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Development Of Colored Flour Plasticine Educational Game Tools (Ape) To Improve Early Childhood Creativity At Kejora PAUD In The 2024/2025 Academic Year

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Abstract

This study aims to develop Color Flour Plasticine educational game tools in increasing children's creativity. The focus of this research are: 1) Describing the Characteristics of Colored Flour Plasticine Educational Game Tools in Improving Early Childhood Creativity. 2) Analyzing the Development Process of Colored Flour Plasticine Educational Game Tools in increasing Children's Creativity. 3) Knowing how the effect of using educational game tools of color flour plasticine on increasing the creativity of early childhood. 4) Describing the advantages and disadvantages of the Color Flour Plasticine Educational Game Tool in increasing Early Childhood Creativity at Kejora Early Childhood Education for the 2024/2025 school year.Based on a comprehensive analysis of the characteristics, development process, effects, and advantages and disadvantages of color flour plasticine APE at Kejora Early Childhood Education, it can be concluded that this media is an educational game tool that is effective in increasing the creativity of children aged 4-5 years. This plasticine meets the ideal criteria of Educational Game Tools with the characteristics of raw material safety, education, and has a soft texture and attractive color variations. Although it has limitations in durability and texture stability, its systematic development process through expert validation and field trials showed a significant increase in children's creativity (post-t score). Technical weaknesses can be overcome through proper storage and teacher assistance, so this APE is still recommended as an innovative solution for early childhood education with limited budgets that prioritize creative and child-friendly learning.

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1. INTRODUCTION

Early childhood refers to children aged 0-6 years who experience rapid growth and development, requiring appropriate stimulation. Therefore, Early Childhood Education (PAUD) plays a crucial role in achieving this development. (Rizky, Ainun, and Bachtiar, Yusri Muhammad, 2023). Therefore, educators play a crucial role in developing all aspects of children's development, including cognitive, physical-motor, social-emotional, religious values, language, and art. (Wulandari, A. P., Salsabila A., A. Cahyani K., Nurazizah T. S., 2023).

Based on the Regulation of the Minister of Education, Culture, Research, and Technology No. 12 of 2024 concerning the Early Childhood Education Curriculum, it explains that one of the

structures of the Early Childhood Education (PAUD) curriculum is Intracurricular learning, which means it is implemented through meaningful play, namely play activities that provide space for exploration so that it is useful for developing children's character and competencies. The learning process is carried out in a way that is appropriate to the child's learning needs, namely a learning process that involves and provides fun and meaningful experiences. Activities can use real learning resources and exist in the child's environment (Ministry of Education and Culture, 2024).

Therefore, what needs to be emphasized is the development of children's character and competencies. This means that these competencies can be realized by stimulating children's creativity, as creativity can influence other aspects of a child's development. (Andriani, 2023) explains that creativity is the modification of something that already exists into a new concept. In other words, two old concepts are combined into a new concept.

Creativity is also the result of interactions between individuals and their environment, the ability to create new combinations based on existing or previously known data, information, or elements. This aligns with Munandar's (2014) explanation that experience and knowledge influence a person's creativity, whether from school, family, or community. Therefore, it can be said that creativity is the ability to generate new, creative ideas, think critically, and possess a high level of imagination.

To foster children's creativity, you can design an environment that supports exploration, imagination, and experimentation. One way to do this is through arts and crafts learning methods, or by experimenting with color, texture, and shape using Educational Play Tools (APE).

Educational Play Tools (APE) are play tools designed for children with the aim of stimulating their development during the learning process. They aim to activate the child's five senses so that all aspects of child development grow and develop optimally. (Ministry of Education, Culture, Research, and Technology, 2021).

APE is crucial for learning because it can increase children's interest in learning, help them understand concepts, increase their motivation, and foster creativity. Creativity is crucial to foster from an early age, as a creative mind enables children to think critically, actively, skillfully, and take unique initiatives in solving everyday problems (Novi, 2019).

Furthermore, (Astini et al., 2019) also emphasized that educational play tools are various types of equipment or objects that can be used for play. These tools or objects can stimulate and develop a child's full range of abilities.

Based on the results of initial observations on February 5, 2025 at PAUD Kejora, the learning media used by teachers were still monotonous and less interesting for children, namely they still used a lot of picture books and LKS paper.

