

DEVELOPMENT OF BUSY BOARD MEDIA ON FINE MOTOR ABILITIES OF 4-5 YEAR OLD CHILDREN

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ABSTRACT

The low fine motor skills of early childhood and the lack of practical and integrated learning aids remain challenges in school education. To address this, research and development (R&D) aims to describe the development process of a flannel-based Busy Board with an open-close mechanism, assess its feasibility, and analyze its effectiveness in improving children's fine motor skills. The study used the ADDIE development model combined with a one-group pretest-posttest pre-experimental design. The study participants consisted of 14 children aged 4–5 years from Group A2 at RA Hj. Sri Musiyarti. The sample selection was carried out by purposive sampling based on the proximity of the class location during the implementation of the Field Experience Program (PLP). Data were collected through interviews, expert validation, and observation. The results of the study showed that the development process produced a product that meets children's stimulation needs. The Busy Board media was considered very feasible with a perfect score of 100% from both material experts and media experts. This media is proven to be effective, where the average score of fine motor skills increased from 7.57 (pre-test) to 18.43 (post-test) ($t = -32.988$, $p < 0.001$) with average N-gain score of 0.88 (high category). The novelty of this research lies in the practical, lightweight, and easy-to-carry flannel-made open-close design, making it an alternative to the generally heavy and rigid wooden Busy Board. This study concludes that the Busy Board media meets the criteria for development, feasibility, and effectiveness in optimizing children's fine motor skills.

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INTRODUCTION

Early childhood education or commonly known as PAUD is one of the important foundations that functions to provide stimulation for the growth and development of children from an early age, as regulated in the National Education System Law Number 20 of 2003 Article 9 paragraph 1 has been emphasized that every child has the right to receive education and teaching to develop personality and intelligence according to their interests and talents (Sudaryanti, 2015). Child development is closely tied to the golden age period, this occurs when children are under 5 years old or toddlers. The golden age period or golden period is very effective and important to optimize the various potential intelligence possessed by children to achieve quality human resources (Uce, 2015). The golden age period cannot be repeated, because this phase only occurs once in a human life (Trenggonowati & Kulsum, 2018). Thus, the golden age period is a crucial determinant in shaping the quality of human resources in the next

developmental phase. Neglecting to fulfill children's needs during the golden period risks resulting in suboptimal growth and development. Delays in achieving developmental milestones in childhood have the potential to become developmental barriers at later stages (Oktaviani & Hasanah, 2022).

Based on aspects of child development, one of the abilities that must be stimulated is the physical motor aspect, especially fine motor skills (Y. Hidayat & Nurlatifah, 2023). Fine motor stimulation is the ability to use the fingers and eyes. Hurlock (1980) argues that fine motor skills are a manifestation of movement coordination in small muscles such as the fingers and eyes. Fine motor skills are movement abilities that involve the coordination of small muscles, hands, and eyes. Fine motor development begins with a simple grasp reflex which will then develop into more organized movements with increasing age and experience. In general, the development of simple fine motor control begins to show progress in the 4-6 year age range. Then, this ability develops at the age of 5-12 years, marked by a significant increase in skills in the wrist muscle area. Fine motor skills are important to train as early as possible because they require a high level of patience and precise coordination, speed, and high concentration (Aulina, 2017). However, this condition has not been fully achieved in the field. Based on the results of observations and observations that have been carried out at RA HJ. Sri Musiyarti in group A2, researchers found that the fine motor aspects of children have not developed optimally. This is seen in children's activities such as coloring, cutting, collage, writing the alphabet that still require teacher assistance. This problem arises due to a lack of stimulation of the strength and flexibility of the fingers. During coloring activities, most children color outside the lines, cut outside the pattern on the paper, collage is not neat, and write the letters of the alphabet that are still upside down. On the other hand, the institution lacks educational game tools, especially for the fine motor aspect, so that learning tends to be monotonous, lacks variety, making children easily bored. It is important to explore methods that can improve children's fine motor skills through interesting educational media. One effective stimulation is through the use of educational game tools in the form of a Busy Board.

