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Improving Creative Thinking Skills of Early Childhood by Utilizing Robotic Activities in Learning Process

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Abstract
This study aims to determine the effect of robotics activities on improving the creative thinking skills of early childhood. This study used quanitative research with the Single Subject Design (SSD) method. The research design used in this study is using the A-B-A reversal design. Data collection was carried out using with a pre-test post-test experimental research design without clear control. The results of this study indicate that robotics activities can improve the creative thinking skills of early childhood. Robotics activities can improve creative thinking skills because the implementation of robotics activities is an activity based on constructive and manipulative activities. The characteristics of creative thinking skills that are improved through robotic activities are fluency, flexibility, originality, elaboration, and tenacity and patience. The relationship between robotics activities and creative thinking skills is that robotics activities are designed to follow environmental developments. So that it can bring out creativity in humans in developing ideas and become a means of realizing these creative ideas.

Keywords: *Robotics Activities, Creative Thinking, Early childhood*

INTRODUCTION

The progress of the times, especially in the fields of technology and knowledge, is developing rapidly along with human development. Technological advances are significant to introduce, primarily through early childhood education. Cipriano explained the importance of 4c: critical thinking, communication, collaboration, and creativity. He conveyed these four things to teachers and education personnel to be applied in children's education (Exelmans & Bulck, 2016). Critical thinking means thinking openly and rationally about technology use through the information children receive. With a rational mind, it is included in early childhood cognitive development (Maftutah, Jannah, & Utama, 2021). Critical thinking can be obtained through several ways, one of which is the experience of the learning process carried out by children (Megavitry et al., 2023). Through a learning process that emphasizes creativity and experimentation, children are directly involved in the process so that it can foster critical thinking in early childhood. The learning process also develops good communication skills between educators and children. In addition, good cooperation skills need to be built to create good competitiveness as well. And the last is creativity, where children are guided to have the ability to think creatively and innovatively in the development of this era (Astuti et al., 2023).

The Organization for Economic Co-operation and Development (OECD) reports that the 2018 Programme for International Study Assessment (PISA) research shows that the quality of education in Indonesia has declined in all indicators (Saefullah, 2020). This puts Indonesia in the bottom 10 out of 79 countries studied in achieving the quality of education (Nisa', 2020). This shows the lack of development of learning methods and the use of media, one of which is the use of technological media in Indonesia (Suwarsono & Muhid, 2020).

This lack of introduction to technology will have an impact on the utilization of technology for things that are not appropriate (Fakhriyani, 2016). As stated by Saefullah in the article he wrote, some of the negative impacts of inappropriate use of technology include many people using technology in the form of inappropriate videos, which are not good examples of teenager's and children's behavior (Parinussa et al., 2023). Children need a supportive environment to recognize technological advances and developments to be used appropriately (Reynaldo et al., 2022).

As with robotics activities, robotics is the science and technology of robots, their design, manufacture, and application (Grosch, 2017). Based on the understanding of robotics, it can be seen that through robotics children can find out that robotics is not only limited to playing, but to be used as a forum for basic introduction to technology starting from design to application to life (Patil & Kale, 2017). In Indonesia, robotics has begun to enter the world of education, especially early childhood (Houtman, 2012). This is intended to increase the potential of early childhood in the field of industry and machinery in the face of technological advances.

Human potential has undoubtedly developed since early childhood, as has creativity (Isa et al., 2021). At the beginning of their development, children can manipulate a movement they see or a sound they hear and then imitate and express it uniquely (Kamaruddin et al., 2023). The importance of developing creativity in children from an early age is first, by creating children can fulfill their basic needs and can show themselves (Kewalramani et al., 2020). Second, by creating children

can solve problems in their own way. Third, through creating will be satisfaction for yourself (Mamangkey et al., 2018). Fourth, through creativity can improve the quality and standard of one's life.

The purpose of this study was to determine the effect of robotics activities on children's creative thinking skills, especially at the age of 5 years. In addition, this research was conducted to find out what are the supporting and inhibiting factors in robotics activities.

METHODOLOGY

This research uses a single subject research method. This research uses a quantitative approach with a pre-test post-test experimental research design without clear control to early childhood. Data was obtained using structured observations and interviews to teacher. This study uses descriptive statistical techniques in processing data from the baseline class that has been determined.

RESULTS AND DISCUSSION

Determination of this directional trend is done to determine the change or development of the creative thinking ability of each subject. The split middle method is the method used to determine the directional trend in this study.

