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THE EFFECTIVENESS OF FINGER PAINTING GAMES TO DEVELOP SCIENTIFIC LITERACY IN EARLY CHILDREN: LITERATURE REVIEW

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Abstract

Finger painting is an activity in science learning that can develop early childhood science literacy. However, the effectiveness of using finger painting is influenced by several factors. This study aims to identify and analyze factors that influence the effectiveness of using finger painting in developing early childhood science literacy. Based on a literature review, there are four main factors that can influence the effectiveness of using finger painting, namely: (1) teacher readiness in designing and implementing finger painting activities that are appropriate to the characteristics of children, (2) availability of materials and tools that support activities, (3) integration of finger painting with other science learning activities, and (4) parental involvement in supporting and continuing activities at home. These factors are interrelated and have an important role in creating effective science learning through the use of finger painting. The findings of this study can be a reference for teachers and related parties in designing and implementing finger painting as a strategy to develop science literacy in early childhood.

Keywords: Finger Painting, Science Literacy, Early Childhood.

INTRODUCTION

Scientific literacy is an important ability that needs to be developed in early childhood. Scientific literacy not only includes knowledge of scientific concepts, but also includes the ability to use scientific knowledge in everyday life (Valladares, 2021). Children who have good scientific literacy are expected to understand the world around them better, make wiser decisions, and participate actively in society (Petscher et al., 2020). Various learning methods and activities can be used to develop scientific literacy in young children, one of which is through finger painting games. Finger painting is a sensory-based art activity that can help children explore, manipulate and understand scientific concepts (Handayani et al., 2023; Purnami & Asril, 2021). Through finger painting activities, children can learn about colors, color mixing, textures, and various other scientific concepts (Mulyani & Mariyani, 2023; Manik, 2024).

Several studies have shown that finger painting activities can be effective in improving the science skills of young children. Lamrani and Abdelwahed (2020) found that

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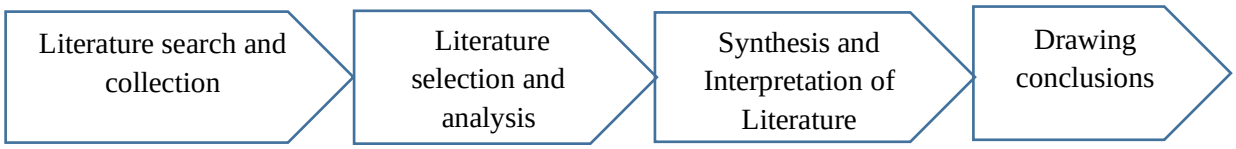
the use of game-based games can improve children's skills in early childhood education, including science abilities. Additionally, Battaglia et al. (2019) stated that physical education programs that involve art activities such as finger painting can improve children's motor skills and pre-literacy. This article aims to fill this gap by conducting a more comprehensive analysis of the effectiveness of finger painting in developing scientific literacy in early childhood. In contrast to previous research which only focused on general scientific abilities, this article will examine in more depth the definition and components of scientific literacy, the role of finger painting in supporting the development of scientific literacy, as well as the factors that influence its effectiveness. Apart from that, this article will also compare the effectiveness of finger painting with other science learning media to show its superiority in developing scientific literacy in early childhood. Through critical and comprehensive analysis, it is hoped that this article can make a significant contribution to the development of scientific literacy in early childhood, as well as become a reference for educators and researchers in designing effective science learning activities using finger painting media.

RESEARCH METHODS

According to Creswell (2012), literature study involves searching and identifying relevant literature, whether in the form of journal articles, books, reports, and other sources, to then be analyzed and synthesized systematically in order to obtain a comprehensive understanding of the topic under study. As stated by Snyder (2019), in-depth literature analysis allows researchers to identify, evaluate, and integrate findings from various sources, so as to present a current picture of a topic or problem. This article is a literature study that focuses on analyzing the effectiveness of using finger painting games in developing scientific literacy in early childhood. The methodology used in writing this article follows the following flow:



