

STIMULATE DEVELOPMENT WITH STEAM LEARNING

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Abstract. Early childhood learning must be able to develop various basic abilities of children to create communicative, collaborative, critical thinking, creative and innovative generations. The STEAM approach is seen as an approach that can prepare the 21st century generation which aims to stimulate creativity, prepare children for a world of work full of innovations and inventions or good quality human resources. The purpose of this study was to find out the application of learning with the STEAM approach based on loose parts media at RA Mutiara Bunda. This type of research is qualitative research with descriptive methods. Data collection was done by way of interviews and observation. While the results of this study describe (1) STEAM learning activities run quite effectively where science, technology, engineering, art, and mathematics skills are successfully improved; (3) The use of loose parts media is proven to be able to increase children's curiosity and creativity in STEAM as evidenced by the enthusiasm and various children's works; (4) The difficulty faced by teachers is the lack of collaboration between children and teachers, because they are still patterned as a teacher center so the learning tends to be direct teaching, applying engineering methods, and integrating STEAM fields in children's play activities

Keywords: STEAM, developmental stimulation, Learning Strategy.

INTRODUCTION

Education is the basis of the development of human life. The function of education plays an urgent role in the development of the nation and state. Efforts to create an advanced, creative and prosperous Indonesian nation cannot be separated from the role of national education. In the context of developing national education, several laws related to education have been established, including Article 31 paragraph 1 of the 1945 Constitution which reads "Every citizen has the right to receive teaching" (Sujtamoko, 2010: 185) and also Law number 9 2009 concerning educational legal entities. Various laws are used as a legal basis for the implementation of education in Indonesia in order to create a better Indonesia by improving the quality of human resources and opportunities to get quality educational services that can be opened as widely as possible for all people (Ahsani and Nurhaliza, 2021: 92).

The quality of education in such a way is related to the development of global markets, especially related to work in the 21st century. Nearly 100% of work requires critical thinking skills and active listening, 70% requires mathematical knowledge, and 60% requires receptive communication and language skills (Carnevale, Smith, & Strohl in Gress, 2017:39). Therefore, efforts are needed to improve the quality of education in order to create a generation of Indonesians who can balance productivity and competitiveness on all fronts which will occur in the future demographic bonus period (Nugraheni, 2019). Preparing the Alpha generation which is expected to become a golden generation in the future with high critical thinking skills and a scientific mindset can be trained with STEAM learning which is currently a concern in the field of education.

STEAM learning can be applied at all levels of education, especially at the AUD level. STEAM learning is a renewal in the world of education that integrates science, mathematics in order to be able to think logically and rationally, so that children can understand phenomena critically and logically. In this latest development, STEAM has transformed into STEAM learning which is in line with the 2013 Curriculum where students are required to master various aspects of both

affective, cognitive and psychomotor which work actively with each other so that an integration of attitudes, intelligence and skills emerges (Permanasari, 2016). This learning can be carried out by getting to know and learning more about things in everyday life and utilizing various materials available in the environment around the child. In this approach, the role of teachers and parents is very useful in supporting and directing children to explore the knowledge around them (Bratatoto et al, 2020).

Early childhood as the alpha generation has a great curiosity. The alpha generation is defined as the generation whose birth and development are within the scope of digital technology development (Nugraheni, 2019). This generation is a group of people who have been continuously affected by technology since childhood. Alpha generation skills related to information technology are more sophisticated and capable compared to previous generations (Bennett, 2008). The AUD world, which is the alpha generation, is a world dominated by a great sense of curiosity about everything they see, hear, and feel. In general, they have high enthusiasm and enthusiasm in seeking out new knowledge about various matters related to the natural environment around them (Imaduddin, 2017). At the AUD level, the systematic teaching and learning activities (KBM) are packaged in the form of games and exploratory activities by applying an approach related to STEAM. This has the goal of encouraging children to construct knowledge about the world around them through observation, active questioning and investigation activities which can later build final conclusions as new knowledge (Helista, 2019).