So that with these conditions, it causes a lack of interest in children in following the teaching and learning process which has an impact on the lack of development of children's creativity which is characterized by when children are given assignments, most children are confused, not confident, less responsive, less enthusiastic and still need help from a teacher. If the teacher is not helped, the children are more silent and daydreaming and when the teacher asks questions, the children just stay silent and do not answer. In conclusion, some children have not been able to complete the tasks given by the teacher.

Then the researcher interviewed one of the teachers at PAUD Kejora named Mrs. Partini on the day

On Wednesday, February 5, 2025, at 8:40 a.m., during the learning process, teachers often only used picture books, worksheets, blocks, and plasticine. However, the plasticine was also relatively small, causing children to fight over the desired color. According to him, the factors that hinder children's creativity are the lack of media or educational play tools (APE) used to train children to be more creative in forming and imagining. In addition, creative activities were considered lacking, because some children were not very enthusiastic about the media used in the learning process.

This situation is also supported by a statement made by the Principal, Mrs. Nani Nuriani, at Kejora Early Childhood Education (PAUD), that the Educational Play Equipment (APE) they have is still limited due to the constraints of purchasing APE. Kejora Early Childhood Education (PAUD) is a non-formal PAUD with a family planning program under the auspices of the Islahul Ummah NW Foundation. Therefore, the media and APE they have are still relatively limited, such as Lego, blocks, model models, hand puppets, colored balls, plasticine, and so on.

Thus, the lack of Educational Game Tools (APE) can have an impact on less varied learning which affects children's enthusiasm in participating in activities so that monotonous and uninteresting learning methods can cause children to be unenthusiastic and quickly bored, this is explained by the Ministry of Education, Culture, Research and Technology in the book Guide to the Selection, Making and Utilization of APE Independently. So to overcome this problem, it is necessary to develop adequate and interesting media according to what students need, this can also build teacher creativity in teaching.

So this study aims to describe the characteristics of APE colored flour plasticine in increasing the creativity of Early Childhood, to analyze the process of developing APE colored flour plasticine in increasing the creativity of Early Childhood, to find out how the use of APE colored flour plasticine influences the increase in creativity of Early Childhood, and to describe the advantages and disadvantages of APE colored flour plasticine in increasing the creativity of Early Childhood at PAUD Kejora in the 2024/2025 Academic Year.

2. MATERIALS AND METHODS

The type of research used is development research. The development research method orResearch and Development is a research method used to produce a specific product and test its feasibility (Sugiyono, 2018). In this study, the feasibility of developing a Colored Flour Plasticine Educational Game Tool (APE) will be tested in developing creativity in early childhood.

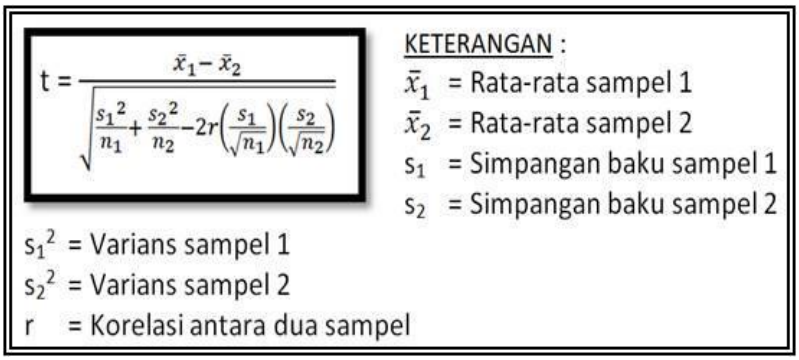
Development research is a type of research used to create a specific product and test its effectiveness. This research aims to produce a specific product through needs analysis and to test its effectiveness so that it can be used by the general public (Waruwu, 2024).

The research begins with an analysis of previous studies, a needs analysis, and the development of a framework. At this stage, researchers evaluate the research site, identify potential within the institutions within the research site, and seek solutions to address the identified potential.

This study uses the development model by Borg and Gall in Education which is structured through 10 stages starting from identifying potential and problems, collecting information, product design, design validation, design improvement, product trials, product revisions, usage trials, product revisions and mass product manufacturing (Gustina, Zipa and Husnayayin, Atina, 2024).

This research utilizes level 3 research and development, which involves researching and testing products to improve existing ones. This development is expected to make existing products more attractive and effective when used.

