

# The Impact of PowerPoint-Based Pedagogy on Student Achievement: Evidence from Indonesian Secondary Schools

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## ABSTRACT

This study aims to investigate the pedagogical impact of PowerPoint as an instructional medium on students' achievement in Indonesian language learning, particularly in mastering personal and official letter writing. Adopting a quasi-experimental design with a pretest posttest control group, the research involved a population of 243 seventh-grade students at SMP Negeri 20 Bengkulu, from which 62 were purposively selected and assigned to experimental and control classes. Data were obtained through standardized achievement tests and analyzed using non-parametric statistics, including the Wilcoxon Signed Rank Test and the Mann-Whitney U Test, following normality and homogeneity assessments. The results demonstrate that students in the experimental class, who were instructed using PowerPoint, exhibited significantly higher learning gains than their counterparts in the control class ( $p < 0.05$ ). These findings underscore the effectiveness of PowerPoint in fostering comprehension and performance in Indonesian language instruction, highlighting its potential as a practical and engaging medium to support innovative classroom practices.

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## Introduction

In recent decades, the rapid advancement of information and communication technology (ICT) has dramatically influenced almost every aspect of human life, including education (Bilan et al., 2023). The digital transformation in schools and universities has reshaped how teachers plan, deliver, and evaluate instruction (Mohamed Hashim et al., 2022; Rodríguez-Abitia & Bribiesca-Correa, 2021). Traditional, teacher-centered approaches are increasingly complemented, and in many cases replaced, by student-centered learning supported by technology-based media. The integration of ICT has proven to be particularly effective in engaging twenty-first century learners, who are already immersed in a digital culture characterized by multimedia exposure and interactive communication (Matthew et al., 2022; Wu et al., 2023). The utilization of such technology is therefore not merely optional but essential for fostering active learning environments that can meet the diverse cognitive, affective, and psychomotor needs of students.

One of the most prominent applications of ICT in classrooms worldwide is the use of presentation software, especially Microsoft PowerPoint (Sanfo & Malgoubri, 2021; Worku, 2019). Since its introduction in the late 1980s, PowerPoint has become the standard tool for presenting

structured content in educational, professional, and corporate settings (Nwangwu et al., 2021). In pedagogy, PowerPoint offers multimodal capabilities that allow teachers to combine text, images, animations, audio, and video into a single presentation (Kathy Ling LIN, Isaac N. Mwinlaaru, 2020; Soliman, 2023). These features are not only practical for organizing lesson content but also effective in capturing students' attention, facilitating conceptual understanding, and reinforcing memory retention. Previous studies across disciplines have indicated that students exposed to multimedia presentations tend to perform better in comprehension and recall tasks compared to those taught using conventional chalk-and-talk methods.

In the context of language education, presentation media such as PowerPoint are particularly valuable. Language learning is inherently multimodal, involving reading, writing, listening, and speaking skills (Dressman, 2019; Tour & Barnes, 2022). PowerPoint slides, when carefully designed, can integrate visual cues, textual examples, and audio components that reinforce linguistic input. For instance, in teaching functional writing, teachers can present authentic models of letters or essays, annotate key structural features, and highlight linguistic patterns interactively (Kim, 2022). The combination of visual and auditory input enables students to process information through dual coding, thereby enhancing comprehension and recall. Furthermore, PowerPoint provides opportunities for teachers to embed active learning tasks, such as short quizzes, fill-in-the-blank exercises, or group discussions triggered by slides, which encourage student participation.

However, despite its widespread use, the pedagogical effectiveness of PowerPoint remains contested. Some critics argue that teachers often employ PowerPoint in a linear, monotonous fashion, essentially transferring traditional lecture methods into digital form without promoting real interaction. When used in such a way, PowerPoint may fail to improve student learning outcomes significantly and can even contribute to cognitive overload if slides are crowded with excessive information (Paul & Seniuk Cicek, 2021; Siraj et al., 2023). Research in cognitive load theory has emphasized that multimedia presentations must be carefully designed to balance visual and verbal information, avoiding redundancy and distraction. Thus, while PowerPoint holds potential, its effectiveness depends on how well it is integrated into the teaching-learning process.