A Busy Board is a board game specifically designed to train young children to play while learning. The main focus of this media is to engage children in various activities that are not only entertaining but also educational (Dimas & Akmal, 2022). The use of a Busy Board can encourage children to be independent, increase focus, and recognize the function of various objects around them (Yuliasari et al., 2020). In line with this, Hasanah & Nurahayati (2023) found that activities using Busy Board media can also significantly improve hand muscle control skills in children aged 4-5 years during activities. The use of Busy Board media has been proven effective in stimulating children's active participation through exploration-based and manipulative learning methods, which are the main characteristics of early childhood education (Ningsih et al., 2025). Although previous research has proven the effectiveness of Busy Boards on fine motor skills, their current use is still dominated by the use of rigid and heavy wood or plywood. The limitations of these older designs created a research gap, with aspects of portability and mobility, as well as safety and comfort factors, rarely addressed. Wooden board media was considered impractical and had a hard surface, limiting children's stimulation. Furthermore, most previous research focused on one-way effectiveness tests without involving a comprehensive product assessment process by media and materials experts prior to testing.

To overcome these problems, this study offers a new innovation in the form of developing an open-close Busy Board media that combines a sturdy board structure with flannel material. The fundamental difference between this study and previous studies lies in three main aspects. First, the innovation of media and materials that use a board frame on the inside so that the media can stand upright and sturdy when played, but made of soft flannel material and safe for the physical of early childhood. Second, the design form carries the concept of an open-close board model that is efficient, compact when closed, can stretch widely when opened, and is very practical and easy to carry anywhere. Third, the process of developing the Busy Board media goes through a sequential evaluation stage, starting from the assessment of product quality by material and media experts, to direct use trials in the field. Based on this background, the formulation of the problem in this study is 1) How is the process of developing an open-close Busy Board media with flannel cloth wrapping using the ADDIE development model? 2) What is the level of feasibility of the Busy Board media based on the assessment of material and media experts? 3) How effective is the use of the innovative Busy Board media in improving the fine motor skills of children in group A2 at RA HJ. Sri Musiyarti? Therefore, this study aims to describe the process of developing an open-close Busy Board media made of flannel based on the ADDIE model stages, measure the feasibility level of the Busy Board media through a validation process from material experts and media experts, and directly test the effectiveness of the application of the Busy Board media in improving the fine motor skills of children in group A2 at RA HJ. Sri Musiyarti.

METHOD

This study uses a research and development approach by applying the ADDIE model (Mutmainnah, 2022). This research was conducted in June 2026 at RA HJ. Sri Musiyarti, an environmentally friendly school located on Jalan Anyer Duwet Bringin, Ngaliyan District, Semarang City, Central Java. The population of this study was all children in group A at RA HJ. Sri Musiyarti spread across 4 different classes. The sampling technique used purposeful sampling, where the researcher determined group A2 with a sample size of 14 students. Meanwhile, the object of the research developed was an open-close Busy Board educational game made of flannel cloth that was equipped with a user guide. The test used a pre-experimental design with a one-group pretest and posttest design model. This design was chosen because the limited number of classes in the research field did not allow for the formation of a control group. The absence of a control group is a limitation of this research, but effectiveness is still measured strictly through a comparison of values. The Busy Board media development procedure was designed through five main stages based on the ADDIE model developed by Robert Maribe Branch (2009), namely: a) Analysis, this stage identifies the fine motor skills problems of group A children at RA HJ. Sri Musiyarti and analyzes the need for appropriate learning media in the institution. b) Design, this second stage focuses on creating a Busy Board media design plan and compiling an assessment instrument. c) Development, the development stage includes media production activities and conducting product feasibility validation tests with material experts and media experts (Oktarina, 2022). d) Implementation, this stage tests the Busy Board directly in classroom learning in group A to measure its effectiveness on children's fine motor skills. e) Evaluation, the evaluation stage is carried out through two approaches, namely formative evaluation to improve the media at each stage and summative evaluation to measure the final achievement of children's fine motor development (Fayrus et al., 2022). Data was collected through direct observation and interviews using instruments such as a pre-test (before the intervention) and a post-test (after the intervention). In the pre-test, children's initial abilities were measured using real-world tools available in the classroom, such as a real microphone and geometric shape games. The post-test was conducted by observing children's activities using the Busy Board. To maintain validity, all instruments and media were tested using a Likert scale of 1-4. The basis for determining media suitability categories by material and media experts is presented in Table 1. The fine motor stimulation components represented by each Busy Board game are presented in Table 2. The criteria and descriptions of children's developmental achievements are presented in Table 3.

