correlation analysis, ensuring that each item contributed meaningfully to the overall construct. Reliability was measured using Cronbach's alpha, with all instruments achieving coefficients above 0.70, indicating acceptable internal consistency (Mirza et al., 2022; Youssef et al., 2023). A pilot test was conducted with a group of students with similar characteristics to refine the instruments and ensure clarity and reliability. These procedures were implemented to minimize measurement error and enhance the credibility of the data.

The data collection procedure was conducted in a structured sequence. Initially, participants completed a pretest to establish baseline performance levels across the SKD domains. This was followed by the implementation of the intervention, during which attendance and participation were monitored to ensure treatment fidelity. Upon completion of the intervention, a posttest was administered to measure learning gains. Subsequently, students completed the perception questionnaire, and a subset of participants was selected for interviews to provide deeper insights into their learning experiences. All data were systematically documented and organized to facilitate analysis and ensure transparency.

Quantitative data were analyzed using paired sample t-tests to examine differences between pretest and posttest scores across the TIU, TWK, and TKP domains, with a significance level set at 0.05. Prior to hypothesis testing, assumptions of normality and homogeneity were assessed using Shapiro–Wilk and Levene's tests, respectively. In addition, effect size (Cohen's d) was calculated to determine the magnitude of the intervention's impact (Bangu et al., 2025; Firdaus et al., 2025). Statistical analyses were conducted using SPSS software to ensure computational accuracy. Qualitative data were analyzed using thematic analysis, following the six-phase framework proposed by Roganović, (2025), including familiarization, coding, theme development, and interpretation. Integration of quantitative and qualitative findings was performed at the interpretation stage to provide a comprehensive understanding of the intervention's effectiveness.

Ethical considerations were strictly observed throughout the study. Participants and their guardians provided informed consent after receiving detailed information about the study's purpose and procedures. Data confidentiality and anonymity were maintained by assigning codes to participants and securely storing all research data. Participants were informed of their right to withdraw at any stage without penalty. The study adhered to established ethical standards for research involving human participants, ensuring integrity, transparency, and respect for participant rights.

RESULTS AND DISCUSSION

Results

The findings of this study provide robust evidence regarding the effectiveness of the integrated visual-digital and public speaking intervention in enhancing students' readiness for the Basic Competency Test (SKD). Prior to hypothesis testing, the distributional assumptions were examined to ensure the appropriateness of parametric analysis. The Shapiro–Wilk test confirmed that the data were normally distributed, while Levene's test indicated homogeneity of variance across measurements, thereby validating the use of paired sample t-tests for subsequent analysis.

The quantitative results demonstrate a consistent and statistically significant improvement across all assessed domains. Students' performance in the analytical reasoning component (TIU) increased markedly from a pretest mean of 55 to a posttest mean of 74, indicating a substantial gain in higher-order cognitive processing. Similarly, the general knowledge component (TWK) exhibited the most pronounced improvement, rising from 58 to 80, which reflects enhanced comprehension and retention of informational content. In contrast, the personal characteristics domain (TKP) showed a more moderate increase from 60 to 70, yet this improvement remained statistically significant and meaningful in the context of affective skill development.

The magnitude of these improvements is further clarified through effect size analysis, which reveals that the intervention produced a large practical impact on both TIU and TWK domains, with Cohen's d values exceeding 0.80. This suggests that the visual-digital instructional approach was highly effective in strengthening students' cognitive capabilities, particularly in analytical reasoning and knowledge acquisition. The TKP domain, while exhibiting a moderate effect size, indicates that the public speaking component contributed positively to students' confidence and situational judgment, although affective competencies appear to require longer or more intensive exposure to achieve gains comparable to cognitive outcomes. This differentiation between cognitive and affective gains highlights the distinct yet complementary roles of the two intervention components.

To provide a clearer representation of these findings, Table 1 summarizes the comparative results between pretest and posttest scores across the three SKD domains, including statistical significance and effect size indicators. The table demonstrates that all observed improvements are not only statistically significant but also practically meaningful, reinforcing the robustness of the intervention's impact.

Table 1. Comparison of Pretest and Posttest Scores Across SKD Domains

Variable	Pretest Mean	Posttest Mean	Mean Gain	p-value	Effect Size (Cohen's d)
TIU	55	74	+19	0.02	0.85 (Large)
TWK	58	80	+22	0.01	0.92 (Large)
TKP	60	70	+10	0.04	0.65 (Moderate)

The trends observed in Table 1 are further reinforced through a visual comparison presented in Figure 1, which illustrates the magnitude of score improvements across domains. The figure clearly shows a steeper increase in TWK and TIU compared to TKP, suggesting that multimedia-based learning exerts a stronger and more immediate influence on cognitive performance than on affective dimensions.

