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Development of a Transportation Miniature Educational Play Tool to Stimulate Higher-Order Thinking Skills (HOTS) among Group B Kindergarten Children at TK Negeri 5 Banda Aceh

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Abstract

This study aimed to develop a Transportation Miniature Educational Play Tool (APE) to stimulate Higher Order Thinking Skills (HOTS) among Group B children at TK Negeri 5 Banda Aceh. The study employed a Research and Development (R&D) method using the ADDIE development model, which consists of the stages of Analysis, Design, Development, Implementation, and Evaluation. The research subjects included a media expert, a material expert, a Group B teacher, and Group B children at TK Negeri 5 Banda Aceh. Data were collected through observation, questionnaires, and documentation. The research instruments consisted of media expert validation sheets, material expert validation sheets, teacher response questionnaires, and observation sheets for assessing children's HOTS. The results indicated that the developed Transportation Miniature APE met the criteria of being highly valid, as evidenced by media and material expert validation scores that reached 100% after revisions. Teacher responses also showed that the media was practical and easy to use in the learning process. Furthermore, the use of the Transportation Miniature APE increased children's engagement in activities such as observing, classifying, comparing, analyzing, and solving simple problems, which are indicators of HOTS. Therefore, the Transportation Miniature APE was found to be valid, practical, and effective, making it suitable for use as a learning medium to stimulate higher-order thinking skills among Group B children at TK Negeri 5 Banda Aceh.

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1. INTRODUCTION

According to Risnawati (2020), early childhood refers to individuals who are undergoing a rapid and fundamental developmental process that serves as the foundation for their future lives. Children are naturally egocentric, possess a strong sense of curiosity, are social beings, unique, imaginative, have short attention spans, and are in the most potential period for learning. Early Childhood Education (ECE) is an educational service designed to facilitate children's growth and development comprehensively by emphasizing all aspects of their personality development. Therefore, ECE provides opportunities for children to develop their personalities and potentials to the fullest extent.

Early childhood development encompasses physical, cognitive, social, and emotional changes that occur from birth until approximately eight years of age. This period is crucial in a child's life, as they develop fundamental skills, learn new concepts, and build relationships with their environment and the people around them. Consequently, early childhood is considered a highly important stage of human development because growth and development occur very rapidly during this period. This stage is often referred to as the *golden age*, a period when children are highly responsive to various forms of stimulation that support their physical, cognitive, social, and emotional development. In accordance with the National Standards for Early Childhood Education, ECE aims to provide educational stimulation that supports children's growth and development, preparing them for the next level of education. Therefore, appropriate learning experiences are needed to optimize all aspects of children's developmental potential (Hayati & Putro, 2021).

According to Rahmadani, Mawadda, and Gusmaneli (2024), learning strategies in Early Childhood Education are general patterns of interaction between teachers and children in implementing learning and play activities. One of the major challenges in education is the weakness of the learning process itself. In many learning activities, children are not sufficiently encouraged to develop their thinking abilities. Classroom instruction often focuses on memorization, where children are directed to remember and store information without being required to understand the information they have learned.

Learning activities for young children should be designed through play-based experiences because play enables children to explore their environment, gain meaningful experiences, and develop various life skills. Through play, children actively interact with objects and situations around them, thereby supporting the development of cognitive abilities and problem-solving skills. Early childhood education should not only focus on knowledge acquisition but also encourage children to think critically and creatively (Suryana, 2021; Sulaeman, 2022).

One important ability that should be stimulated from an early age is Higher Order Thinking Skills (HOTS). HOTS refers to thinking abilities that involve analyzing, evaluating, and creating. Children who possess HOTS are able to think critically, solve problems, make decisions, and generate creative ideas. According to Salmah et al. (2024), HOTS is closely related to cognitive abilities that enable learners to analyze, evaluate, and innovate in various learning situations. Similarly, Hafifah et al. (2025) stated that critical and creative thinking are the primary characteristics of higher-order thinking because they encourage individuals to generate innovative solutions to various problems.

However, preliminary observations conducted at TK Negeri 5 Banda Aceh revealed that children's HOTS still need improvement. The learning process is predominantly supported by media such as magazines and posters, while children tend to follow teachers' instructions with limited opportunities to explore, analyze, and solve problems independently. As a result, learning activities remain focused on Lower Order Thinking Skills (LOTS), such as memorizing and imitating, rather than fostering critical and creative thinking abilities.

Previous studies have highlighted the importance of Educational Play Tools (*Alat Permainan Edukatif* or APE) in supporting children's development. Agustia (2023) explained that APE is a play medium designed to provide educational value while maintaining the enjoyment of play. Hidayat and Audiyah (2023) stated that the use of APE can help establish concrete thinking foundations, improve

concentration, and provide meaningful learning experiences for children. Furthermore, Syahreni et al. (2024) found that APE enhances learning motivation and supports the effectiveness of the learning process. Research conducted by Ferdila and Us (2021) discussed transportation concepts as learning materials, while Prihadianto and Darmo (2021) explained that miniature vehicles can serve as engaging learning media for children. Meanwhile, Hidayah and Rohimah (2025) emphasized that learning activities that provide opportunities for children to solve problems can effectively stimulate higher-order thinking skills.

