Implementation of the Steam Approach in the Area Learning Model (Case Study at Islamic Kindergarten Al Azhar Bekasi)

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Abstract. The STEAM approach is an approach that integrates five disciplines, namely Science, Technology, Engineering, Art, and Mathematics in one learning unit. In its implementation there is a framework that must be considered, namely involvement, exploration, elaboration, explaining, thinking clearly and rationally, and creativity. The STEAM approach can be carried out in the area learning model, which is a learning model that organizes the class in the form of play activities that can be chosen based on the child's interests, and is carried out in 1 day of learning. The purpose of this study is to find out the implementation of the STEAM approach framework in the area learning model. The research was conducted using a descriptive qualitative approach. Data collection is done by observation, in-depth interviews, and documentation. The determination of research subjects was carried out by purposive sampling technique. Data analysis was performed using the Miles and Hubberman model. The results showed that STEAM was implemented in five of the six existing areas, namely: Language, Mathematics, Creativity, Science, and Drama. The visible implementation of the STEAM approach framework is: involvement in the five areas; exploration in the area of creativity and the area of Science; elaboration in the Language area and Science area; explains that there are five areas; thinking clearly and rationally about what needs to be done in the areas of creativity, science and drama; and creativity are found in the areas of Language, Creativity and Science. This shows that STEAM is spread over the five areas.

Keywords: STEAM approach, framework, area learning model

1 Introduction

In the era of the industrial revolution 4.0, a generation that is highly creative, alert, able to collaborate, has resilience, masters technology, is able to think critically, knows everything around it and can analyze what is going on is urgently needed. The STEAM approach is an approach that can make children's personalities mature, adaptive, creative, resilient and social [1] so that children are ready to face and compete in the era of the industrial revolution 4.0. The STEAM-based approach is also considered an approach that is able to encourage aspects of children's development, namely one of them is the development of creativity, the goal is for children to be able to think critically and increase the knowledge possessed by children [2]. This approach gives children the opportunity to explore and discover new knowledge, solve problems

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and find ways to solve these problems, so as to improve children's critical thinking skills and increase children's participation in the learning process. [3]

The STEAM approach is an integrated approach from various disciplines namely science, technology, engineering, art and mathematics which are in one unit. [4]. Science in early childhood can be interpreted as things that stimulate children to increase their curiosity, interest, and problem-solving skills [5]. So as to bring up thoughts, ideas, and behaviors such as observations, thoughts, and relationships between concepts or events. From the results of the observations made, it will raise a child's curiosity so that the child will carry out a thought process to find a way as a form of solving problems/events that the child finds.

Technology is a tool that is used by someone in carrying out daily activities [6]. In carrying out activities, it is necessary to use technology, especially in the current era of the industrial revolution 4.0, where all activities use technology, both simple technology and modern technology. For simple technology in early childhood in the implementation of learning, you can use crayons, scissors, pencils, rulers, staples, and so on. Meanwhile, the use of modern technology in learning is in the form of gadgets, computers, blenders to practice making juice.

The important thing, which also needs to be mastered by children, is engineering. According to Siantajani in [7], engineering can be interpreted as engineering for technology. Technique is a way to solve problems, technique relates to children's analytical thinking because children can identify what is going on around them and can provide solutions. For example, when a child is trying to make a solid foundation to make a block tower, the child will start by placing the biggest block at the bottom so that it can hold the smaller blocks on top. When the child tries to make a miniature vehicle from a bombik, the child will determine what vehicle which will be made after that the child looks for parts of the bombik that can be put together/attached so that the bombik can blend together and form the desired vehicle.

Skills in art also really need to be owned by children, because by having artistic skills children become creative, so that in identifying problems and finding solutions children will be more varied. According to [7], art can stimulate cognitive development, social emotional, and physical motor. Some of the arts in children include painting, drawing, coloring, sculpture, dance, drama and singing [8]. One example of an art activity in the STEAM approach is finger painting, where children are free to use or mix various colors so that later the results of the finger painting on paper will be decorated by children into various shapes such as insects, flowers, and so on. Apart from finger painting activities, children can also make various shapes from plasticine, children are freed to be creative in making things (objects around them) using plasticine.

Likewise with mathematical concepts that always appear in everyday life. Not only in counting but in the form of geometry, patterns and so on. For this reason, mathematics skills must also be possessed by children. The Mathematical Approach is used by children in processing their findings, including measuring, comparing, classifying, classifying [9]. An example of Mathematical activity in the STEAM approach is getting to know various geometric shapes from objects around for example whiteboards in the form of rectangles, bottle caps in the shape of circles, grouping objects according to shape, color and size.