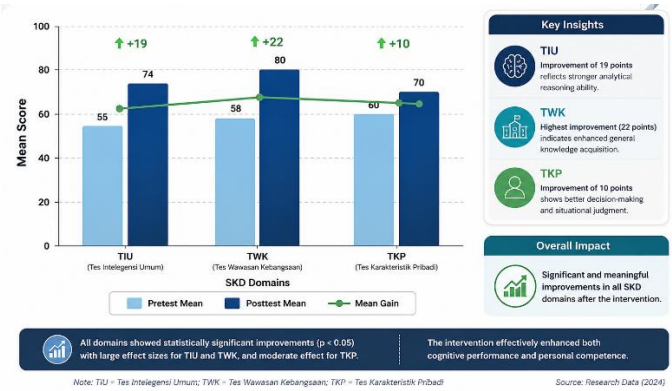

Figure 1. Comparative Improvement in SKD Scores Before and After the Intervention

The visual pattern depicted in Figure 1 highlights the differential impact of the intervention, where cognitive gains are more pronounced due to the structured and content-driven nature of multimedia learning. In contrast, the relatively moderate increase in TKP underscores the complexity of developing affective competencies such as confidence and decision-making, which are often shaped by repeated exposure and experiential learning.

Complementing the quantitative findings, the qualitative data provide deeper insight into the mechanisms underlying these improvements. Thematic analysis of student responses reveals a strong pattern of increased engagement, motivation, and confidence following the intervention. Students consistently reported that the integration of visual and interactive elements made the learning process more accessible and stimulating, allowing them to better understand complex concepts. This enhanced engagement appears to have played a critical role in facilitating cognitive gains, particularly in the TIU and TWK domains.

Furthermore, the public speaking component contributed significantly to students' affective development. Many participants described a noticeable increase in their willingness to express ideas, participate in discussions, and respond to situational questions. This shift in behavior aligns with the observed improvement in TKP scores, suggesting that communication training not only enhances confidence but also supports decision-making processes under evaluative conditions. Table 2 presents a summary of students' perceptions of the intervention, indicating consistently high levels of engagement, motivation, and self-confidence.

Table 2. Student Perceptions of the Intervention

Indicator	Percentage (%)
Increased engagement	80%
Increased motivation	75%
Improved confidence	78%

The data presented in Table 2 indicate that the majority of students experienced positive learning outcomes beyond measurable test performance. The high level of engagement suggests that multimedia learning effectively captures students' attention, while the reported increase in confidence reflects the influence of public speaking training on affective readiness.

Despite these positive outcomes, several implementation challenges were identified. A portion of participants reported difficulties related to internet connectivity and access to digital resources, which occasionally limited their ability to fully engage with the multimedia components. These constraints highlight the persistent infrastructural barriers in peripheral regions and suggest that the effectiveness of digital interventions is closely tied to technological accessibility. Additionally, some students required an initial adjustment period to adapt to the interactive and technology-driven learning environment, indicating the importance of gradual integration and support.

Overall, the results demonstrate that the integrated intervention produced significant and meaningful improvements in students' SKD readiness, with particularly strong effects on cognitive domains and moderate yet important gains in affective competencies. The convergence of quantitative and qualitative findings provides compelling evidence that combining visual-digital instruction with communication training offers a powerful and contextually relevant approach to enhancing educational outcomes in underserved settings.

Discussion

The findings of this study demonstrate that the integration of visual-digital learning and public speaking pedagogy significantly enhances students' readiness for the Basic Competency Test (SKD), particularly within cognitive domains such as analytical reasoning (TIU) and general knowledge (TWK). This improvement reflects not only statistical gains but also a transformation in how students process and internalize knowledge. From a theoretical perspective, these results strongly align with multimedia learning theory, which emphasizes the effectiveness of dual-channel processing in enhancing cognitive outcomes (Mayer, 2024; Twabu, 2025). However, this study extends prior assumptions by demonstrating that such benefits are attainable even in peripheral regions characterized by limited technological infrastructure. This finding contrasts with earlier arguments suggesting that digital learning effectiveness is highly dependent on contextual readiness and infrastructure (Kaimara, 2026; Matsieli & Mutula, 2024). Instead, the results suggest that pedagogical design may outweigh technological constraints in determining learning success. Consequently, this study redefines multimedia learning as a context-adaptive pedagogical strategy rather than a technology-dependent one.