Table 1, Media Suitability Criteria by Material and Media Experts

Achievement Percentage	Interpretation
81-100 %	Very Good
61-80 %	Good
41-60	Fairly Good
21-40 %	Not Good
0-20 %	Not Good

Source : Data by researchers

Table 2, Fine Motor Stimulation Component Indicators in Each Busy Board Game

No	Game Representation on Busy Board Media	Stimulation Components	Explanation
1.	Tying shoelaces	Flexibility of the fingers	Able to move fingers flexibly.
2.	Matching geometric shapes	Accuracy and Coordination	Able to precisely align eye gaze and hand movements to stick or match objects.
3.	Buttoning up clothes	Accuracy	Able to control the coordination of the fingers to direct and insert objects such as buttons into holes.

4.	Counting the number of buttons on a train	Accuracy in calculation	Able to synchronize finger movements to pick up small objects one by one according to the specified number symbols.
5.	Singing with a microphone	Grip strength	Able to control the strength of the palm and finger muscles to hold or release objects.

Source : Data by researchers

Table 3, Criteria for Achieving Children's Fine Motor Development

Rating Scale	Category	Explanation
1	BB (Not Yet Developed)	If the child is not able to complete the activity in the Busy Board game even though the teacher has given an example
2	MB (Beginning to Develop)	If the child has started to be able to try to complete activities in the Busy Board game, but still needs help or direction from the teacher
3	BSH (Developing as Expected)	If the child is able to complete the challenges in the Busy Board game independently, correctly and consistently without the help of a teacher
4	BSB (Developing Very Well)	If the child is able to complete the Busy Board game independently very quickly, accurately, neatly and is able to help friends who are having difficulties

Source : Adapted from Permendikbud No. 137 of 2014

Data analysis uses a quantitative descriptive approach to answer a problem and collect more comprehensive data (Yusuf, 2014). Data were analyzed quantitatively using SPSS 2025 software. The normality test for data distribution was conducted using the Shapiro-Wilk method ($N = 14$) on the Gain Score value. If the data value is normally distributed ($P > 0.05$), then the hypothesis test is continued using the Paired Samples T-Test.

RESULT AND DISCUSSION

Busy Board Media Development Stages

This research aims to develop a Busy Board learning medium that educators can use to help improve fine motor skills in children. The findings regarding the stages of Busy Board media development in this research are as follows:

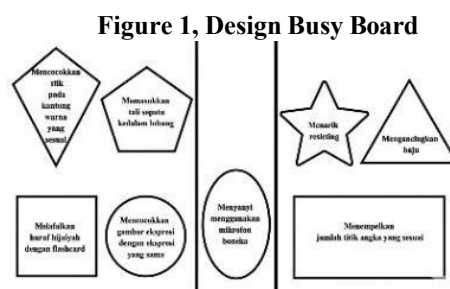
Analysis Stage

The initial stage in the Busy Board development process is analysis, which focuses on the factors causing problems in learning activities. To achieve this, educators are required to establish appropriate instructions and set achievement targets for problem-solving based on empirical evidence to optimize children's potential for learning success (F. Hidayat & Nizar, 2021). Researchers conducted interviews with class teachers in Group A2 at RA HJ. Sri Musiyarti. The interviews revealed a problem, namely the lack of available learning media, particularly for children's fine motor development. This indicates an urgent need for the development of innovative and creative learning media for early childhood.

Design Stage

The design stage involves developing a concept for the Busy Board, complete with instructions for use. Researchers designed the Busy Board, considering ease of use for teachers and children's visual appeal (Viana, D.L., & Harahap, 2025). The tools and materials used to create the Busy Board included flannel, thread, glue, buttons, elastic, adhesive, plywood, scissors, shoelaces, pencils, and needles. The Busy Board design is divided into several sections. The front cover features a variety of vegetables, and the back cover features fruits. These themes were chosen to encourage children's imagination and vocabulary development. On the right side of the Busy Board, there are four games: matching sticks to the corresponding colored bags, tying shoelaces, matching pictures with the same expression, and reciting the Hijaiyah letters using flashcards. On the left side, there are four games: singing

using a doll microphone, buttoning clothes, zipping up, and matching the number of train dots to the correct number. The guide is designed to help educators understand the steps of the Busy Board media game from the beginning to the end.



Source: Design 8 Media Busy Board

Development Stage

The Busy Board media development process involved three validation stages conducted by subject matter and media experts to ensure product feasibility. Researchers selected subject matter and media expert validators to help validate the Busy Board's feasibility before testing it on research subjects in Group A2. The validators provided notes regarding the media's effectiveness for early childhood. The following table details the Busy Board media validation process.