The literature search was carried out through online databases such as Google Scholar, Science Direct, and Proquest. Keywords used in the search included "early childhood scientific literacy," "finger painting," "effectiveness of finger painting," and combinations of related terms. The literature collected includes journal articles, books and research reports published in the last 5 years (2019-2024). Furthermore, the literature obtained is then filtered based on inclusion criteria, namely: (1) focus on discussing early childhood scientific literacy, (2)) examine the use of finger painting in science learning, and (3) examine the effectiveness of finger painting in developing scientific literacy. Literature that meets the inclusion criteria is then analyzed systematically to extract information relevant to the research objectives. And information extracted from the literature is grouped and synthesized based on main themes, such as the definition and

components of scientific literacy, the role of finger painting in developing scientific literacy, benefits and positive impacts, factors that influence effectiveness, and comparison with other learning media. The synthesis results are then interpreted and linked to relevant theories or concepts to answer research questions. Based on analysis and interpretation of the literature, this article draws conclusions about the effectiveness of using finger painting in developing scientific literacy in early childhood. The formulated conclusions also include practical implications for educators and recommendations for further research.

RESULTS AND DISCUSSION

Based on the results of literature analysis and synthesis, the discussion in this article will focus on three main aspects, namely: 1) the definition and components of scientific literacy in early childhood, 2) the role and effectiveness of finger painting techniques in developing children's scientific literacy, and 3) factors -factors that influence the effectiveness of using finger painting.

Definition and Components of Early Childhood Science Literacy

Scientific literacy in early childhood can be defined as the basic ability to understand scientific concepts, use scientific knowledge in everyday life, and be actively involved in the process of scientific investigation (OECD, 2016). Scientific literacy in early childhood includes several main components, including: (1) conceptual knowledge related to natural phenomena and scientific processes, (2) scientific process skills such as observing, classifying, predicting and communicating, and (3) positive attitudes and feelings. curious about science (Harlen, 2015; Eshach & Fried, 2005).

1. Conceptual knowledge related to natural phenomena and scientific processes:
   At an early age, children begin to develop their initial understanding of natural phenomena such as weather changes, the life cycles of living things, the properties of objects, and so on. They also begin to understand basic concepts in the scientific process, such as cause and effect, classification, measurement and experimentation. This conceptual knowledge is obtained through direct experience interacting with the environment and through directed learning activities.
2. Science process skills:
   Young children have a high curiosity and tend to learn through direct experience. Science process skills that can be developed at an early age include: observing, grouping, comparing, predicting, measuring and communicating. Through practical activities and investigations, children can practice and master these skills gradually.
3. Positive attitude and curiosity towards science:
   A fun and meaningful science learning experience will foster children's positive attitudes towards science. High curiosity about natural phenomena and scientific processes is the basic capital for children to be actively involved in science learning. The

teacher's role is very important in facilitating and fostering children's interest and enthusiasm in studying science.

The Role and Effectiveness of Finger Painting in Developing Scientific Literacy

Ida ayu ketut at. al. 2021 in his article wrote that finger painting is a painting technique by applying colorful paint to paper with your fingers directly without using tools or brushes (Desai & Nomlomo, 2014). Finger painting is an effective science learning technique for increasing scientific literacy in young children. Through finger painting activities, children can be actively involved in the process of investigating and exploring natural phenomena (Pyle & Danniels, 2017). This activity can help children develop a conceptual understanding of science concepts, such as color, texture, and the properties of materials (Brownell, 2020). Apart from that, finger painting can also improve children's science process skills, such as observing, describing and communicating findings (Isbell & Raines, 2007). Furthermore, finger painting activities can encourage the growth of children's positive attitudes and curiosity towards science, as well as increase their motivation to be involved in scientific activities (Torquati et al., 2013).