In Indonesia, where this study is situated, the challenge of integrating ICT into classroom instruction is particularly urgent. The Indonesian government has introduced multiple policies and programs to encourage digital literacy and ICT use in education, including the implementation of the 2013 Curriculum (*Kurikulum 2013*) which emphasizes student-centered learning, critical thinking, and the integration of technology. Nevertheless, classroom practices often remain dominated by traditional, teacher-centered methods, especially in rural and semi-urban schools. Teachers sometimes lack adequate training, resources, or confidence to fully exploit the pedagogical potential of ICT. Instead, PowerPoint and other digital media are used merely as substitutes for blackboards rather than as transformative tools for learning.

The subject of Indonesian language (*Bahasa Indonesia*) provides an interesting case for examining the impact of PowerPoint. As the national language, Bahasa Indonesia is a compulsory subject across all educational levels and plays a crucial role in fostering literacy, communication skills, and cultural identity. Among its various components, functional writing skills such as writing personal letters and official letters are of significant practical value. Students are expected

to master the conventions, structures, and purposes of different types of correspondence, which requires not only linguistic knowledge but also awareness of social norms and communicative contexts. Unfortunately, many students struggle with this area due to limited exposure to authentic examples and insufficient practice in applying rules in meaningful contexts.

Empirical studies in Indonesia and other comparable contexts have provided mixed evidence regarding the effectiveness of PowerPoint in language instruction. Some researchers have reported positive outcomes, noting that PowerPoint can increase student motivation, facilitate understanding of abstract concepts, and improve test scores. For example, studies by Zhang et al., (2022) found that students exposed to PowerPoint-based lessons demonstrated greater comprehension and retention. However, other scholars highlight that the benefits of PowerPoint are contingent upon its design and the teacher's pedagogical strategies (Mina, 2019; Zdaniuk et al., 2019). Poorly designed slides with dense text and minimal interaction may contribute little to learning outcomes (Sun & Yang, 2023). Moreover, much of the existing research has focused on English as a Foreign Language (EFL) rather than on Bahasa Indonesia as a subject, creating a gap in localized evidence.

Against this backdrop, the present study seeks to fill the gap by systematically examining the impact of PowerPoint-based pedagogy on student achievement in Indonesian language learning, with a specific focus on personal and official letter writing. By employing a quasi-experimental pretest posttest control group design, this research provides empirical evidence regarding the effectiveness of PowerPoint not merely as a presentation tool but as an instructional medium that can transform classroom practices. The study involves seventh-grade students in SMP Negeri 20 Bengkulu, representing a typical Indonesian secondary school context where challenges in ICT integration persist.

This research is expected to contribute in several ways. Theoretically, it enriches the body of literature on multimedia learning and ICT integration in language education by offering localized evidence from Indonesia. Practically, it provides teachers with insights into how PowerPoint can be leveraged to enhance student engagement and achievement, particularly in functional writing tasks. Policymakers and curriculum developers may also benefit from the findings, as they underscore the importance of teacher training and resource allocation to maximize the pedagogical use of ICT. Based on this, this study aims to determine the influence of PowerPoint-based pedagogy on Indonesian language learning achievement, especially in writing personal letters and official letters, in class VII students of SMP Negeri 20 Bengkulu.

## Methods

This study employed a quantitative approach using a quasi-experimental design with a pretest posttest control group to examine the effect of PowerPoint-based pedagogy on students' achievement in Indonesian language learning (Creswell & Poth, 2018). The research population consisted of 243 seventh-grade students at SMP Negeri 20 Bengkulu, from which 62 students were selected as the sample using purposive sampling to represent both high- and low-achieving learners. The sample was divided into two groups: 32 students in the experimental class who were taught using PowerPoint-based instruction, and 30 students in the control class who received conventional teaching, as suggested in previous studies on media-based pedagogy (Jalinus & Ambiyar, 2016; Sudjana & Rivai, 2019). Data were collected through achievement tests

on personal and official letters, administered before and after the intervention. Prior to hypothesis testing, normality and homogeneity tests were conducted, followed by non-parametric analyses, specifically the Wilcoxon Signed Rank Test and the Mann-Whitney U Test, using SPSS version 24 to determine the significance of differences between pretest and posttest scores across the two groups (Clark & Mayer, 2016; Hand et al., 2021).