AUD is a time when children play with many things around them. Therefore it is necessary to have auxiliary media to maximize the application of STEAM learning. Media is needed to stimulate all aspects of AUD development. For AUD, learning is carried out through play activities with various learning media, both direct media, visual media, audio media, audio-visual media or media in the surrounding environment so that later learning can take place effectively (Dewi, 2017). There are several considerations in choosing learning media, namely first, the availability of local sources. Which means if the required media is not available from existing sources, then you can buy or make your own. Second, whether or not the availability of funds, manpower and facilities to buy or make. Third, factors related to the practicality, durability, and flexibility of the media needed for a long time. Which means it can be used anywhere, anytime and easy to carry and move (Syamsuardi, 2012). Referring to this, the use of loose parts media is considered appropriate in STEAM learning. Loose parts media is readily available at home without having to make or buy again. This loose parts media is an affordable learning material because it comes from open materials that can be separated and constructed into one, easily moved, can be aligned, flexible because it can be arranged or combined with other materials, it can also be made from natural or synthetic materials. All media from used materials can stimulate a child's imagination to learn while playing by exploring various things at his own will (Helista, 2019). Thus the child will be able to develop various skills in mathematics, science, art, technology, and engineering. STEAM learning combined with loose parts media can increase the creativity of early childhood (Auliyalloh & Rakhman, 2020). Referring to the study of theory and research results, further research is needed to strengthen the results of previous research, namely by identifying the application of STEAM with loose parts media at RA Mutiara Bunda.

RESEARCH METHOD

The type of research used is qualitative research with an inductive perspective that focuses on exploring and interpreting each individual meaning, and translating the complexity of a problem (Creswell, 2015: 5). Qualitative research includes the subjects studied, field data, personal experiences, and real conditions in the field that are interpreted by researchers (Creswell, 2015: 1). The research subjects were 20 students of Kindergarten (TK). The research took place at RA Mutiara Bunda. The research lasted for 3 weeks, from September 18 to November 18, 2021.

The research method used is descriptive. Descriptive research is carried out by describing or describing in detail the circumstances that occur without doing any treatment to the research subject (Sugiyono, 2017: 212). In this study, activities were carried out to analyze and describe STEAM learning with teachers as research subjects for data collection. Data was collected through interviews and observation stages which were complemented by triangulation. The triangulation that was carried out included method triangulation, inter-researcher triangulation, data source triangulation, and theoretical triangulation (Rahardjo, 2010).

The data collected includes the implementation of STEAM-based learning with loose parts media to stimulate children's development. The data collected through the structured interview stage was obtained from 2 informants, namely the Kindergarten B teacher and the school principal. Observation data was obtained through observation activities for 3 weeks by observing every activity carried out by AUD (Early Childhood).

The data analysis technique used is the Miles and Huberman model. Then the qualitative data analysis is carried out interactively and continuously until complete, so that the data will be valid. Activities in data analysis include three stages, namely; (1) data reduction; (2) data display (presentation of data); and (3) conclusion drawing/verification.

RESULT AND ANALYSIS

Based on the results of observations in the field, it shows that learning with STEAM learning directly provides children's experiences about several skills and abilities, namely; Science; Science learning is very important to be taught at an early age. Learning science is all the skills needed to acquire, develop, and apply various concepts, principles, laws, and scientific theories, both physical, mental and social skills (Science learning in schools has several benefits, namely: (a) learning to explore and investigate, namely activities to observe and investigate natural objects and events; (b) learn to develop basic science process skills, such as making observations, measuring, conveying the results of observations either written or oral; (c) practicing developing children's curiosity, comfort and desire to try to inquire; (d) learning to understand knowledge about various objects, both their characteristics, structure and function (Munawar et al, 2019). The scientific activities carried out at RA Mutiara Bunda include; (a) observing and analyzing tools, materials and work steps; (b) make initial guesses; (c) sorting used bottles or containers; (d) carrying out activities of planting plants; (e) measuring plant development from day to day; (f) draw final conclusions.

Technology; The use of technology can have various impacts on children depending on how it is applied. If children are introduced to technology, they will quickly become independent and competent individuals. Because basically technology provides benefits for child development (Gunawan, 2019:10). In AUD learning, the term technology refers more to the use of equipment and develops fine and gross motor skills. Equipment or tools can encourage children to develop hand-eye coordination, as well as train and strengthen hand and finger muscles for writing, typing and drawing ((Munawar et al, 2019). Activities carried out by RA Mutiara Bunda to develop technological skills, namely non-electronic technology games such as; (1) using scissors; (2) paper folding creations; (3) play development; (4) legos; (4) beam sets; (5) paperclips; (6) stationery; (7) watercolor; (7) used plastic straws; (8) ruler; (9) hole punch; (10) rope; and (11) stapler. The items that are often used now are technologies whose function is to help facilitate human work. Therefore RA Mutiara Bunda's children were trained to use these various technologies to carry out various creative and innovative activities.

