Effectiveness of PowerPoint Media in Improving Letter Recognition Skills among Indonesian Preschoolers

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ABSTRACT

Purpose – This study investigates whether PowerPoint-based media can improve early literacy skills, focusing on letter recognition among preschool children. Traditional methods often fail to engage young learners effectively, and this research aims to explore the potential of multimedia tools to enhance literacy outcomes.

Design/methods/approach – A quantitative, pre-experimental one-group pre-test-post-test design was used, involving 18 children aged 5–6 years from TK Tunas Mandiri Sungai Raya, Indonesia. Data were collected through structured observation using a checklist assessing letter identification, sound pronunciation, and letter-image association. Statistical analysis was conducted via paired sample t-tests in SPSS.

Findings – Results showed a significant increase in letter recognition scores, from a mean of 4.67 in the pre-test to 8.61 in the post-test. These findings suggest that PowerPoint can be a practical and effective tool to support early literacy learning, engaging children through visual and auditory stimuli.

Research implications/limitations – The study's limitations include the absence of a control group and a small sample size, which limit generalizability. Nonetheless, this research contributes valuable insights into how simple digital tools can enhance literacy education in early childhood settings, particularly where resources are limited.

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Introduction

Since early childhood, letter recognition has been paramount in developing children's reading abilities and enriching their vocabulary, especially between the ages of 4 and 5 when their interest in letters begins to emerge (Sippola, 1994). Therefore, stimulating this ability through engaging methods appropriate for their developmental stage is essential, as letter recognition activities must be enjoyable to capture their attention. In this context, audio-visual media such as PowerPoint offer an effective alternative, capable of presenting material through a combination of engaging animations, images, sounds, and colors (Farani, 2012, 2016). PowerPoint is also easily accessible, practical, and flexible, allowing educators to adapt learning materials (Abdullah & Nasution, 2024). Extensive literature supports the effectiveness of this medium; for instance, research indicates that multimedia presentations significantly enhance letter recognition skills in preschool children through audio-visual mnemonics (Jamian et al., 2025) and digital game-based learning (Rahman, 2024). Nevertheless, gaps persist in the implementation and optimization of digital media within specific early childhood education contexts, particularly regarding individual variations in cognitive abilities and prior knowledge (R. Mayer, 2024; R. E. Mayer, 2014; Ramlatchan, 2019). This research aims to bridge these gaps by focusing on concrete problems faced at TK Tunas Mandiri Sungai Raya, where Group B children struggle with letter recognition and pronunciation, exacerbated by monotonous teaching methods.

The pervasive issue of low letter recognition abilities among Group B children at TK Tunas Mandiri Sungai Raya forms the primary background of this study. Initial observations revealed that some children struggled to differentiate similarly shaped letters (e.g., 'b' and 'd', 'p' and 'q', 'm' and 'n') and mispronounced certain letter sounds (such as 'f', 'q', 'j', 'v', and 'z'). This situation is compounded by a teaching methodology that has primarily relied on traditional whiteboards, creating a monotonous and unengaging atmosphere for early childhood learners, often leading to disengagement during learning activities. This problem aligns with literature findings indicating that the effectiveness of learning media is highly dependent on content quality and educators' ability to integrate it effectively, and that digital learning innovations frequently fail to fully implement instructional theories (Reigeluth & Honebein, 2020). The research gap lies in the in-depth exploration of the specific impact and optimal implementation of PowerPoint-based instruction as a solution to letter recognition problems within a kindergarten context facing traditional method challenges. While various studies have identified the benefits of ICT in emergent literacy (Chuang & Jamiat, 2023; Neumann et al., 2017), there is a paucity of research specifically examining PowerPoint's influence on complex letter recognition and pronunciation issues observed in settings like TK Tunas Mandiri Sungai Raya.

Therefore, the research question becomes critically important: Can the use of PowerPoint media significantly stimulate letter recognition abilities in Group B children at TK Tunas Mandiri Sungai Raya? This question is highly relevant to current research themes in multimedia learning and emergent literacy. Theories such as the Multimedia Learning Theory (R. Mayer, 2024; R. E. Mayer, 2014) and Emergent Literacy Theory (Sippola, 1994) emphasize the importance of multisensory stimulation and active interaction in learning. Although studies have shown PowerPoint's effectiveness in teaching word recognition to at-risk children (Parette et al., 2009) and enhancing phonological awareness (Massetti, 2009), this research's contribution is to provide empirical evidence from a specific Indonesian context that has been underexplored. Previous research has also reviewed digital tools in preschool education for improving language and pre-reading skills (Braslauskienė et al., 2024; Tomaš et al., 2023). However, this study will focus specifically on PowerPoint's effect in addressing the precise challenges of letter recognition and letter sound pronunciation that are often overlooked in broader studies.