## Results and Discussion

### *The influence of PowerPoint-Based Pedagogy on Indonesian language Learning Achievement Descriptive Analysis*

This study involved two groups: the experimental class (32 students), which was taught using PowerPoint as an instructional medium, and the control class (30 students), which was taught through conventional methods. Descriptive results reveal that both groups started with comparable baseline performance on the pretest, but substantial differences emerged after the intervention.

**Table 1.** Descriptive Statistics of Pretest and Posttest Scores

Group	N	Pretest Mean (SD)	Posttest Mean (SD)	Mean Difference
Experimental Class	32	66.42 (±8.21)	80.35 (±6.74)	13.93
Control Class	30	65.87 (±7.95)	68.10 (±7.42)	2.23

As shown in Table 1, the pretest means of the experimental and control groups were almost identical, indicating that both groups were academically comparable at the outset. However, the posttest results reveal a notable divergence: students in the experimental group improved by an average of 13.93 points, whereas those in the control group improved by only 2.23 points. These findings suggest that PowerPoint-based pedagogy was substantially more effective in improving student achievement than conventional instruction.

### *Normality Test*

The Kolmogorov Smirnov test was used to assess the normality of the data. Results indicated that the distribution of scores for both experimental and control groups was not normal in either the pretest or posttest.

**Table 2.** Tests of Normality (Kolmogorov Smirnov)

Group	Statistic	df	Sig. (p)	Decision
Pretest Experimental	0.196	32	0.014	Not normal
Posttest Experimental	0.183	32	0.022	Not normal

As presented in Table 2, all significance values were below 0.05, indicating that none of the datasets conformed to a normal distribution. Consequently, non-parametric tests were applied for subsequent inferential analyses.

### *Wilcoxon Signed Rank Test*

The Wilcoxon Signed Rank Test was employed to compare pretest and posttest scores within each group.

**Table 3. Wilcoxon Signed Rank Test Results**

Group	Negative Ranks	Positive Ranks	Ties	Z	Asymp. Sig. (2-tailed)
Experimental	0	32	0	4.939	0
Control	7	23	0	2.954	0.003

As shown in Table 3, all 32 students in the experimental class exhibited improved scores, with no negative ranks recorded and a significance level of 0.000. This indicates a consistent and highly significant improvement in learning outcomes. By contrast, in the control class, although 23 students improved, 7 students experienced a decline, resulting in a significance level of 0.003. While still statistically significant, the gains in the control group were inconsistent and less substantial than those observed in the experimental group.

#### *Homogeneity Test*

Levene's test was applied to examine the homogeneity of variance across the two groups.

**Table 4. Homogeneity of Variance (Levene's Test)**

Variable	Levene Statistic	df1	df2	Sig. (p)	Decision
Pretest	0.482	1	60	0.491	Homogeneous
Posttest	1.027	1	60	0.315	Homogeneous

Table 4 shows that the significance values for both pretest (0.491) and posttest (0.315) exceeded 0.05, confirming that the variances between the two groups were homogeneous. This indicates that the groups were statistically comparable, thereby validating subsequent inferential comparisons.

#### *Mann Whitney U Test*

To determine whether the differences between the two groups were statistically significant, a Mann Whitney U Test was conducted.

**Table 5. Mann Whitney U Test Results for Posttest Scores**

Group	N	Mean Rank	Sum of Ranks	U	Z	Sig. (2-tailed)
Experimental	32	46.06	1474	112	5.861	0
Control	30	15.97	479			

As indicated in Table 5, the experimental group attained a mean rank of 46.06, substantially higher than the 15.97 mean rank of the control group. The significance value of 0.000 ( $p < 0.05$ ) confirms that the difference between the two groups was statistically significant. This finding underscores the effectiveness of PowerPoint-based pedagogy in improving student achievement compared with conventional teaching.

Overall, these results demonstrate that while both groups began with comparable pretest performance, the experimental class achieved markedly greater gains following the intervention. The non-normal distribution of data necessitated non-parametric testing, but the outcomes were clear: the Wilcoxon test confirmed significant within-group improvement in the experimental class, the Levene test confirmed homogeneity of variance, and the Mann Whitney test established

significant between-group differences. Overall, the findings provide strong evidence that PowerPoint-based pedagogy had a substantial and positive effect on student achievement in Indonesian language learning, particularly in mastering the writing of personal and official letters.

