

EXAMINING THE EFFECTIVENESS OF MULTISENSORY MAGNETIC LETTER MEDIA FOR ENHANCING EARLY READING SKILLS IN EARLY CHILDHOOD EDUCATION

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ABSTRACT

Early reading skills are a fundamental aspect of early literacy development and significantly influence children's readiness for formal education. However, early reading instruction in many early childhood education settings is still predominantly delivered through conventional methods that provide limited opportunities for active and meaningful learning experiences. This study aimed to examine the effectiveness of magnetic letter media in improving the early reading skills of Group B children at TA Al Amin, Batu City. The study employed a quantitative approach using a quasi-experimental design with a nonequivalent control group design. The participants comprised 22 children aged 5–6 years, who were divided into an experimental group and a control group. Data were collected through pretests and posttests, classroom observations, and documentation. The data were analyzed using descriptive statistics, normality and homogeneity tests, paired-sample t-tests, independent-sample t-tests, and N-Gain analysis with the assistance of SPSS version 25. The findings revealed that the mean score of the experimental group increased from 26.36 on the pretest to 31.82 on the posttest, while the control group improved from 25.27 to 28.82. Furthermore, the independent-samples t-test indicated a p-value of 0.036 ($p < 0.05$), demonstrating a statistically significant difference between the experimental and control groups after the intervention. These findings suggest that magnetic letter media effectively enhance children's early reading skills, particularly in letter recognition, syllable reading, and simple word reading. This study contributes to the development of interactive and multisensory literacy instruction strategies that are developmentally appropriate for young children and may serve as an alternative learning medium for early childhood educators.

Keywords: magnetic letter media; early reading skills; early literacy; early childhood education; multisensory learning.

INTRODUCTION

Early childhood education (PAUD) plays a strategic role in laying the foundation for children's cognitive, language, social, emotional, and motor development, which will determine the quality of human resources in the future (Kasmiati, 2025; Masran, 2025). One of the necessary early developments is the ability to read, especially beginning reading. Ability: This becomes the basis for a child to understand information, communicate, and follow the learning process at the next level of education. The urgency of strengthening literacy from an early age is more important to remember. The results of the 2022 Program for International Student Assessment (PISA) show that Indonesian participants' reading ability remains below the OECD average, with a score of 359 compared to the OECD average of 476 (Prasetyo et al., 2025). The condition underscores the need for systematic efforts to improve children's reading readiness from an early age.

Ability to read begins with knowledge of letters, understanding the connection between symbols and sounds in language, reading syllables, and reading simple words (Ganarsih et al., 2022; Ismawati et al., 2024). Based on Piaget's theory of cognitive development, children aged 5–6 years are at a stage that demands preoperational use of concrete media and experiences. Study directly in the learning process. Besides that, Vygotsky and Cole (1978) emphasized the importance of social interaction and the appropriate use of media to help children reach the zone of proximal development. However, the practice of learning to read in many PAUD institutions is still dominated by conventional, teacher-centered methods and lacks involvement of exploratory child activities. Condition: This potentially lower-motivation study may hinder the development of literacy in beginning children.

Various studies have shown that the use of interactive learning media can improve reading ability in early childhood. Putri et al. (2024) and Fardani (2023) found that game-based media effectively increase reading ability through fun, experience-based learning. Research by Nafiah et al. (2022) showed that alphabet maze media can increase early letter recognition and reading, while Nirmala et al. (2024) demonstrated the effectiveness of sandpaper letters in increasing early reading ability through a multisensory approach. Findings: A similar report by Suryani (2022) showed that movable alphabet media can help children recognize letter symbols more effectively. Although a large study previously focused more on letter recognition and has not yet studied the ability to read beginning words in a comprehensive way, which includes introducing letter-sound correspondences, reading syllables, and reading simple words.

Besides that, research on the effectiveness of magnetic letter media remains relatively limited, especially studies using quasi-experimental designs in early childhood education institutions based on religious principles. In fact, magnetic letter media have characteristics that allow children to study through visual, auditory, and kinesthetic activities simultaneously. This media not only helps children recognize letter forms but also provides an active and fun learning experience through activities that compile letters, syllables, and simple words. Limitations of the study, empirically in the context of RA (Raudhatul Athfal), especially in Batu City, indicate a necessary research gap that warrants further review and continuation.