Table 4, 3 Stage Busy Board Validation Flow

Material Expert Score	Media Expert Score	Input From Material Experts and Media Experts
85 %	65 %	Subject Matter Expert: Pay attention to the instructions given to children to ensure they are easily understood. Pay attention to the color selection, from the basics to the media used in each game. Media Expert: Instructions for use are not manuals. Games should be reduced to the developmental goals to be achieved. Color selection should be tailored to the characteristics of children, who generally prefer bright, attractive, and challenging colors.
95 %	85%	Material Expert: The media used is excellent, as seen from the material selection and color scheme. However, the activity names could be changed to all lowercase. Media Expert: All sides should be sewn to make them more attractive. Include activity names on all games on the Busy Board. The user guide should differentiate between rules and types of activities. Buttoning games should be left on the outside and larger.
100 %	100 %	Subject Matter Expert: Busy Board is very suitable for children aged 4-5 years to stimulate various aspects of their development. Media Expert: You can now move on to the next activity.

Source: Data by researchers

Based on the table above, the process or flow of Busy Board media development was carried out through

three stages. In Stage I, the Busy Board media with 8 games obtained a score of 85% from material experts and 65% from media experts with several notes for improvements such as color selection adjusted to child characteristics, instructions for use that must be considered, and play activities that must be reduced. Researchers followed up on suggestions for improvement from validators by conducting a complete product revision. Researchers reduced the number of games from the initial 8 to 5 types of play activities. The five games include tying shoelaces, matching geometric shapes, buttoning clothes, counting the number of buttons on a train, and singing into a microphone. Next, researchers submitted to Stage II validation. At this stage, the score obtained 95% from material experts and 85% from media experts with notes for improvements including changing the format of writing activities using lowercase letters, sewing the edges on the Busy Board media, and moving the buttoning activity to the back cover area. The refined product was then resubmitted to Stage III as a form of final verification. In Stage III, a score of 100% was obtained from material experts and 100% from media experts. Both validators stated that the Busy Board media was ready for field testing.

Implementation Stage

Figure 2, Busy Board Media



Source : Data by researchers

After going through the improvement stages based on the validator's suggestions (material experts and media experts), the game activities on the Busy Board media were simplified into 5 main aspects, namely tying shoelaces, matching geometric shapes, buttoning clothes, counting the number of buttons on the train, singing with a microphone. Then, researchers began conducting direct trials which were conducted in June 2026 involving 14 children in group A2 aged 4-5 years at the RA HJ. Sri Musiyarti institution. The implementation was designed to test the effectiveness of the Busy Board media in improving children's fine motor skills in a structured manner through 5 games that had been integrated into one media board.

Figure 3, Busy Board Media Trial in Group A2



Source : Data by researchers

The implementation process began with an initial testing phase, or pre-test. During this phase, the researcher utilized actual objects already available in the classroom such as shoes for practicing tying shoelaces, blocks for matching geometric shapes, the children's own button-up shirts for buttoning practice, seeds in a container for counting exercises, and a real microphone for singing activities. These real objects were used to assess the children's baseline fine motor skills prior to the introduction of the newly developed Busy Board. Observations during the pre-test revealed that the children tended to take longer and struggled to coordinate their finger muscles, as the existing classroom objects were not fully designed to be child-friendly for fine motor skill development. Subsequently, the researcher implemented an intervention using the Busy Board, which integrated those five activities into a single play device. Once the full sequence of activities was completed, a final testing phase or post-test was conducted using the Busy Board to evaluate the extent of improvement in the children's fine motor skills. The implementation of the Busy Board proved effective in tangibly enhancing the children's focus and learning enthusiasm. This success was supported by the use of soft felt fabric, which provided comfortable sensory stimulation, and a design size tailored to the physical characteristics of early childhood learners. The following table presents the pre-test and post-test results, as well as the N-Gain scores, regarding the effectiveness of the Busy Board in improving the fine motor skills of children aged 4–5 years:

Table 5, Pre-test, Post-test, and N-Gain Score Results for the Use of Busy Board Media

No	Busy Board Activity Indicator	Average Pre-test Score	Average Post-test Score	N-Gain Score
1.	Tying shoelaces	1,14	3,21	0,72
2.	Matching geometric shapes	1,79	3,86	0,94
3.	Buttoning clothes	1,43	3,64	0,86
4.	Counting buttons on a train	1,50	3,86	0,94
5.	Singing into a microphone	1,71	3,86	0,94
Overall Total Average		1,51	3,69	0,88

Source: Data by researchers

Based on Table 5, a significant improvement in the children's fine motor skills is evident following the use of the Busy Board learning aid. The average child development score rose significantly from 7.57 (pre-test) to 18.43 (post-test).