STEAM learning will naturally occur every day when children do activities at school and in the family environment. By trying new things, children continue to explore and find solutions to problem solving from their own point of view. Thus, the purpose of the STEAM approach, which is to meet the learning needs of the 4.0 industrial revolution era in the form of the ability to analyze, innovate, communicate and collaborate with others, can be achieved [10].

The STEAM approach is an approach that must be implemented in the learning process, including learning for early childhood. One of the learning models applied in early childhood

education institutions in Indonesia is the area learning model, which is an interest-based learning model, which allows children and teachers to explore ideas through planned and spontaneous interactions. [10] provide the widest possible opportunity for children to be able to choose activities according to their preferences or interests [12] and based on children's character, namely playing while learning, both normal and needy children can play together [13].
The area learning model developed by Highscope in the US, aims to develop all aspects of child development including NAM, physical-motor, cognitive, language, social and artistic. The areas used are arranged in an interesting way using different tools and materials in each area. Several areas are available in this learning model [14], is: Beam Area; Drama area; Art Area; Sand and Water Area; Reading and Writing Area; Motion and Music Areas; Science Area; Mathematics Area; and, the Imtaq Area.
In implementing the area learning model, there are several indicators that must be considered, namely [12]:

1.1 The initial activities carried out by the teacher are classical, with a period of 30 minutes.
1.2 Core activities, carried out in each area teacher provided. The core activity lasts about 60 minutes.
1.3 Rest or eat for 30 minutes.
1.4 The last activity includes storytelling, singing and praying for 30 minutes, all of which are taught classically.

Many studies have been found regarding the implementation of STEAM and the resulting impact, but no one has specifically examined the application of STEAM in area learning models. Where this model is certainly different from the group and center learning models. Based on that, the purpose of this research is to be able to describe the process of implementing the STEAM approach in schools with the area learning model.

2 Research Methodology

This research was conducted at the KB Al Azhar 11 Islamic Kindergarten Kemang Pratama which is located on Jl. Kemang Pratama Raya, RT.003/RW.001, Bojong Rawalumbu, Kec. Rawalumbu, Bekasi City, West Java 17116. While the research lasted for 4 months, namely January 2022-June 2022. Observations were carried out in Term-3 in March 2022 which was carried out in Group B1 with the theme "Plants" sub-theme Trees the Arrogant and the Woodcutter". The reason for choosing the KB TK Islam Al Azhar 11 Kemang Pratama as the research location is because this institution is a unit of PAUD educational institutions that use an area learning model with a STEAM-based approach.
The subjects in the study were two B1 group teachers in the Al Azhar 11 Kemang Pratama Islamic Kindergarten KB. The determination of the subject was carried out based on the purposive sampling technique, namely the technique of selecting research subjects based on certain considerations or criteria. The criteria referred to are: 1). Teachers who teach in group B; 2). already 3 years teaching; 3). is the main teacher and not a companion teacher; 4). willing to provide comprehensive data regarding the STEAM approach and area learning models; and, 5). with the permission of the principal.
The research was conducted using a qualitative descriptive method. There are 2 types of data sources in this study, namely primary data sources obtained from teachers and students in group B1 using direct observation and interviews, guided by observation guidelines andinterview guidelines at the KB TK Islam Al Azhar 11 Kemang Pratama. The type of interview used was a semi-structured interview which is included in the in-depth interview. The purpose of this type

of interview is to find more open issues, where the interviewees are asked about their opinions and thoughts regarding the application of the STEAM approach in the area learning model [15]. Secondary data is a source of data obtained indirectly from informants in the field, such as documentation related to the problem under study in the form of photos, audio, video, manuals and class administration (RPPM, RPPH, assessment sheets etc.). For observation, the observed aspects are one-day learning activities in class, including the strategies and learning methods used; Facilities and infrastructure; as well as, theatmosphere and interaction during learning activities in class.

Data analysis was carried out using the Miles and Huberman model with stages [16]; 1). Data reduction is the process of selecting, simplifying, focusing, and transforming raw data into field notes. Data reduction is made in the form of coding, CO: Observation notes; CWG: Teacher interview notes; and CD: Documentation notes; 2).Presentation of data, using narrative, which is a way of summarizing data that makes it easier to conclude research results; and 3). Draw conclusions and verify from data collection. Thus the work of collecting data for qualitative research must be immediately followed by the work of writing, editing, classifying, reducing, and presenting data, as well as drawing conclusions presented in the form of verbal words.