Engineering; The third element of STEAM is Engineering. Engineering can be interpreted as an engineering of technology. Engineering is an activity that begins with efforts to identify problems, then find solutions that feel right and solve problems. For example, children go through a process when they are looking for ways to construct a building toy by thinking of the right solution to make a strong foundation so that the building they make can be even taller (Siantajani in Wahyuningsih et al, 2020). The engineering skills developed at RA Mutiara Bunda include the ability to assemble used straws, make used bottles hang, stick folded paper on walls, build certain animal or plant shapes from used straws and bottles, arrange lego tall, sharpen broken pencils. This activity is carried out at each meeting so that children are used to finding solutions to various problems they encounter.

Art; Art is one aspect that must be developed in humans. In AUD art is usually more desirable because it attracts attention and is fun. Art adds treasure to life, calming our thoughts and feelings beyond the mundane events of our daily lives. In the AUD world, the expressive arts are all things enjoyable such as drawing, painting, sculpture, architecture, music, literature, drama and dance. Art stimulates the development of various abilities such as emotional, physical, cognitive and social in AUD (Wahyuningsih, 2020). Art skill development activities at RA Mutiara Bunda include recognizing and demonstrating various artistic works and activities such as making rough designs of dream pots, forming dream pots, painting pot creations from used containers, drawing,

painting with a brush and then sticking it to the wall, finger painting, paper folding colors, arranging straws into the shape of the animal you like, forming straws into wall hangings, playing music with teacher accompaniment, singing together, expressions of movement according to the rhythm, designing dream pots, art telling stories about the work they make, dancing, and exploring with different objects. can be used to create works of art.

Mathematical; Mathematics is often considered a difficult subject because it is carried away by a paradigm that is ingrained in Indonesian society. To deal with this problem, of course the teacher must train AUD with fun learning mathematics. In general, the activities implemented by teachers in the field of mathematics for AUD are; (1) planning mathematical activities to stimulate children's social, physical and cognitive development; (2) planning mathematical activities by paying attention to each child's portion; and (3) incorporate math activities into all curriculum studies (Wahyuningsih et al, 2020). The mathematics learning developed in STEAM at RA Mutiara Bunda includes several things. The activity was carried out in an integrated manner with various other activities, including; (1) playing with colors and sizes; (2) measuring plastic bottles so that they can form the desired animal; (3) measure the length of the hanging pot hook rope; (3) count the number of pieces of straw; (4) measuring plant height; (5) measure with a color folding paper ruler; (6) recognize patterns; (7) sorting various forms; (8) counting paperclips and others. Based on the reference of learning activities, learning is carried out systematically starting from the introduction, core, and closing. In scientific learning In the scientific approach, preliminary activities are carried out in order to perfect the cognitive understanding of the child's initial knowledge that has been mastered, followed by the delivery of learning objectives with the aim that the child's curiosity can emerge. At this stage the child's curiosity is raised with loose parts that the teacher has previously asked to bring from their respective homes. Loose parts that children bring include used mineral water bottles, used straws, folded paper, colored markers, and scissors.

The great curiosity of children is a reference for developing children's creativity in core activities. In the core activities, children carry out learning activities through scientific methods with the aim that learning activities become systematic and meaningful learning activities for children. Therefore, scientific activity sheets have been prepared for STEAM activities by utilizing loose parts as shown in the following table.

The application of the STEAM approach is carried out by utilizing loose parts media as a learning resource to build knowledge and improve children's development. In the process, the teacher always guides children to argue with question words 5W (What, Who, When, Why, Where) and 1H (How). Open ended questions continue to be developed by teachers in activities carried out by children.

In order to improve children's development, especially during the early stages of education, such as kindergarten in the 21st century, learning that supports various competencies is needed. Various competencies needed include the ability of science, technology, art, and others. In order to support this, we need a learning that can cover everything, namely STEAM learning. STEAM is a learning approach that strives for students to have a broad perspective on science (science), technology (technology), engineering, art (art), and mathematics (mathematic). The implementation of STEAM learning is focused on asking children to actively ask questions in inquiry-based learning, problem-based learning, as well as various activities that direct children to think critically, creatively and innovatively (Farhati, 2020: 5).