This successful improvement is supported by an average N-Gain score of 0.88. According to Hake (1998) classification, this value falls within the high improvement category ($g \geq 0.70$). An analysis by activity reveals that the highest N-Gain scores were achieved in the activities of matching geometric shapes, counting buttons on the toy train, and singing into a microphone, each recording a score of 0.94.

Evaluation Stage

Based on the results of the conducted trials, the researcher carried out the evaluation phase the final step of the ADDIE method to measure the product's success, effectiveness, and quality using data obtained during the implementation phase. Testing began with a prerequisite test specifically, a normality test to determine whether the distribution of the differences between pre-test and post-test scores met the requirements for parametric statistics. Given the limited sample size ($n = 14$), the Shapiro-Wilk method was employed. The results of this prerequisite test are presented in Table 6 below:

Table 6, Results of the Shapiro-Wilk Normality Test

Tests of Normality			
Shapiro-Wilk			
Data variables	Statistic	df	Sig.
Fine Motor Skills Group	.882	14	.061

A

Source: Data by researchers

Based on Table 6, a significance value (p-value) of 0.061 was obtained. Since this value exceeds the significance level of 0.05 ($0.061 > 0.05$), it can be concluded that the data regarding the difference in research

researcher selected this specific class because they were conducting a field experience program (PLP) there, allowing for familiarity with the children's characteristics and a more focused implementation of the intervention. However, given the small sample size and single-class scope, the observed improvements in fine motor skills cannot necessarily be generalized to much larger groups of children in other schools. 2) Absence of a control group. This development study employed a pre-experimental one-group pretest-posttest design without a comparison (control) group.

Consequently, it is difficult to definitively attribute the improvement in fine motor skills solely to the Busy Board intervention, as natural developmental maturation during the study period may have also played a role. 3) Geographical scope. The study was conducted at a single early childhood education institution (RA Hj. Sri Musiyarti) therefore, the findings regarding the medium's effectiveness might not be replicated in institutions with different social backgrounds and school environments.

Regarding product refinement, a practical challenge arose during the shoelace-tying activity: most children were unaccustomed to using lace-up shoes in their daily lives, as the majority of young children today typically wear Velcro or slip-on shoes. The lack of familiarity with the task meant that the shoelace-tying activity required additional adjustment time and guidance from the researcher while it was underway. Another technical issue arose when a component specifically the label identifying the activity detached after being pulled by a child; this occurred because the adhesive used was not strong enough. In response to this evaluation, the researcher revised the design by using a different type of adhesive for the label to ensure it would be more secure and durable during use.

CONCLUSION

Based on the research and development conducted, it can be concluded that the Busy Board learning aid developed using the ADDIE model is rated as excellent and suitable for early childhood education. Feasibility assessments by subject matter and media experts yielded a perfect score of 100%. The Busy Board proved highly effective in enhancing the fine motor skills of children aged 4–5 (Group A2) at RA Hj. Sri Musiyarti. This effectiveness is evidenced by an increase in the children's average score from 7.57 in the pre-test to 18.43 in the post-test, supported by an average N-gain score of 0.88, which falls into the high improvement category. The Busy Board serves as a practical, safe, and engaging alternative learning aid for stimulating children's fine motor skills in school settings, whether used independently or as part of an integrated curriculum.

Practical challenges identified in the field highlight two key issues requiring attention from teachers and developers: children often lack experience tying shoelaces (due to the prevalence of slip-on or velcro shoes), necessitating consistent guidance with the Busy Board to improve finger dexterity; and activity labels are prone to detaching during play. Consequently, teachers or developers are advised to reinforce material attachment techniques using stronger adhesives.

Future researchers interested in developing or testing similar aids are encouraged to: test the Busy Board with a significantly larger sample size (beyond a single class) to demonstrate its benefits across a broader group of children; employ a true experimental design with a control group to accurately confirm that fine motor skill improvements stem directly from the intervention; and develop a wider variety of activities on the Busy Board to stimulate other developmental domains, such as cognitive, socio-emotional, language, and artistic skills.

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