The data analysis used the T-test. The T-test analysis in this development research used a two-sample comparative hypothesis test. The T-test in this study was used for data analysis testing, namely testing the level of effectiveness of APE Colored Flour Plasticine by comparing t-tests.tablewith a significance level of 0.25%. The T-test formula used is:



Source: Endah Wahyu Sugiharti (2020:62)

To determine the level of effectiveness before and after using APE Colored Flour Plasticine, a comparison must be made.table that is:

- H0 = there is no significant difference between before and after using APE Colored Flour Plasticine
- Ha = there is a significant difference between before and after using APE Colored Flour Plasticine

3. RESULTS

RESEARCH FINDINGS

1. Characteristics of APE Colored Flour Plasticine in Enhancing Early Childhood Creativity at Kejora PAUD

Based on the results of observations and interviews conducted at PAUD Kejora Dusun Tempos Kujur, several obstacles were found in the learning process, especially in developing the creativity of group A children. The main problems include limited Educational Game Tools (APE), lack of enthusiasm of children, and the characteristics of children who tend to be passive and afraid to try new things. The pre-test results showed that 73.3% of children were in the "Undeveloped" category in the aspect of creativity, so more interesting and effective learning media are needed to encourage children's exploration.

As a solution, researchers developed a colored powdered plasticine APE, which was validated by educational theorists and practitioners, confirming that the colored powdered plasticine meets the criteria for appropriate learning media for children aged 4-5 years, both in terms of safety, practicality, and visual appeal.

The development of APE colored powder plasticine is expected to provide an alternative to addressing the limitations of learning media while simultaneously enhancing children's creativity. With characteristics tailored to children's needs, this product not only supports the teaching and learning process but also encourages children to be more active, expressive, and adventurous.

2. The process of developing APE Colored Flour Plasticine in Increasing the Creativity of Early Childhood at PAUD Kejora

The development process of colored flour plasticine APE was carried out through product design and validation stages by both theorists and practitioners. Product design began with planning a flour-based learning medium that was safe, economical, and easy to produce, with a total manufacturing cost of IDR 56,000. This product was designed to address the limitations of APE in Kejora PAUD while simultaneously stimulating children's creativity through activities based on the theme "I Love the Earth." Product validation involved six experts who assessed aspects of safety, practicality, and educational value, with the results showing that the flour plasticine met safety standards (score 90–100) and pedagogical benefits (score 93.3), although improvements were needed in the texture and durability of the material.

Validation results revealed that this APE requires technical improvements, such as adjusting ingredient proportions to reduce softness and stickiness, adding natural preservatives, and increasing color variations. Recommendations from the validators included the use of transparent packaging, more accurate ingredient measurements, and increasing production volume to meet the needs of the number of children. This feedback served as the basis for product refinement before implementation in learning environments.

3. The Effect of Using APE Colored Flour Plasticine on Increasing Early Childhood Creativity at Kejora PAUD

Based on the results of the product trial, the use of APE colored flour plasticine has been proven to have a significant effect on increasing the creativity of children aged 4-5 years at PAUD Kejora. Post-test data showed that all participants (100%) reached the "Very Well Developed" category with an average score of 85.9, a drastic increase from the average pre-test score of 57.2. Statistical analysis of the paired t-test ($t = -34.100$; $p < 0.001$) confirmed that this increase was statistically significant, rejecting the null hypothesis and accepting the alternative hypothesis that the plasticine intervention was effective in developing children's creativity.

This success is supported by the characteristics of colored flour plasticine that have been revised based on validator input, including the addition of color variations (from 8 to 10 colors), improvements in ingredient proportions (such as the addition of vinegar and the use of scales), and improvements in texture quality (not sticky, easy to shape). The final validation of 23 indicators showed that all aspects—material safety (score 100), practicality (score 83.3–100), and educational value (score 90–100)—were achieved with the "Very Valid" category, making this product ideal for stimulating early childhood creativity.

The implications of this research recommend the use of colored flour plasticine as part of the learning curriculum, with the note that teacher guidance is needed to maximize children's exploration.

4. The Advantages and Disadvantages of APE Colored Flour Plasticine in Increasing Early Childhood Creativity at Kejora PAUD

APE colored flour plasticine has the main advantages in terms of safety and educational value for developing creativity in early childhood at Kejora PAUD. These advantages include: (1) natural ingredients that are free from harmful chemicals, ensuring safety during use; (2) soft and easy-to-shape texture that supports children's imaginative exploration and multidimensional stimulation (cognitive, motor, and sensory); and (3) bright color variations that attract interest in learning while introducing the concept of color in a concrete way. These advantages are in line with APE standards for PAUD which emphasize safety, ease of use, and the potential for stimulating child development.