STEAM learning is very important for children. This is in accordance with the opinion of several sources at RA Mutiara Bunda. Based on an interview conducted with one of the teachers at RA Mutiara Bunda, Mrs. Maesaroh on October 18, 2021, stated that the STEAM approach, namely science, technology, engineering, art, and mathematics can stimulate the ability of students to develop their curiosity by asking lots of questions and giving opinions until they can solve the problems they face, have creativity when carrying out the various activities they do. (Haryuni, 2021).

STEAM learning has its own advantages for the Principal in the learning process. As explained by Mr. Ma'sum Hasan as the Head of RA Mutiara Bunda, he said that the advantages or advantages of this STEAM approach are approaches that cover various abilities such as science, technology, engineering, art, and mathematics. (mathematics). These various approaches can encourage children to always be curious about what they are learning by frequently asking questions to teachers or friends who they think know. So that later children can build their own knowledge

based on experience by exploring, observing, discovering, and investigating how things they do or observe can happen. (Sulikah, 2021).

The results of observations made by researchers at RA Mutiara Bunda on October 22 2021, found that the implementation of the STEAM approach in learning begins with the teacher inviting children to develop thinking skills, children are given the opportunity to observe and explore the tools and materials that are in front of them with various senses. So that children are encouraged to be more curious about what they will do later with various existing tools and materials which will encourage children to actively ask questions. The teacher as a companion first provides bait for children so that they are captivated to have curiosity. The bait given by the teacher was in the form of open questions such as "What are the tools and materials in front of you children?", "Who knows what activities we will carry out later?", "Why can the plants you plant grow and flower? ", "If you don't take care of the flowers, what will happen?", "Why do we all have to take care of the plants?", and so on (Rachmah, 2021)

The teacher continuously invites children to do challenges. The challenges given are open so that later the child is able to solve problems with what he has. Giving children the opportunity to investigate, discover, explore and be creative with existing materials. As stated by Mrs. Hayuni on October 19, 2021, she said that the use of STEAM learning is very good, children can play an active role in learning. because basically the STEAM approach emphasizes PAIKEM learning, so it can stimulate children to learn to solve problems and find solutions that feel right. Therefore learning must be packaged in such a way that children can be happy and comfortable. (Haryuni, 2021).

Based on the results of the three weeks of research, it can be said that the implementation of STEAM for AUD has had a good impact. One of the impacts of implementing STEAM learning in teaching and learning activities for children aged 5 to 6 years is in the form of developing student creativity, or as infrastructure to improve problem-solving skills in daily activities (Perignat & Katz-Buonincontro in Wahyuningsih, 2020). There are several reasons that can explain that STEAM learning can improve children's development. First, children are trained to learn to process by observing, playing, identifying new things and practicing critical thinking skills and collaborating and communicating skills between children when completing tasks or activities presented by the teacher. teacher (Guyotte, Sochacka, Costantino, Walther, & Kellam, 2014). The two KB be used are based on scientific technology and skills to solve problems in real life (Hong, 2017). Third, in the STEAM teaching and learning process, children are accustomed to being able to express themselves in the form of criticism or ideas. This improves children's verbal and non-verbal communication skills as well as the emergence of a sense of openness to the assumptions of people around or knowledge about various new things obtained from experience and also emotional expression from within the child himself (Seidel, S., Tishman, S., Winner, E., Hetland, L., & Palmer, 2009) The fourth is to develop children's potential so that there is a positive relationship between teaching and learning materials, teaching and learning designs and also the circumstances around the child (Sochacka, N. W., Guyotte, K. W., & Walther in Wahyuningsih, 2020). Fifth, the STEAM teaching and learning activities carried out by children in the classroom do not clearly give children an idea of what they are learning. So that they will find a variety of overlapping information which impacts children to think creatively and critically about various new things that are received by children. Apart from that, children are also encouraged to solve various problems with their friends and teachers (Michaud in Wahyuningsih, 2020).