Developing Conceptual Knowledge through finger painting activities, children can directly explore the properties of materials, such as texture, color and shape changes. The activity of mixing colors and observing the changes that occur can help children understand scientific concepts related to color, light and the properties of objects. Teachers can relate finger painting activities to natural phenomena, such as observing changes in leaf color or making models of the life cycles of living creatures. In developing science process skills when doing finger painting, children are involved in the process of observation, description, prediction and experimentation. They can test the effects of mixing colors, try different techniques using their fingers, and explore different paint textures. Teachers can encourage children to document and communicate their processes and findings through drawings, writing, or presentations. And developing a positive attitude and curiosity from finger painting activities which are fun and stimulate children's creativity can foster children's enthusiasm and curiosity towards science. Children can express themselves freely, thereby increasing self-confidence and active involvement in the learning process. Teachers can utilize children's curiosity to trigger questions that encourage children to think critically and investigate further and various studies have shown that finger painting is effective in increasing conceptual understanding of science, science process skills, as well as children's positive attitudes and curiosity towards science. (Brownell, 2020; Pyle & Danniels, 2017; Torquati et al., 2013). Thus, finger painting activities can be a very useful strategy in developing scientific literacy in young children.

Factors that Influence the Effectiveness of Using Finger Painting

Several factors can influence the effectiveness of using finger painting in developing scientific literacy in early childhood, including: (1) teacher readiness in designing and implementing finger painting activities that suit children's characteristics

and needs, (2) availability of materials and tools that support activities finger painting, (3) integration of finger painting with other science learning activities, and (4) involvement of parents in supporting and continuing finger painting activities at home (Pyle & Danniels, 2017; Torquati et al., 2013). With the following explanation:

1. Teacher Readiness:

   Teachers must understand the purpose and benefits of finger painting in science learning. Teachers need to design finger painting activities that are appropriate to the child's developmental stage and characteristics, such as choosing paint materials that are safe and attractive to children. Teachers must be skilled in facilitating, motivating and directing children during finger painting activities so that the process of exploration and discovery can occur well. Teachers can integrate finger painting with other science activities, such as observing nature, simple experiments, or discussing science concepts.
2. Availability of Materials and Tools:

   Providing a variety of finger painting materials, such as paint with various colors and textures, can encourage children to explore more actively. The availability of supporting tools, such as mats, rags and hand washing facilities, will facilitate the smooth running of finger painting activities. Materials that are safe, easy to obtain and environmentally friendly will increase children's comfort in being creative.
3. Integration with other science learning activities:

   Finger painting can be integrated with nature observation activities, such as observing changes in the color of leaves or flowers. Children can carry out simple experiments, such as mixing colors or observing changes in texture, then document their findings through finger painting. The results of finger painting can be used as a medium in discussing scientific concepts, such as the properties of objects or the life cycles of living things.
4. Parental Involvement:

   Parents can support their children's finger painting activities at home by providing the necessary materials. Parents can be involved in accompanying children when doing finger painting at home, then discussing the child's findings or experiences. Collaboration between teachers and parents in monitoring and continuing finger painting activities at home can strengthen children's understanding and interest in science.

   By paying attention to the definition, components and factors that influence effectiveness, the use of finger painting techniques can be an effective strategy in developing scientific literacy in early childhood. This activity can not only improve conceptual understanding and science process skills, but can also encourage the growth of children's positive attitudes and curiosity towards natural phenomena.

CONCLUSION

Based on the discussion that has been presented, it can be concluded that scientific literacy in early childhood is the basic ability to understand scientific concepts, use scientific knowledge in everyday life, and be actively involved in the process of scientific investigation. The main components include conceptual knowledge, science process skills, and a positive attitude and curiosity towards science. The finger painting technique has been proven to be effective in developing scientific literacy in early childhood. Through this activity, children can be actively involved in exploring natural phenomena, develop conceptual understanding, improve science process skills, and foster a positive attitude and curiosity towards science.

Several factors influence the effectiveness of using finger painting in developing scientific literacy in early childhood, including: teacher readiness, availability of materials and tools, integration with other learning activities, and parental involvement. Attention to these factors can help maximize the potential of finger painting in improving children's scientific literacy. Thus, the use of finger painting techniques can be an effective strategy in developing scientific literacy in early childhood, by paying attention to the definition, components and factors that influence its effectiveness. This can make a significant contribution to efforts to increase scientific literacy in children from an early age.

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