The pronounced improvement in the TWK domain indicates that visual-digital instruction is particularly effective in facilitating the acquisition and structuring of conceptual and factual knowledge. This finding can be interpreted through the lens of structured cognitive processing, where multimedia elements enhance comprehension and retention by organizing information more efficiently. Prior studies have similarly demonstrated that multimedia learning improves knowledge acquisition and retention (Çeken & Taşkın, 2022; Deng, 2026). Furthermore, digital learning environments have been shown to increase motivation and engagement, which indirectly supports knowledge construction (Li et al., 2024; Yu, 2022). However, unlike these previous studies conducted primarily in well-resourced environments, this research reveals that comparable learning gains can be achieved in peripheral contexts when instructional strategies are appropriately adapted. This divergence suggests that contextual alignment plays a more critical role than infrastructure alone. Therefore, this study contributes to the literature by emphasizing that effective learning is not solely determined by technological access but by how technology is pedagogically utilized.

In relation to analytical reasoning (TIU), the findings indicate that visual-digital learning significantly enhances higher-order thinking skills. The observed improvement suggests that students were able to engage in deeper cognitive processes, including analysis, evaluation, and problem-solving. This aligns with recent research highlighting the effectiveness of interactive and multimodal learning environments in fostering critical thinking and transferable skills (Yeganeh et al., 2025; H. Zhou, 2025). Additionally, prior studies in peripheral education contexts have identified limited exposure to analytical problem-solving as a key barrier to student performance (Huang et al., 2024; Naseer & Khawaja, 2025). The present study addresses this gap by demonstrating that structured multimedia interventions can effectively bridge this deficiency. However, it is also plausible that the observed gains were influenced by increased engagement and novelty of the learning approach, rather than cognitive mechanisms alone. This alternative explanation highlights the need to interpret cognitive improvements within a broader pedagogical context. Thus, the findings suggest that analytical reasoning development is not solely content-driven but also influenced by the nature of instructional engagement.

Conversely, the relatively moderate improvement in the TKP domain underscores the complexity of developing affective competencies such as confidence and situational judgment. While the gains remain statistically significant, they are less pronounced compared to cognitive domains, indicating that affective development may require longer-term interventions. This finding is consistent with studies demonstrating that communication-based pedagogy enhances confidence, decision-making, and situational awareness (Ceylan, 2025; Zheng et al., 2025). Moreover, research

on communication-based learning indicates that affective skills develop gradually through repeated practice and experiential learning (Jiao & Yu, 2026; Yi et al., 2024). However, the present study provides additional insight by showing that even short-term interventions can initiate measurable improvements in affective readiness. At the same time, it is possible that the observed improvement was partially influenced by increased student motivation due to the interactive nature of the intervention. This highlights the importance of distinguishing between sustained competence and temporary performance enhancement. Therefore, while public speaking pedagogy contributes positively to affective development, its long-term impact warrants further investigation.

The qualitative findings further reinforce the quantitative results by highlighting the role of engagement and motivation as key mediating factors. Students reported increased interest, participation, and confidence, suggesting that the intervention created a more dynamic and supportive learning environment. This aligns with prior research indicating that interactive and multimodal learning environments enhance student motivation and participation (Li et al., 2024; Islam et al., 2024). Additionally, studies have shown that technology-enhanced learning can reduce educational disparities when combined with appropriate pedagogical strategies (Tang et al., 2024). However, this study advances the literature by demonstrating that the integration of cognitive and affective pedagogies produces a synergistic effect that amplifies both engagement and learning outcomes. This suggests that engagement should be understood as a multidimensional construct that integrates cognitive, emotional, and behavioral dimensions. Consequently, the findings highlight the importance of designing learning environments that simultaneously address these dimensions.

Despite the positive outcomes, the study also identifies significant contextual challenges, particularly related to limited digital infrastructure and inconsistent access to technology. These constraints reflect broader structural inequalities in peripheral regions, as highlighted in previous research on educational disparities (Nthambeleni & Motadi, 2025; Olanrewaju et al., 2021). While such limitations did not eliminate the effectiveness of the intervention, they influenced the consistency of student participation. This partially supports earlier findings that digital learning effectiveness is contingent upon contextual readiness (Kaimara, 2026). However, the present study offers a contrasting perspective by demonstrating that pedagogical adaptability can mitigate infrastructural limitations. It is also possible that the controlled nature of the intervention contributed to its effectiveness, raising questions about scalability in less structured environments. Therefore, while the results are promising, they should be interpreted with caution when considering broader implementation. This critical reflection strengthens the robustness of the study's conclusions.