This research aims not only to investigate the impact of PowerPoint media on stimulating letter recognition abilities but also to enhance the utilization of PowerPoint as a varied learning activity at TK Tunas Mandiri Sungai Raya. The research positions itself as an in-depth case study, providing localized evidence that can enrich the global literature on the effectiveness of educational technology in early childhood education. Unlike systematic reviews that often discuss educational technology broadly (Bautista et al., 2023), this study specifically focuses on one of the most common and accessible ICT tools, PowerPoint, in addressing concrete literacy problems. This approach will highlight how a relatively simple technology can be effectively implemented as a practical and affordable solution to improve the quality of learning in educational environments that may face resource limitations. Thus, this research will offer a novel contribution to understanding how seemingly basic technology can be strategically employed to support early literacy development.

To achieve these objectives, this study will involve the implementation of PowerPoint media specifically designed for letter recognition among Group B children at TK Tunas Mandiri Sungai Raya. Data will be collected through direct observation and evaluation of children's letter recognition abilities before and after the intervention. The anticipated outcomes of this research include motivating educators to optimally utilize PowerPoint media, leading to a significant improvement in children's letter recognition abilities and a more effective and engaging learning process. The findings of this study are also expected to serve as crucial considerations for the development of teaching methods in other schools, particularly within the context of early childhood education, and to provide a practical framework for educators to judiciously integrate technology in support of emergent literacy.

Materials and Methods

This study utilized a quantitative research approach with a pre-experimental design, specifically adopting the one-group pre-test-post-test model, as this method allows researchers to observe the direct impact of an intervention within a single group without the need for a control group, which can be challenging to implement in early childhood educational settings (Creswell, 2014). The research was conducted at TK Tunas Mandiri Sungai Raya and involved eighteen preschool children from Group B, consisting of ten boys and eight girls aged five to six years. Participants were selected purposively based on their enrollment and regular attendance in the targeted class, ensuring the reliability of the collected data. Ethical considerations were strictly observed, with informed consent obtained from parents, guaranteeing voluntary participation and the confidentiality of all participants' identities, thus aligning with ethical standards in research involving young children.

The primary instrument used in this study was an observation checklist meticulously developed based on theoretical indicators from Seefeldt and Wasik (2006), focusing on essential components of letter recognition as a foundational skill in early literacy. The checklist captured three critical areas: the ability of children to visually identify and correctly name letters, their capacity to pronounce letter sounds accurately, and their skill in associating letters with images beginning with the corresponding initial sounds. Each child's performance was evaluated using a developmental scale frequently applied in early childhood assessments, which categorized children's skills as Emerging, Developing as Expected, or Very Well Developed. This structured instrument was designed to provide a clear, systematic, and age-appropriate method for measuring the specific literacy outcomes targeted by the intervention, ensuring the validity and reliability of the research findings.