Behind its advantages, APE colored flour plasticine also has several technical weaknesses, especially in terms of material durability and dependence on the environment. These weaknesses include: (1) dough that dries easily if exposed to air, (2) the need for special storage (airtight containers) to maintain moisture, (3) limitations in making 3-dimensional works that require a sturdy structure, and (4) sensitivity to room temperature that can affect the texture. However, these weaknesses are practical and can be overcome through proper usage management, such as dividing the dough into small portions, good storage, and teacher guidance during activities.

4. DISCUSSION

1. Characteristics of APE Colored Flour Plasticine in Enhancing Early Childhood Creativity at Kejora PAUD

Based on observations and interviews at Kejora Early Childhood Education Center (PAUD Kejora), it appears that the low creativity of children aged 4-5 years is caused by the

limited availability of Educational Play Equipment (APE), which is less attractive and does not encourage children's exploration. This is in line with the characteristics of APE proposed by (Kemdikbud, 2016), which emphasizes that APE must be able to stimulate creativity, be safe for children, and have educational value. Research findings show that 73.3% of children are still in the "Undeveloped" category in terms of creativity, indicating the need for more innovative learning media. The development of colored flour play dough APE as a solution meets these characteristics, as it is designed to encourage creative, safe, and multi-purpose activities. In addition, this play dough also meets the safety indicators for raw materials and packaging according to (Wahyuni, 2021), because it is made from natural ingredients such as flour, salt, and food coloring that are not harmful to children.

Furthermore, the physical characteristics of colored powder plasticine, such as its soft texture, bright color variations, and good durability, strengthen its function as an effective learning medium. The theory (Kemendikbud Ristek, 2023) states that APE must be constructive and can be used in various ways, which is in accordance with research findings that this plasticine can stimulate fine motor skills, imagination, and understanding of the concept of shape and color. In addition, in terms of cost, colored powder plasticine is more economical than wax-based plasticine, making it a sustainable development for PAUD with limited budgets. Thus, the findings of this study not only support the existing theory but also provide practical innovations in the development of APE that is appropriate to the needs of early childhood in PAUD institutions.

2. The Process of Developing APE Plasticine in Enhancing Early Childhood Creativity at PAUD Kejora

The development process of colored flour plasticine APE at Kejora PAUD was carried out through systematic stages that included product design, lesson plan preparation, and expert validation, demonstrating its conformity with the principles of developing innovative learning media for early childhood. The findings of this study are in line with Wartini's (2014) theory which states that playing with plasticine can develop children's fine motor skills, imagination, and creativity through various shape manipulations. The validation results by six experts (three theorists and three practitioners) confirmed that this APE meets the safety aspect with a very valid score (93.3-100) because it uses natural ingredients such as flour, salt, and food coloring, which is in accordance with the standards of the Minister of Education, Culture, Research, and Technology (Permendikbudristek) (2021) regarding safe and non-toxic APE. However, there are several notes on improvements in the texture and practicality aspects, such as the need to modify the water and oil composition to reduce softness, which indicates that the development of APE must go through an iterative process to achieve optimal quality. In addition, the efficiency of production costs (Rp. 56,000 for a larger amount compared to commercial plasticine) strengthens the finding that creative learning media does not have to be expensive, as long as it meets the principles of affordability and sustainability.

The implementation of colored flour plasticine APE in learning at Kejora PAUD is designed through structured steps, starting from preparing tools to giving children freedom of expression. Through the implementation of Plasticine APE, it can stimulate children's creativity through their divergent thinking skills which is in line with the theory of intellectual structure (Hall, T., Meyer, A., & Rose, 2012) that divergent thinking skills are indicators of creativity shown by several characteristics such as fluency, flexibility, originality and elaboration. The research findings show that this plasticine not only functions as a medium for creativity, but is also integrated into the RPP themed "I Love Earth" to enrich the understanding of natural concepts, in accordance with the opinion (Kemendikbud Ristek,

2023) regarding multipurpose APE that combines cognitive and motor aspects. The validator's recommendation to add color variations and use clear packaging emphasizes the principle of visually appealing APE design. Thus, these findings not only strengthen previous theories about creative learning media, but also provide concrete examples of how simple APE can be optimized through collaboration between pedagogical principles and local material innovation.