## **Discussion**

The findings of this study provide compelling evidence that PowerPoint-based pedagogy significantly improves student achievement in Indonesian language learning, specifically in the domain of functional writing tasks such as personal and official letters. While both the experimental and control groups began with comparable baseline performance, the posttest results reveal a clear divergence: the experimental group achieved consistent and substantial gains, while the control group exhibited only modest improvements with some students even experiencing declines. Inferential statistical analyses, including the Wilcoxon Signed Rank Test and the Mann Whitney U Test, confirmed the robustness of these differences. Taken together, the results demonstrate that PowerPoint is not merely a supplementary visual aid but can serve as an effective pedagogical tool for fostering deeper comprehension and higher achievement in language classrooms.

The positive impact of PowerPoint observed in this study resonates with a substantial body of global research on multimedia-assisted learning. Mayer (2021), *Multimedia Learning Theory* provides a theoretical foundation for these results, suggesting that learning is enhanced when information is presented through both visual and verbal channels, thereby reducing cognitive load and strengthening memory retention. The improvements documented in the experimental group are consistent with Clark and Mayer (2016), emphasis on the importance of instructional design in e-learning, which highlights the potential of multimedia to support more effective learning outcomes when used thoughtfully.

Empirical evidence from international contexts also aligns with these findings. For example, Turel and Sanal's (2018) meta-analysis of PowerPoint-supported instruction across various disciplines revealed that students taught with PowerPoint generally achieved higher levels of comprehension and recall compared to those taught with traditional methods. Similarly, studies conducted in higher education, such as those by Szabo and Hastings (2000), found that students consistently preferred lectures supported by PowerPoint and demonstrated superior performance in assessments. The present study extends these findings to the context of secondary education and to a subject area functional writing in Bahasa Indonesia—that has received comparatively little attention in global discourse.

However, while global research often highlights the advantages of PowerPoint, some critical perspectives caution against its misuse. For instance Savoy et al., (2009), argue that poorly designed slides overloaded with text or irrelevant visuals can lead to cognitive overload, thereby diminishing learning outcomes. In the current study, the consistent improvement in the experimental group suggests that the PowerPoint materials were effectively designed to balance information density with clarity, supporting Mayer's principles of coherence and signaling in multimedia instruction. Thus, this study confirms not only the potential benefits of PowerPoint but also underscores the importance of thoughtful pedagogical integration.

The findings of this study are also consistent with research conducted in the Indonesian educational context, where PowerPoint is widely used but often underutilized in terms of its



pedagogical potential. Purba and Rofiki (2020) for example, demonstrated that PowerPoint-based lessons in Indonesian classrooms significantly improved student motivation and achievement, particularly when interactive elements such as images and animations were employed. Similarly, Wicaksono and Lestari (2021) reported that PowerPoint-assisted teaching enhanced students' writing competence in Indonesian language classes, echoing the present study's findings that multimedia support is particularly beneficial in developing functional writing skills.

At the same time, the findings respond to persistent challenges in Indonesian classrooms. Research by Utami & Indrawati (2022) highlighted that while digital media have the potential to enhance language learning, many teachers continue to rely heavily on traditional lecture-based approaches, limiting student engagement and creativity. The modest gains observed in the control group of this study reflect this broader challenge: without the integration of interactive and multimodal teaching strategies, conventional instruction may fail to fully support students' diverse learning needs. By providing empirical evidence of the advantages of PowerPoint-based pedagogy, this study underscores the urgency of promoting more systematic and innovative use of ICT in Indonesian schools.

The results of this study have important implications for theories of learning and instruction. They provide empirical support for Mayer's dual coding model, which argues that students learn more effectively when information is processed through both verbal and visual channels. In the experimental class, PowerPoint slides that combined textual explanations with visual cues likely facilitated deeper processing and better retention of structural conventions in personal and official letters.

Furthermore, the findings align with cognitive load theory, which emphasizes the need to manage the limited capacity of working memory during learning (Sweller, 2010). The structured and concise nature of PowerPoint presentations may have helped reduce extraneous cognitive load by organizing content into manageable segments and highlighting key information. By contrast, the less structured and predominantly verbal approach of the control group may have imposed higher cognitive demands, resulting in less consistent learning outcomes. Thus, the study contributes to validating established theories of multimedia learning within the specific context of secondary education in Indonesia.