Figure 1. Research Procedure
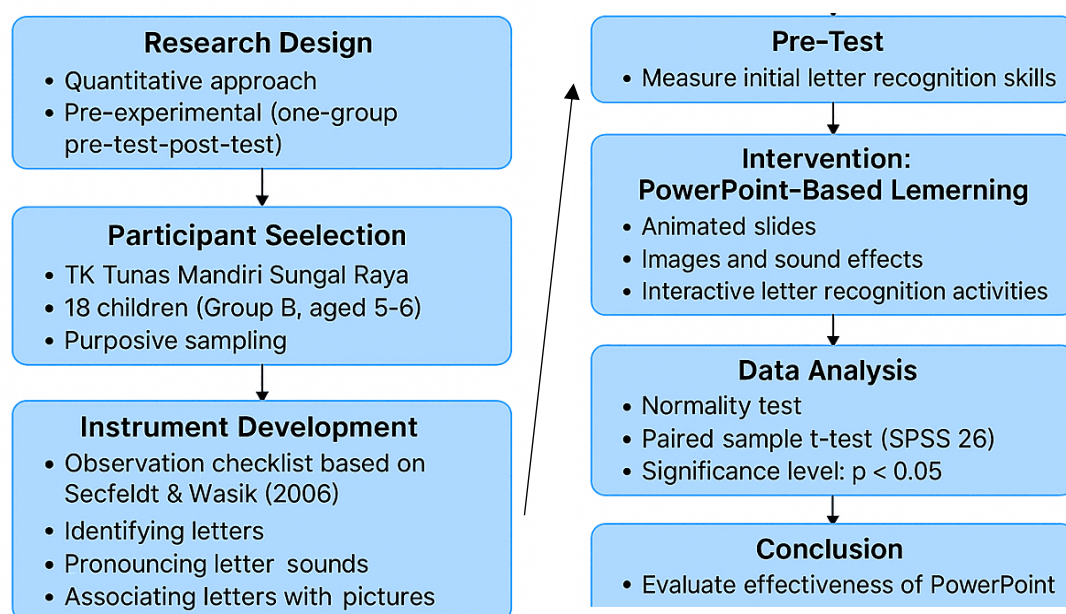
The research procedure began with the preparation of engaging PowerPoint learning materials that integrated colorful images, animations, and sound elements intended to capture and sustain young children's attention. Following this, a pre-test was conducted to establish a baseline of the participants' letter recognition skills prior to the intervention. The intervention itself consisted of several instructional sessions in which PowerPoint presentations were used to deliver interactive and visually stimulating learning experiences focusing on letters and their corresponding sounds and images. After the intervention, a post-test was administered using the same observation checklist to assess any improvements in the children's skills. The collected data were analyzed using SPSS version 26, beginning with tests of normality to ensure data suitability for parametric analysis, followed by a paired sample t-test to determine whether the differences between pre-test and post-test scores were statistically significant, using a significance threshold of $p < 0.05$. This analytical strategy was chosen to rigorously evaluate the effectiveness of PowerPoint media in enhancing letter recognition skills among Indonesian preschoolers, thereby contributing empirical evidence to support the use of multimedia tools in early childhood education (Santoso, 2017).

Result

The primary objective of this study was to examine the effectiveness of PowerPoint-based learning media in improving letter recognition skills among preschool children. To achieve this, the researchers conducted a pre-test and post-test on the same group of 18 participants from Group B at TK Tunas Mandiri Sungai Raya. The observations were structured around three indicators of letter recognition: identifying letters correctly, pronouncing letter sounds accurately, and associating letters with images whose initial sounds corresponded to the respective letters. The raw scores from both the pre-test and post-test were collected, categorized, and analyzed to determine the extent of learning gains after the intervention.

Before the intervention, the average score of children's letter recognition abilities in the pre-test phase was 4.67, placing them in the "Emerging" developmental category. After the PowerPoint-based instructional sessions, the average post-test score increased to 8.61, which aligned with the "Developing as Expected" category. This change reflects a mean improvement of 3.94 points, suggesting a substantial increase in performance across the group. Table 1 provides a summary of the pre-test and post-test results across all 18 participants.

Table 1. Summary of Pre-Test and Post-Test Scores

Test Phase	Mean Score	Standard Category
Pre-Test	0,213194444	Emerging
Post-Test	0,375694444	Developing as Expected

The data were subjected to a paired sample t-test using SPSS version 26 to assess the statistical significance of the observed differences. Prior to the t-test, normality tests were conducted, indicating that both the pre-test and post-test data were normally distributed (pre-test p = 0.15; post-test p = 0.09). The paired sample t-test yielded a Sig. (2-tailed) value of 0.000, which is significantly below the threshold of 0.05. The calculated t-value was -19.178, which greatly exceeded the critical t-value of 1.740 for the given degrees of freedom. These results confirm a statistically significant difference between pre- and post-intervention scores, indicating that the PowerPoint media intervention had a strong and measurable effect on children's letter recognition performance.