3. The Effect of Using APE Colored Flour Plasticine on Increasing Early Childhood Creativity at Kejora PAUD

The results of research at Kejora PAUD showed that the use of colored powdered plasticine APE had a significant effect on increasing the creativity of children aged 4-5 years, which is in line with the theory of the benefits of plasticine for child development proposed by (Arlinah & Rohita, 2014). The research findings revealed that all children (100%) achieved the "Very Well Developed" category with an average increase in creativity of 28.7 points, which was statistically very significant ($p < 0.001$). This strengthens the statement of Siti Arlinah and Rohita that playing with plasticine can develop children's thinking skills, imagination, and creativity through exploration of shapes and colors. In addition, the results of expert validation which showed a perfect score (100) on the indicators "encouraging creativity" and "helping to recognize colors & textures" are also in accordance with the theory that plasticine effectively trains children's sensory abilities through touch and material manipulation. Design improvements by adding color variations from 8 to 10 colors and refining textures further optimize visual and tactile stimulation, which are key aspects in the theory of early childhood sensorimotor learning.

The implications of this research are not only limited to increasing creativity, but also encompass children's multidimensional development, as explained in Siti Arlinah and Rohita's theory on the holistic benefits of playing with plasticine. The finding that children become more confident in expressing ideas and telling stories about their creations is in line with the statement that plasticine can improve children's self-esteem and language skills. In addition, the social interactions that are built during plasticine play activities at Kejora PAUD support the theory on the role of plasticine in fostering social skills through collaboration and communication between friends. The research recommendation to develop variations of plasticine-based activities also expands the potential application of the theory, by adding fine motor and cognitive aspects to learning. Thus, the findings of this study not only confirm previous theories about the benefits of plasticine but also provide empirical evidence on the effectiveness of colored powdered plasticine as an innovative learning medium that is affordable, safe, and able to address the challenges of limited resources in PAUD.

4. Advantages and Disadvantages of APE Colored Flour Plasticine in Increasing Early Childhood Creativity at Kejora PAUD

The colored flour plasticine developed at Kejora PAUD has several significant advantages in supporting early childhood learning. In terms of safety, the use of natural ingredients such as flour, salt, oil, and food coloring makes it free from harmful chemicals, making it safe for children. This is in line with research (Priyani, 2019) which states that natural plasticine is harmless and provides a safe, hands-on learning experience. Its soft and malleable texture allows children to explore various shapes according to their imagination, not only stimulating creativity but also honing fine motor skills and sensory skills. The bright and diverse color variations (10 colors) not only attract children's interest but also help them understand the concept of color and color mixing, which are important parts of early learning. This advantage is reinforced by findings (Priyani, 2019) that plasticine is easy to shape and does not leave excessive dirt, making it practical for use in learning activities.

Despite its many advantages, APE colored flour plasticine also has several drawbacks that need to be considered. The dough tends to dry out easily if exposed to air for too long, resulting in a hardened and cracked texture, thus reducing its durability. Environmental conditions such as hot temperatures or high humidity can also accelerate drying or make the dough too sticky, affecting comfort of use. These drawbacks align with findings (Priyani, 2019) that plasticine cannot last long without maximum care and tends to become dirty or black after repeated use. Furthermore, this plasticine is less suitable for creating three-dimensional works that require strong structures due to its soft texture. However, these drawbacks can be minimized through proper storage in airtight containers, teacher guidance, and regulating the duration and type of play activities. Thus, despite its technical limitations, APE colored flour plasticine remains an effective and economical option for enhancing early childhood creativity, especially in PAUD institutions with limited resources, as revealed in research (Priyani, 2019).

5. CONCLUSION

This research has successfully developed APE colored powder plasticine that meets the standards of the Ministry of Education, Culture, Research, and Technology with superior characteristics: non-toxic natural ingredients, soft, easy-to-shape texture, and attractive color variations. This product has been proven effective in increasing the creativity of children aged 4-5 years at PAUD Kejora, shown by a significant increase in the average score from 56.2 (pre-test) to 85.9 (post-test) as well as expert validation stating its suitability as a multipurpose learning medium.

The development process, which involved systematic steps from needs identification and product design to expert validation, yielded an economical solution for budget-conscious preschools. While limited in durability and texture stability, appropriate storage strategies and teacher guidance can optimize its use. This product also reinforces the theory of creativity development and the principles of multi-purpose APE.

Overall, APE colored powdered plasticine is worthy of adoption as an innovative learning medium in early childhood education (PAUD). Its combination of safety, educational, and economic advantages makes it a sustainable solution for enhancing early childhood creativity while addressing the challenge of limited learning resources in PAUD institutions.

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