Based on the description provided, this research aims to analyze the effectiveness of using magnetic letters as a medium for improving the reading ability of beginning-level children

in Group B at TA Al Amin Batu City. Research: This is expected to make a theoretical contribution to the development of early childhood literacy studies, particularly regarding the use of multisensory, manipulable media for beginning reading. Besides that, in a practical study of the results, this can serve as an alternative for PAUD teachers to develop more effective learning strategies that are interactive, creative, and appropriate to the characteristics of early childhood development.

LITERATURE REVIEW

Ability read beginning is one of the fundamental aspects in development literacy child age early to become base for success learning at the level education next. Reading beginning is a stage in the development of reading ability that emphasizes the introduction of letters, sounds, language, syllables, and simple words (Islamy, 2023). At this stage, the child starts to understand the connection between the symbol written and the sound. Language is the basis for the development of literacy. Next, Sinaga et al. (2022) explain that reading begins as a process of recognizing written symbols, allowing the child to understand simple information through the language of symbols. Ability develops gradually and requires appropriate stimulation aligned with the characteristics of a child's early development.

Study on the ability to read, beginning with the study. This is based on the theory development of Piaget's cognitive theory and the reading theory development of Jeanne Chall. According to Piaget (1964), children aged 5–6 years are in the pre-operational stage, when they find it easier to understand concepts through concrete objects, manipulative activities, and direct experience than through abstract explanations. Therefore, the use of learning media that allows children to interact directly with objects becomes important in the learning process. Meanwhile, Chall (1983) explains that children at an early age are at the prereading stage, namely the phase when children start to recognize letters and sounds, language, and relationships between letters and sounds. At this stage, the child needs integrated visual and phonological stimulation to optimally support the development of reading ability.

One of the relevant media with characteristics for development is a magnetic letter media. Magnetic letter media is a manipulative learning medium consisting of letters that can be arranged, moved, and attached to other media, which allows children to recognize letters, compose syllables, and form simple words through interactive play (Suryani, 2022). This medium

not only functions as a visual aid but also engages auditory and kinesthetic senses for multisensory learning (Alam et al., 2025). Use of manipulatives like magnetic letters, in line with view constructivism, which places the child as the subject and actively builds their knowledge through direct experience. Besides helping children recognize letters and compose simple words, this medium also contributes to the development of motor skills, care, and motivation in children (Pattiwael et al., 2024).

Various studies have confirmed the effectiveness of interactive learning media in improving the reading ability of children in early childhood. Antariani et al. (2021), through an experimental study, find that the use of Big Book media can increase children's ability to recognize letters and read simple words at an early age. Nabila et al. (2023) use a pre-experimental design and report that the rotating alphabet media has a positive influence on the ability to read beginning through interactive play. Nafiah et al. (2022) used a research and Development approach to develop proven alphabet maze media effective in increasing the ability to recognize letters and read for early-age children. Furthermore, Nirmala et al. (2024) showed that using sandpaper letters can improve reading ability in children at the beginning of the school year, aged 5–6 years, through multisensory stimulation involving visual and kinesthetic activities. Research by Arini (2025) also found that large movable alphabet media is effective in increasing the ability to read beginning words, especially in recognizing letters, reading syllables, and reading simple words. Findings show that the media play an important role in improving the quality of early childhood literacy learning.

However, there are still several gaps in necessary research that need attention. Most previous studies focused more on letter recognition and not yet on the ability to read, in a more comprehensive way that includes introducing letter-sound correspondences, reading syllables, and reading simple words. In addition, some studies use design action classes or approach media development to provide empirical evidence on the effectiveness of magnetic letter media through quasi-experimental designs, though such studies remain limited. Research in the context of RA or institutional education, child age, and early-based religious education is also still relatively seldom found. Therefore, this research aims to fill the theoretical and empirical gap by testing the effectiveness of magnetic letter media in improving the reading ability of beginning-age children aged 5–6 years through a quantitative quasi-experimental approach. Contribution

study: This lies in strengthening empirical evidence on the use of manipulative, media-based multisensory learning in literacy, beginning with and expanding research at institutions of early childhood education based on religious institutions.