To further illustrate the improvement, Figure 1 presents a bar chart comparing the mean scores of the pre-test and post-test phases. The graph shows a clear upward shift in performance following the intervention.
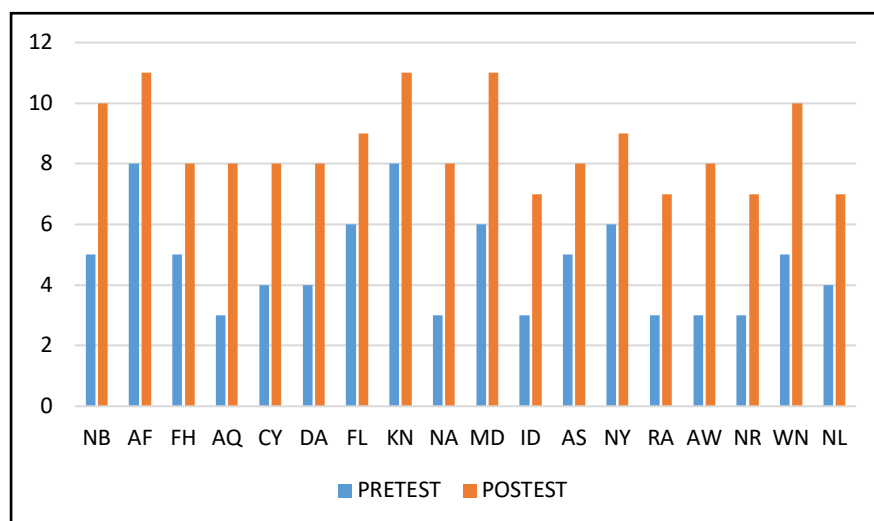

Figure 1. Comparison of Pre-Test and Post-Test Mean Scores

An analysis of performance categories also revealed notable changes. In the pre-test, 50% of the children were in the "Emerging" category (score 1–3), 39% in "Beginning to Develop" (score 4–6), and only 11% reached "Developing as Expected" (score 7–9). No students scored in the "Very Well Developed" category. After the intervention, the distribution shifted dramatically: 17% reached "Very Well Developed", 61% reached "Developing as Expected", and only 22% remained in "Beginning to Develop". No students remained in the lowest category, as shown in Table 2.

Table 2. Distribution of Participants Across Developmental Categories

Development Category	Score Range	Pre-Test (%)	Post-Test (%)
Emerging	1–3	50% (9)	0%
Beginning to Develop	4–6	39% (7)	22% (4)
Developing as Expected	7–9	11% (2)	61% (11)
Very Well Developed	10–12	0%	17% (3)

This categorical shift demonstrates that the intervention not only improved average scores but also elevated a significant number of students into higher developmental classifications. Across the three observed indicators, improvements were observed consistently: more children were able to identify letters correctly, pronounce letter sounds accurately, and successfully associate letters with images that shared the corresponding initial sounds. These findings provide a comprehensive picture of the learning gains achieved through PowerPoint-based instruction and affirm the suitability of multimedia tools in promoting early literacy outcomes.

Discussion

The results of this study definitively indicate that the use of PowerPoint-based instructional media significantly enhances letter recognition skills among young children. The substantial increase in the average score from 4.67 in the pre-test to 8.61 in the post-test provides strong evidence of real progress in children's ability to identify letters, articulate letter sounds, and connect letters with images sharing the same initial sounds. These findings align with the core principles of Multimedia Learning Theory (MLT) developed by Mayer (2024; 2014), who asserted that learning is more effective when information is delivered through a combination of words and pictures. The integration of visual and auditory elements in PowerPoint effectively utilizes the dual-channel principle and active information processing, which are crucial for capturing attention and sustaining focus among young learners (Farani, 2012, 2016). This effectiveness is further supported by studies showing that multimedia presentations, especially those employing audio-visual mnemonics, significantly improve letter recognition among preschool children (Jamian et al., 2025). Moreover, research comparing multimedia-based instruction to traditional methods has confirmed that multimedia approaches lead to higher scores in vocabulary acquisition and story comprehension, demonstrating their superiority in facilitating early literacy learning (Lee & Choi, 2010).

Within the framework of early literacy development, these results underscore that letter recognition is a fundamental skill that can be effectively improved through interactive instructional media. Children aged five to six years are in a cognitive developmental stage that heavily relies on concrete experiences and visual stimuli, consistent with Piaget's theory of cognitive development (Yanarateş, 2024). Therefore, PowerPoint, which delivers content through animations, colors, images, and sounds, proves highly effective in facilitating children's understanding of letter shapes and sounds. The fact that most children in this study advanced in developmental categories—from "Emerging" to "Beginning to Develop," "Developing as Expected," and even "Very Well Developed"—further confirms the effectiveness of this medium in supporting basic literacy learning. These findings also resonate with emergent literacy theory, which

emphasizes that literacy development begins from birth through everyday interactions with the environment, and that key components such as oral language development and print awareness can be enhanced through experiences like listening to stories and experimenting with writing (Sippola, 1994). This improvement also aligns with evidence regarding the effectiveness of interactive digital tools (IDT) in promoting cognitive development and early literacy skills by offering personalized learning experiences and fostering critical thinking (Maitra, 2024).