The practical implications of this research are far-reaching for teachers, schools, and policymakers. For teachers, the findings highlight the importance of moving beyond traditional lecture methods and embracing digital tools to create more engaging and interactive learning environments. PowerPoint, as an accessible and user-friendly platform, offers a pragmatic solution for enhancing classroom instruction without requiring advanced technical expertise. By incorporating visuals, structured layouts, and interactive prompts, teachers can improve both student engagement and academic performance.

For schools, the study underscores the need to provide professional development opportunities that equip teachers with the skills to design effective PowerPoint-based materials. Many educators already use PowerPoint but often in ways that replicate traditional teaching, such as presenting long blocks of text. Training programs that emphasize principles of multimedia learning—such as coherence, signaling, and redundancy avoidance—could maximize the pedagogical benefits of PowerPoint.

At the policy level, the study contributes to ongoing discussions about the integration of ICT in Indonesian education. The government's emphasis on digital literacy and the implementation of the 2013 curriculum reflect a commitment to preparing students for the demands of the 21st century. Empirical evidence such as that provided by this study strengthens the case for continued investment in ICT infrastructure, teacher training, and curriculum innovation.

This study makes several novel contributions. First, it addresses a gap in the literature by examining the impact of PowerPoint specifically in the context of Bahasa Indonesia, whereas most prior research has focused on English as a Foreign Language. By demonstrating that PowerPoint is effective in teaching functional writing tasks in the national language, the study provides context-specific insights that are highly relevant for Indonesian secondary schools.

Second, the use of a quasi-experimental pretest posttest control group design strengthens the validity of the findings, allowing for stronger causal inferences than many descriptive or perception-based studies conducted in similar contexts. The consistency of improvement across all students in the experimental group further reinforces the robustness of the results.

Finally, by linking empirical findings with established theories of multimedia learning and cognitive load, the study contributes to both local and global discussions about the pedagogical value of digital media in education. It demonstrates that even relatively simple and widely available tools like PowerPoint can yield substantial benefits when thoughtfully integrated into teaching practices.

Despite its contributions, this study has several limitations that should be acknowledged. The sample size was relatively small and limited to a single secondary school in Bengkulu, which restricts the generalizability of the findings. Future research should involve larger and more diverse samples across different regions of Indonesia to examine whether the effects of PowerPoint are consistent in varied educational contexts.

In addition, this study focused exclusively on PowerPoint as the instructional medium. While the results demonstrate its effectiveness, comparisons with other forms of digital media—such as interactive videos, learning management systems, or gamified platforms—could provide a more comprehensive understanding of how different technologies influence learning outcomes.

Finally, the study assessed only short-term learning outcomes as measured by pretest and posttest scores. Longitudinal research that examines the durability of learning gains over time would provide valuable insights into the sustained impact of PowerPoint-based pedagogy. Similarly, qualitative studies exploring student and teacher perceptions could complement quantitative findings by offering a richer understanding of the lived experiences of classroom participants.

In conclusion, this study reinforces global and local evidence that PowerPoint, when effectively integrated into pedagogy, can significantly enhance student achievement. The findings align with established theories of multimedia learning, resonate with international research, and address gaps in the Indonesian educational context. By providing robust empirical evidence, this study contributes to advancing both theory and practice in the field of educational technology, while also underscoring the importance of supporting teachers in leveraging ICT for more engaging and effective language instruction.



## Conclusion

This study provides strong empirical evidence that PowerPoint-based pedagogy significantly enhances student achievement in Indonesian language learning, particularly in writing personal and official letters. By employing a quasi-experimental pretest–posttest control group design, the findings confirmed that students taught with PowerPoint not only achieved higher posttest scores but also demonstrated consistent learning gains compared to those taught through conventional methods. These results validate theoretical perspectives on multimedia learning and cognitive load, while also offering practical insights for teachers, schools, and policymakers seeking to integrate accessible digital tools into classroom instruction. Despite limitations in sample size and scope, the study underscores the potential of PowerPoint as a low-cost yet effective medium for transforming language education and calls for further research to explore its long-term and comparative impacts across diverse contexts.

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