Although previous studies have examined APE, transportation media, and HOTS separately, research specifically focusing on the development of transportation miniature APE designed to stimulate higher-order thinking skills in early childhood remains limited. Therefore, the novelty of this study lies in the development of a Transportation Miniature Educational Play Tool that integrates transportation materials with HOTS-based learning activities. Through this approach, children are not only introduced to different types of transportation but are also actively involved in observing, classifying, comparing, analyzing, and explaining the reasons behind the decisions they make during the learning process.

Based on the above rationale, this study aims to develop a Transportation Miniature Educational Play Tool (APE) and determine its validity, practicality, and effectiveness in stimulating Higher Order Thinking Skills (HOTS) among Group B children at TK Negeri 5 Banda Aceh.

2. METHOD

This study employed a **Research and Development (R&D)** method aimed at developing and producing an educational product in the form of a **Transportation Miniature Educational Play Tool (APE)** to stimulate **Higher Order Thinking Skills (HOTS)** in early childhood. The development model used was the **ADDIE model**, which consists of five stages: **Analysis, Design, Development, Implementation, and Evaluation** (Tegeh & Kirna, 2021; Rustandi, 2021).

a. The **Analysis** stage was conducted through preliminary observations to identify learning needs and problems occurring at TK Negeri 5 Banda Aceh. The results indicated that the higher-order thinking skills of Group B children were still relatively low, and the available learning media were limited.
b. The **Design** stage involved designing the Transportation Miniature APE based on the characteristics of children aged 5–6 years. The media were designed in the form of transportation miniatures consisting of land, sea, and air transportation categories. At this stage, learning objectives, HOTS indicators, media utilization scenarios, and assessment instruments were also developed.
c. The **Development** stage involved producing the media according to the established design and conducting validation by a media expert and a material expert to determine the product's feasibility. Suggestions and feedback from the validators were used as the basis for revising and improving the product before the trial implementation.
d. The **Implementation** stage was carried out through a limited trial involving Group B children at TK Negeri 5 Banda Aceh. During this stage, the product was introduced and utilized in learning activities to determine its practicality and effectiveness.

e. The **Evaluation** stage was conducted to assess the entire development process and the outcomes of the product in order to determine the feasibility, practicality, and effectiveness of the developed Transportation Miniature APE.
f. This research was conducted at **TK Negeri 5 Banda Aceh**. The research subjects consisted of one media expert, one material expert, one Group B classroom teacher, and Group B children of TK Negeri 5 Banda Aceh as participants in the product trial.
g. The data collection techniques used in this study included **observation, questionnaires, and documentation**. Observation was employed to monitor the development of children's HOTS during the use of the media. Questionnaires were administered to the media expert, material expert, and teacher to obtain data regarding the feasibility and practicality of the product. Documentation was used to support the research data through photographs and records of activities conducted during the learning process.

The collected data were analyzed using **descriptive quantitative analysis techniques**. Expert validation data were analyzed using percentage formulas to determine the product's feasibility level. Practicality data were obtained from teacher response questionnaires and converted into percentages. Meanwhile, the effectiveness of the media was analyzed through children's HOTS pretest and posttest results. Prior to hypothesis testing, the data were tested for normality using the **Shapiro–Wilk test**. Subsequently, hypothesis testing was conducted using the **Paired Sample t-Test** at a significance level of **0.05** to determine whether there was an improvement in children's higher-order thinking skills after using the Transportation Miniature Educational Play Tool (APE).

3. RESULTS AND DISCUSSION

The analysis stage was conducted through preliminary observations and interviews with teachers at TK Negeri 5 Banda Aceh. The findings revealed that children's higher-order thinking skills had not yet developed optimally. Learning activities tended to focus on memorization and following teachers' instructions, resulting in limited abilities in analyzing, comparing, classifying, and solving simple problems. In addition, the learning media available were limited to magazines and posters, which were insufficient to provide concrete and engaging learning experiences for children.

Based on these findings, there was a need for learning media that aligned with the characteristics of early childhood learners and provided opportunities for critical and creative thinking. Therefore, a Transportation Miniature Educational Play Tool (APE) was developed, incorporating activities such as classifying, comparing, selecting, and solving simple problems related to land, sea, and air transportation.

a. Design

At the design stage, the researcher developed research instruments, including media expert validation sheets, material expert validation sheets, teacher response questionnaires, and observation sheets for assessing children's HOTS. Subsequently, the Transportation Miniature APE was designed to include three categories of transportation: land, sea, and air transportation.