However, while the majority of participants showed positive development, the study candidly acknowledges that not all children reached the highest developmental category; only a small proportion achieved the "Very Well Developed" level after the intervention. This suggests that using PowerPoint alone, though highly beneficial, may not fully address the needs of all learners, particularly those requiring more intensive or individualized instructional approaches. This aligns with the understanding that the effectiveness of instructional media greatly depends on careful application of learning theories and thoughtful instructional design, and recognizes that digital learning innovations often fall short in fully implementing instructional theories (Reigeluth & Honebein, 2020). In other words, while such media contribute significantly, learning success remains influenced by the unique characteristics and needs of each child, including individual differences in cognitive abilities and prior knowledge, which require ongoing adaptation (R. Mayer, 2024; R. E. Mayer, 2014; Ramlatchan, 2019). Therefore, it is crucial for educators to integrate PowerPoint with other personalized instructional strategies, such as direct guidance (Parette et al., 2009), interactive educational games (Chin et al., 2024; Chuang & Jamiat, 2023), or structured motor activities, to create a more holistic learning experience (Yani et al., n.d.).

The successful use of PowerPoint media in this study also highlights its practical potential for implementation in various early childhood education institutions, particularly those with limited facilities or resources. Given that PowerPoint is a software tool that is easily accessible and user-friendly (Mamonto et al., 2023), teachers can quickly adapt learning materials to suit different themes, needs, and classroom conditions. This ease of adaptation opens opportunities for improving the quality of literacy instruction in early childhood education more broadly, especially in environments that have traditionally relied on conventional, one-way teaching methods, which are often less engaging for young children (Corbeil, 2013). This supports the notion that instructional media, even those as simple as PowerPoint, can significantly enhance learning outcomes (Atubi, 2023). The practical contribution of these findings to educational practice lies in providing concrete evidence of how widely available ICT tools can be used effectively and efficiently to address early literacy challenges while fostering a more interactive and engaging learning environment (Ilham & Desinatalia, 2022).

Nevertheless, this study has several limitations that must be acknowledged. First, the research employed a pre-experimental design without a control group, making it impossible to fully eliminate the potential influence of external factors on the results, which is a common limitation in action research in education. Second, the sample size was limited to a small group from a single educational institution, constraining the generalizability of the findings (Blanchard & Moore, 2010). Therefore, future research is recommended to adopt stronger experimental designs that include comparison groups and larger sample sizes drawn from diverse educational backgrounds. Additionally, the scope of this study was confined solely to letter recognition, leaving other important literacy domains such as phonemic awareness (Daal & Sandvik, 2012; Karemaker et al., 2010), early vocabulary development (Rochmah, 2024), and emergent reading skills unexplored. Further research should investigate these broader aspects to provide a more comprehensive understanding of the effectiveness of digital instructional media.

In conclusion, the findings of this study offer valuable practical contributions to the field of early childhood education. Teachers are encouraged to be more creative and adaptive in selecting and developing instructional media suited to the characteristics of their learners. PowerPoint can serve as an effective, cost-efficient, and easy-to-use alternative for improving the quality of instruction, especially in fostering early literacy skills. However, it should not be used as a stand-alone solution but rather combined with active and engaging teaching strategies to ensure that learning outcomes are optimized and equitable for all children.

Conclusion

This study concludes that PowerPoint-based instructional media is highly effective in improving letter recognition skills among preschool children, as evidenced by significant increases in children's ability to identify letters, articulate letter sounds, and associate letters with corresponding images after the intervention. These findings confirm that multimedia tools, when thoughtfully designed and applied, can enhance early literacy development by engaging young learners through visual and auditory stimuli, thus achieving the study's objective of exploring effective methods for fostering foundational literacy skills. The research contributes valuable insights to the field of early childhood education by demonstrating how accessible technologies like PowerPoint can be utilized to create dynamic, interactive learning experiences even in resource-limited educational settings. However, recognizing that some children may require additional support beyond multimedia interventions, it is recommended that future research investigate complementary strategies and broader literacy outcomes to ensure more comprehensive and equitable learning progress for all learners.

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