Overall, this study contributes to the advancement of educational theory by integrating multimedia learning and communication-based pedagogy into a unified instructional model. Unlike previous studies that examine cognitive and affective interventions separately, this research demonstrates that their integration produces complementary and mutually reinforcing effects. This finding addresses a critical gap in the literature regarding the lack of integrated pedagogical models in low-resource settings. Furthermore, the study positions itself within the broader discourse on educational equity in the Global South by offering a context-sensitive and scalable solution. By emphasizing the role of pedagogical design over technological dependency, this research provides a new perspective on how educational disparities can be addressed. Ultimately, the findings suggest that effective learning occurs at the intersection of cognitive development and affective readiness. This integrated approach represents a significant conceptual advancement in the field of educational research.

CONCLUSION

This study establishes that an integrated visual-digital and public speaking pedagogical model provides a robust and context-sensitive pathway for enhancing students' readiness for the Basic Competency Test (SKD) in peripheral educational settings. The empirical evidence demonstrates that the intervention produces substantial gains in cognitive domains, particularly analytical reasoning and general knowledge, while also generating meaningful improvements in affective competencies such as confidence and situational judgment. These findings indicate that learning effectiveness is not fundamentally constrained by infrastructural limitations, but rather

shaped by the extent to which instructional design successfully activates both cognitive processing and affective engagement. In doing so, the study challenges prevailing assumptions that position technological access as the primary determinant of educational success, and instead foregrounds pedagogy as the central driver of equitable learning outcomes.

At a theoretical level, this research advances the field by explicitly reconceptualizing learning as a dual-domain process in which cognitive and affective dimensions operate in a mutually reinforcing system. Unlike conventional models that treat knowledge acquisition and personal competence as separate trajectories, the findings demonstrate that meaningful learning emerges from their integration. This study therefore proposes a refined conceptual framework in which multimedia learning facilitates structured cognitive processing, while communication-based pedagogy enhances self-efficacy and situational adaptability, together forming a unified mechanism of performance readiness. By embedding this model within a peripheral context, the research extends existing theories beyond their traditional application in well-resourced environments and redefines their relevance within the Global South. This constitutes a significant theoretical shift, positioning pedagogical integration—not technological advancement—as the core mechanism for addressing educational disparities.

From a practical and policy-oriented perspective, the findings carry substantial implications for educational reform in underserved regions. The demonstrated effectiveness of the intervention suggests that scalable improvements in learning outcomes can be achieved through strategically designed, low-cost pedagogical innovations rather than reliance on high-end technological infrastructure. However, the comparatively moderate gains in affective domains highlight the necessity of sustained, iterative, and experiential learning processes to fully develop competencies such as confidence and decision-making. This underscores the importance of long-term pedagogical planning and institutional support systems that extend beyond short-term interventions. Furthermore, the persistence of infrastructural constraints calls for the adoption of hybrid and flexible instructional models that can accommodate varying levels of resource availability while maintaining pedagogical integrity.

Notwithstanding its contributions, this study acknowledges several limitations that warrant careful consideration. The quasi-experimental design without full randomization and the relatively limited sample size constrain the generalizability of the findings, while the short duration of the intervention may not fully capture the longitudinal development of affective competencies. Future research is therefore encouraged to employ longitudinal and multi-site designs to validate the sustainability and scalability of the proposed model. Additionally, further investigation is needed to explore how contextual variables—such as cultural factors, institutional support, and digital literacy—interact with integrated pedagogical strategies over time.

Ultimately, this study positions integrated dual-domain pedagogy as a transformative approach capable of bridging persistent gaps in educational equity. By demonstrating that meaningful learning gains can be achieved through the alignment of cognitive and affective processes, even in resource-constrained environments, the research offers a compelling alternative to infrastructure-centric paradigms. In this sense, the study not only contributes to the refinement of educational theory but also provides a strategic blueprint for reimagining instructional practices in the Global South. More fundamentally, it advances the proposition that the future of equitable education lies not in the expansion of technological access alone, but in the deliberate redesign of pedagogy to align with the complex realities of learners' cognitive and human development.

AUTHOR CONTRIBUTIONS STATEMENT

Adellia Agusta conceptualized the study, designed the research framework, and led the overall writing of the manuscript. Noverius Henutesa Nggili contributed to the development of the research methodology and supervised the implementation of the intervention. Roidah 'Afro' was responsible for data collection and coordination with participating schools. Sirilus N.M. Lelan conducted data analysis and contributed to the interpretation of quantitative findings. Mariano A.T. Nugraha supported the development of instructional materials and contributed to the theoretical framework. Yuan Valentino Elim assisted in qualitative data analysis and validation of research instruments. Dalmasius S. Naif contributed to literature review development and manuscript editing.

Aprianus R. Modena supervised the project administration and provided critical revisions to the manuscript.

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