METHODOLOGY

Study This uses a quantitative approach with a quasi-experimental design to test the effectiveness of magnetic letters as a medium for reading ability in early childhood. The election approach is quantitative, based on objective research that measures treatment influence through statistical analysis. The research design used is a nonequivalent control group design, which involves group experiments and a control group without full subject randomization. The group experiment uses magnetic letter media for learning, while the group control uses conventional card letter media. This design was chosen because it aligns with the learning conditions in PAUD, maintains established class distributions, and enables measurement of reading ability through a pretest and posttest.

Study held at TA Al Amin Batu City in the even semester of the 2025/2026 academic year. Research location chosen because of the participant's own characteristics and appropriate education, with the objective of the research, namely, child Group B, aged 5–6 years, who are at the stage of development readiness for reading. The population study includes all children in group B, which consists of 22 participants. Technique of taking a sample using saturated sampling, so that the entire member population is included in the sample research. The sample was then divided into two groups: 11 children in the experimental group and 11 in the control group. Saturated sampling is chosen because the population is relatively small and homogeneous with respect to age and stage of development; read beginning.

Data collection was carried out through observation, testing, and documentation. Observation was used to assess the child's involvement during the learning process, while the test was used to measure reading ability at the beginning and after treatment. Ability to read beginning measured based on several indicators, namely knowing symbol letters, recognizing sound letters, reading simple syllables, reading simple words, and connecting sound with symbol letters. Instrument study arranged based on indicator development: Language, child age, and early, which refers to the Minister of Education and Culture Regulation Number 137 of 2014. The instrument's validity was assessed through expert judgment and analyzed using Aiken's V

index, while its reliability was assessed using Cronbach's Alpha coefficient to ensure measurement consistency (Forester et al., 2024; Subhaktiyasa, 2024).

Data analysis was performed using IBM SPSS version 25. Stage analysis began with descriptive statistics to characterize the research data. The next normality test was carried out using the Shapiro–Wilk test, and the homogeneity test used Levene's test as a prerequisite for the analysis. Hypothesis testing was conducted using a paired-samples t-test to assess a known difference in reading ability before and after treatment within each group, and an independent-samples t-test to compare the experimental and control groups. Effectiveness treatments were also analyzed using the N-Gain calculation to determine the level of improvement in reading ability from the beginning to the end of magnetic letter media use.

RESULTS AND DISCUSSION

Results

This study aims to analyze the effectiveness of using magnetic letters as a medium for the reading ability of beginning children in Group B at TA Al Amin, Batu City. Analysis results show that the ability to begin reading at the beginning of the group experiments and the control group is in a relatively good condition, equivalent. The average score for the pretest group experiment was 26.36, while the control group was 25.27. Findings: This shows that before treatment, both groups' reading abilities were comparable, making it worthwhile to compare the treatment's effectiveness.

During the ongoing learning process, the second group experiences improvement in reading ability. However, the increase in the group experiment was greater than in the group control. The average score in the posttest group experiment increased to 31.82, while the control group reached 28.82. The difference in improvement scores in group experiments shows that magnetic letter media provide greater stimulation, which is effective in helping children recognize letters, read syllables, and understand simple words, compared to conventional learning media.

Prerequisite test results indicate that the research data have homogeneous variance, with Levene's test significance values of 0.206 for the pretest and 0.110 for the posttest ($p > 0.05$). Furthermore, the results of the paired sample t-test showed that the ability to read improved significantly in both groups, with a significance level of 0.000 ($p < 0.05$). Although the second

group experiences an increase, the group experiment shows further improvement compared to the group control.

Effectiveness: The use of magnetic letter media is increasingly supported by the results of the independent-samples t-test, which shows a significant p-value of 0.036 ($p < 0.05$). This result indicates a significant difference in the abilities of beginning children in the experimental and control groups after treatment. Thus, the research hypothesis that magnetic letter media affects the reading ability of beginning children is accepted. **Findings:** This shows that effective use of magnetic letter media improves the ability to read in beginning children at an early age in the areas of introducing letters, introducing letter sounds, reading syllables, and reading simple words.

DISCUSSION

Findings from the study show that magnetic letter media is effective at improving reading ability in early childhood. This result is in line with Piaget's (1964) cognitive theory, which posits that children aged 5–6 years are in the pre-operational stage, namely the phase in which children more readily understand concepts through concrete objects and manipulatives. Magnetic letter media offers children a chance to interact directly with letters and symbols through activities such as sticking, moving, and arranging them to form syllables and simple words. Activities that allow children to build understanding actively make the learning process more meaningful than learning centered solely on the teacher's explanation.