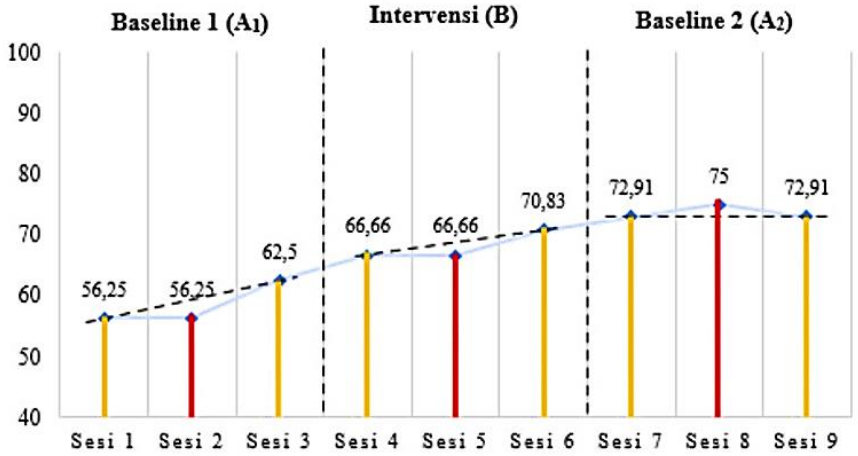

Figure I. Experiment Result of Creative Thinking Ability

Based on the experiment result, the directional trend of AS creative thinking ability data in baseline 1 (A1) and intervention conditions (B) is upward. Meanwhile, at baseline 2 (A2) the directional trend in subject AS is flat. The trend in the direction of JQ subject's creative thinking ability data at baseline 1 (A1) and baseline 2 (A2) is flat and in the intervention condition (B) the trend in the direction of the data is flat. The trend in the direction of RK subject's creative thinking ability data at baseline 1 (A1), intervention (B) and baseline 2 (A2) conditions is upward.

Creative thinking ability as one of the abilities in cognitive development that supports children to explore various activities or games. In this study, a significant increase in creative thinking skills was found, as evidenced by the acquisition of stable scores in each research condition. The average percentage of the final score in the baseline condition obtained by the AS subject is 73.6; JQ obtained 72.91%; and RK obtained 74.99% where in the interpretation of descriptive analysis the score is

included in the good classification. With this it can be said that robotics activities can improve the creative thinking skills of children aged 5 years.

The findings in this study are reinforced by previous research conducted by Kewalramani et al (2020) on children's engineering design thought process: the magic of robots and the power of blocks (electronics) which found that during Little Bits robot play, when children take different roles in doing activities, they can find problems and solve problems together as well. In this case, exploratory and fun activities are more effective than directive teaching. This study shows that robotics activities as a medium to improve children's thinking skills can be implemented well and bring out the nonconferential nature in children, namely having their own way of doing things which encourages children to have innovative behavior.

According to previous study entitled the effect of robotics activities on the creative thinking skills of elementary school students, one of the important agendas in introducing technology and information to IT development is through robotic activities. The main purpose of this robotics activity is of course inseparable from the development of children's creative thinking skills so that children can describe, imagine, and assemble or install this robotics. As for the previous research that found robotics activities have an influence on creative thinking skills. This can be seen not only in terms of making a work in the field of technology, but its influence on the potential that exists in students, especially problem solving. This will affect creativity and independence so that it creates confidence in children to express their ideas. 63 In line with the research conducted by the author, robotics activities are certainly not only given solely to create works, but to develop children's ability to express their ideas, solve problems, and socialize with their peers. This is what fosters self-confidence in children through providing opportunities and full trust when doing activities.

In activities, of course, there are supporting and inhibiting factors in implementation. The supporting factors in this robotics activity are the opening of parents' minds about the importance of introducing technological advances that involve child development and the enthusiasm of children to get to know robotics activities. In addition, the inhibiting factors in the implementation of this robotics activity are limited robotics media and less affordable media costs and limited research time during the pandemic. The difficulty of adapting to child-centered activities is also one of the factors inhibiting the implementation of this activity.

CONCLUSION

Based on the discussion and results of the analysis in this study, it can be concluded that robotics activities have an influence on the creative thinking of children aged 5 years. This is evidenced by the results of creative thinking abilities in each research subject who experienced an increase in scores. The following is a description of the results of research on the creative thinking ability of one of the subjects: The creative thinking ability of subject AS at the time before being given robotics activities, namely obtaining a score with an average of 58.33%, which in the interpretation of descriptive analysis falls into the category of less. Then when given robotics activities obtained a score with an average of 68.05%. After being given robotics activities, the average score of creative thinking skills obtained is 73.60%, which in the interpretation of descriptive analysis falls into the good category. So it

can be said that the ability to think creatively in terms of fluency, flexibility, originality, elaboration, and tenacity of subject AS has increased.

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