The real form of implementing STEAM both from the process at RA Mutiara Bunda is that children experience an increase in activity at the 6-10th meeting even though the presentation is still 40%. Then the children succeeded in applying simple engineering methods (discovery and projects), the children also succeeded in being guided by the teacher to carry out inquiry activities but with a lot of teacher assistance. At meetings 11-15, children can be invited to develop thinking skills and children are given the opportunity to discover how something can happen. As many as 55% of children have actively communicated and expressed opinions, collaboration has also begun between teachers and children. Whereas at the 16-20th meeting there was a better improvement, as 65-70% of the children were active in communicating and having opinions, there was good collaboration between the teacher and the children, and the children could be invited to carry out simple inquiry activities (Rachmah, 2021).

In terms of STEAM learning activities that have been carried out, children can do various things and be creative with enthusiasm. Starting from the aspect of science, children can observe and

analyze tools, materials and work steps, make initial guesses, sort used bottles or containers, carry out plant planting activities, measure plant development from day to day, and draw final conclusions. From the Technology aspect, children can use scissors, paper folding creations, building games, lego, block sets, paperclips, stationery, watercolors, used plastic straws, rulers, hole punches, ropes, and staplers. The items that are often used now are technologies whose function is to help facilitate human work. From an engineering perspective, children can assemble used straws, make used bottles hang, stick folded paper on walls, build certain animal or plant shapes from used straws and bottles, arrange legos to make them tall, sharpen broken pencils. From the aspect of art, children can recognize and demonstrate various artistic works and activities such as making rough designs on dream pots, forming dream pots, painting pot creations from used containers, drawing, painting with a brush and then sticking it to the wall, painting with fingers, folding colored paper, arranging straws into favorite animal shapes, forming straws into wall hangings, playing music with teacher accompaniment, singing together, expressions of movement according to the rhythm, designing dream pots, art telling stories about the work they make, dancing, and exploring with objects that can be used to produce works of art. Then from the Mathematical aspect, children can play with colors and sizes, measure plastic bottles so they can form the animal they want, measure the length of a hanging pot hook rope, count the number of pieces of straw, measure plant height, measure with a color folding paper ruler, recognize patterns, sort various shapes, counting paperclips and others (Rachmah, 2021).

STEAM learning in such a way encourages children to generate curiosity, openness of children's experiences (Perignat & Katz-Buonincontro in Wahyuningsih) and active questioning so that children can construct knowledge around them by exploring, observing, finding, and investigating something that is around them (Munawar, 2019). Research conducted by Tabi'in in 2019 shows the results that the application of the STEAM method is very beneficial for children's development, not only children are able to think critically in solving problems, but also children experience very good social development (Tabi'in, 2019). Research by Harjanti & Hardianti in 2020 explains that the application of STEAM is visible but needs further improvement, this is because the application of STEAM is considered more fun and provides opportunities for children to think more critically in teaching and learning activities (Harjanti & Hardianti, 2020).

Loose part media in STEAM learning at RA Mutiara Bunda is crucial, because STEAM must relate to the environment around the child. With this media, children can explore their needs and interests in line with their creativity without causing boredom because they are done with a variety of media (Priyanti et al, 2021). Research by Priyanti & Warmansyah in 2021 explains that AUD's naturalist intelligence can be developed by utilizing loose parts media made from natural materials. PAUD educators need to realize that learning activities using loose parts media made from material around children can be used as a means of developing naturalist intelligence for AUD (Priyanti & Warmansyah, 2021). Another study by Nipriansyah in 2021 showed the result that STEAM learning with loose part media can increase children's creativity and imagination. As evidenced by observations made 4 times, all children experience good development when learning with loose part media (Nipriansyah et al, 2021). This shows that the use of loose part media in STEAM learning is needed to support the learning process child.

CONCLUSION

Based on the results of the research and discussion that has been reviewed, it can be concluded the following points.

1. The STEAM learning process is classified into 5 stages where each stage consists of 5 days of observation. At each stage there is an increase in the STEAM process carried out in learning.
2. STEAM learning activities run quite effectively where science (science), technology (technology), engineering, art (art), and math (mathematic) skills have been successfully improved.
3. The use of loose parts media is proven to be able to increase children's curiosity and creativity in STEAM as evidenced by the enthusiasm and various children's works.
4. The difficulty faced by teachers during learning activities is the lack of good collaboration between children and teachers, because it is still a teacher center pattern so the learning tends to be direct teaching, applying engineering methods, and integrating STEAM fields in children's play activities.

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