Research results also support theory development, as noted by Chall (1983), who emphasized that at the prereading stage, the child needs visual and phonological stimulation to understand the connection between letters and sounds in Language. Magnetic letter media can integrate the second aspect through multisensory experiences that involve sight, hearing, and physical activity simultaneously. **Condition:** This helps children more easily recognize letter forms, connect letters to sounds, and gradually understand the structure of syllables and simple words.

The findings of this study are consistent with the results of a previous study demonstrating the effectiveness of manipulatives in early literacy learning. Antariani et al. (2021) found that using the Big Book can increase children's reading ability at an early age. Similar results were reported by Nabila et al. (2023), who showed that the rotating alphabet media can

improve letter recognition and syllable reading. Research by Nafiah et al. (2022), Nirmala et al. (2024), and Arini (2025) also proved that learning media based on manipulation and multisensory approaches have a positive impact on the development of reading ability in beginning children. Thus, the results of this study strengthen empirical evidence that the use of interactive and concrete learning media is an effective strategy for developing literacy in early childhood.

From a practical perspective, the use of magnetic letter media can create a more learning-active, fun, and child-centered atmosphere. During the learning process, children show more enthusiasm than when using conventional media. Characteristics of media that can be touched, moved, and arranged in a way that directly involves the child in the learning process. Findings: This shows that PAUD teachers need to consider the use of manipulative media as alternative learning strategies to increase the quality of literacy early in class. Besides that, magnetic letter media is relatively easy to use, economical, and can be customized with various themed learning applied in PAUD.

In a theoretical sense, this research contributes to the development of early literacy in children, strengthening the relevance of Piaget and Chall's theories to context-based beginning reading learning through manipulative media. In empirical research, this fills a gap in previous studies by testing the effectiveness of magnetic letter media through a quasi-experimental design in religiously based early childhood education institutions that have been seldom examined in prior research. Thus, this research expands the scientific evidence on the effectiveness of multisensory learning media in improving reading ability in early childhood.

Although this research has several limitations, the sample size is relatively small, and the research is conducted at only one educational institution; therefore, generalizing the results of the study requires careful consideration. Besides that, research has not yet considered external factors like environmental literacy, family reading habits at home, and parental involvement, which also have the potential to influence children's reading development. Therefore, the research further recommended involving more samples and testing the effectiveness of magnetic letter media across various educational contexts, as well as integrating family-environment variables to gain a more comprehensive understanding of the factors influencing children's literacy development.

CONCLUSION

This study proves that the effective use of magnetic letter media improves the reading ability of beginning children aged 5–6 years at TA Al Amin, Batu City. Research results show an improvement in reading ability at the beginning of the group that received instruction using magnetic letter media, as indicated by an increase in the average score from 26.36 on the pretest to 31.82 on the posttest. Meanwhile, the group control also improved; however, its achievements were lower than those of the group experiment. Results of the difference test show a significant influence of using magnetic letters as a reading medium for beginning children.

The study's findings strengthen theory development. Piaget's cognitive theory emphasizes that children at an early age find it easier to understand concepts through experience. Study is concrete and manipulative. The research results also support theory development, as noted by Chall, who explained that the ability to read develops through visual, phonological, and experiential stimulation and meaningful learning. Magnetic letter media provides an experience. Study possible multisensory child recognition of letters, understanding the connection between symbols and sounds in language, and reading syllables and simple words more effectively.

In a way, practical research shows that magnetic letter media can serve as an innovative alternative learning medium to improve the quality of literacy learning in early childhood education. The characteristics of interactive, concrete, and enjoyable media can increase children's involvement in the learning process, making early reading instruction more effective and better suited to young children.

Contribution to scientific study: This lies in providing empirical evidence of the effectiveness of magnetic letter media through a quasi-experimental design in the context of early childhood education in religious institutions. This topic is still relatively seldom researched. In addition, this study's reading instruction begins more comprehensively, covering introductory letters, introductions to sound letters, reading syllables, and reading simple words. In contrast, the study's previous findings generally focused only on letter recognition.

The study furthermore recommended using a larger sample size, expanding coverage to include research on various types of early childhood education institutions, and considering external factors such as the family literacy environment, reading habits at home, and parental involvement in supporting children's literacy development. Thus, an understanding of the

effectiveness of learning media in developing reading ability can be obtained more comprehensively and has a stronger level of generalization.

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