The media were designed using attractive colors and materials that were safe for children aged 5–6 years. Furthermore, the activities embedded in the media were aligned with HOTS indicators,

enabling children to classify types of transportation, compare vehicle functions, select appropriate transportation modes for specific situations, and justify their choices.

b. Development

The development stage involved producing the media according to the established design. After the product was completed, validation was conducted by a media expert and a material expert to determine its feasibility.

The first-stage media expert validation resulted in a score of **55%**, categorized as feasible with revisions. Following improvements based on the validator's suggestions, the validation score increased to **100%** in the second stage, indicating that the product was highly valid and suitable for use without further revisions. This improvement demonstrates that the revisions successfully enhanced the design, safety, and visual appearance of the media.

Similarly, the first-stage material expert validation resulted in a score of **50%**, categorized as moderately feasible. After revising the content and presentation of the material, the second-stage validation score increased to **100%**, indicating that the product was highly valid and suitable for use without revisions. These results suggest that the content of the Transportation Miniature APE is appropriate for children aged 5–6 years, aligns with the early childhood education curriculum, and supports the development of higher-order thinking skills.

c. Implementation

The implementation stage was carried out through a limited trial involving Group B children at TK Negeri 5 Banda Aceh. The product was integrated into learning activities through play-based experiences using transportation miniatures.

During the implementation process, children demonstrated increased participation and engagement in learning activities. They were able to classify vehicles according to their categories, compare the functions of different transportation modes, justify their choices, and attempt to solve simple problems presented by the teacher. These activities indicate that the developed media provided meaningful learning experiences and encouraged higher-order thinking processes.

Furthermore, teacher responses indicated that the Transportation Miniature APE was easy to use, attractive, safe for children, and effective in supporting the delivery of learning materials.

d. Evaluation

The evaluation stage was conducted throughout the development process to assess the quality of the product. Evaluation was based on expert validation results, teacher responses, and the implementation outcomes in the classroom. The results indicated that the Transportation Miniature APE met the criteria of validity, practicality, and effectiveness, making it suitable for use as a learning medium to stimulate HOTS among early childhood learners.

The findings of this study indicate that the developed Transportation Miniature APE fulfilled the feasibility criteria based on evaluations conducted by media and material experts. The validation results, which reached **100%**, demonstrate that the product is consistent with the principles of early childhood learning media development, emphasizing safety, attractiveness, ease of use, and appropriateness of learning content.

These findings are consistent with Agustia (2023), who stated that Educational Play Tools are designed to provide educational value while maintaining the enjoyment of play. Similarly, Hidayat

and Audiyah (2023) explained that the use of APE helps children develop concrete thinking skills, improve attention, and gain more meaningful learning experiences.

The improvement in children's higher-order thinking skills during the use of the media indicates that learning activities involving classification, comparison, selection, and problem-solving effectively stimulate HOTS development. These findings support Hidayah and Rohimah (2025), who argued that higher-order thinking skills include the abilities to analyze, evaluate, and create during problem-solving processes. Furthermore, Salmah et al. (2024) emphasized that HOTS is closely related to critical, creative, and innovative thinking skills that can be developed through challenging learning activities.

The successful implementation of the Transportation Miniature APE also demonstrates that concrete learning media can help children understand transportation concepts more easily and enjoyably. This finding is in line with Syahreni et al. (2024), who reported that the use of Educational Play Tools can enhance learning motivation and support the effectiveness of the learning process. Therefore, the Transportation Miniature APE functions not only as a medium for introducing transportation concepts but also as a tool for developing higher-order thinking skills among young children.

Overall, the results indicate that the developed Transportation Miniature APE meets the criteria of **validity, practicality, and effectiveness**, making it an appropriate learning medium for stimulating **Higher Order Thinking Skills (HOTS)** among Group B children at TK Negeri 5 Banda Aceh

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4. CONCLUSION

This study successfully developed a **Transportation Miniature Educational Play Tool (APE)** to stimulate **Higher Order Thinking Skills (HOTS)** among Group B children at TK Negeri 5 Banda Aceh using the **ADDIE development model**, which consists of the stages of Analysis, Design, Development, Implementation, and Evaluation. The development of the media was based on a needs analysis indicating that children's higher-order thinking skills still required improvement and that the available learning media were limited in providing concrete and meaningful learning experiences.

The findings revealed that the developed Transportation Miniature APE met the criteria of validity, practicality, and effectiveness. The validity of the product was demonstrated through the results of media and material expert validations, which achieved a highly valid category after revisions were made based on the validators' suggestions. The practicality of the product was reflected in the positive responses from teachers regarding its use in the learning process. Furthermore, the effectiveness of the media was evident from the increased engagement of children in learning activities involving observing, classifying, comparing, analyzing, providing reasons, and solving simple problems, all of which are indicators of HOTS.

Therefore, the objective of developing a Transportation Miniature APE that is suitable for classroom use and capable of stimulating children's higher-order thinking skills was successfully achieved. The Transportation Miniature APE can serve as an innovative and enjoyable alternative

learning medium to assist teachers in fostering HOTS among young children, particularly in learning activities related to the theme of transportation

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