3 Results and Discussion

KB TK Islam Al Azhar Kemang Pratama Bekasi opens 6 learning areas, namely the religion area, language area, art area, mathematics area, and creativity area. From these 6 areas, it is known that the STEAM approach is implemented in 5 areas. Each area is described as follows.

3.1 Implementing the STEAM Approach in the Language Area

The language area was opened on Monday, where the activities carried out were observing pictures of characters through the story book “Trees of the Arrogant” and discussions about what projects to do. Before having a discussion about what will be done, theteacher reviews the discussion of the themes that have been presented in the main room.

Teacher: "Children today we are going to make a costume project, friends can choose which costumes to make, does anyone remember what characters were in the story earlier?".

Child: "What character is the teacher?"

Teacher: "Characters are actors, players in the story"

Child: "I know, I remember there were mango trees, fig trees, bees, there was wind, there was a lumberjack".

Teacher: "Now, teacher, I want to ask you what costumes you want to make using materials at home that fit your friends' bodies. For example, if the teacher wants to make a bee costume out of large black plastic, the teacher will also decorate it using yellow paper with black plastic attached to make it look like a bee. Now, the teacher wants to ask one by one the costumes that will be made by friends. What costume do you want Kiano to make and from what?”

Kiano: "I made a costume out of a raincoat, the raincoat is no longer in use but it fits on my body, later I also want to make bees out of paper for 4 of them to put on my body (the child shows 4 of his fingers), I will cut them out later and stick them"

Sky: "The teacher said mom, I want to make it using a paper bag, it fits my body. I want to make a mango costume, I also want to make the crown on the head so it's the same as in the story. Sky wants to make a crown out of leaves, because mango trees have leaves."

Pimpa: "Today I made the face of the wind and pasted it on the cardboard. Make it using a large cardboard box, markers, and cardboard. First, Pimpa drew a picture of the wind's face from cardboard, then cut it out and affixed it with glue. Later it will also be colored so that it looks good. The wind also has cute hair, right?"

Teacher: "Okay, now friends, write down what is needed to make costumes, earlier the children needed cardboard, needed raincoats, needed plastic, tomorrow, we will make costumes together. You don't have to finish it in one day, because this is a project for friends and it will take several days"

In this area, it can be seen that the teacher applies a scientific approach by giving children the activity of observing pictures from the Arrogant Tree story book. From the observations made on the storybook pictures, the child then mentions the costumes to be made as well asthe tools and materials needed, namely paper bags, raincoats, and others. This shows that thereare technological tools in the activity plans that will be carried out by children. Engineering can be seen when children tell how to make bees (cut and paste). The Art can be seen when the child will color the wind costume. And, Mathematics is seen when the child shows 4 fingers to make a bee out of paper.

3.2 Implementation of the STEAM Approach in the Mathematics Area

The Math Area is open on Tuesdays and Wednesdays. The activities carried out in this area are large and small measurements and pattern recognition. Pattern recognition is done by compiling AB patterns which will be used as bees for costume decoration. Previously, the children made observations from pictures of bees in the arrogant tree story books about how bees looked and what color they were.
Teacher: Now friends, please see what the bee looks like, friends can make it with the materials that have been prepared after that it is affixed with the AB pattern, remember the pattern is AB because the body of the bee has an AB pattern.

Rasya: Teacher, I brought a ribbon to stick on my bee shirt, I cut the clothes yesterday, now I just need to add ribbon.

Teacher: Now Rasya can measure the length of the ribbon according to the width of Rasya's shirt.

Razka: This is Razka's bee costume, wearing orange, because the yellow carton had run out. So Razka wears black and orange. Razka also made the wings long so the bees could fly" **Biya:** Biya becomes a bee wearing a bee suit. It's black and yellow from plastic andcardboard. There is also a crown because Biya wants to be the queen bee and is also coloredyellow to make her beautiful.

Figure 1. Children's work

3.3 Implementing the STEAM Approach in the Creativity Area

The activities carried out in this area are making and decorating the work of the chosen project. Children are freed to choose tools and materials that have been provided by theteacher in front of the class. The child chooses directly what he needs to make the costume.

Figure 2. Making a Wind Face

Teacher: What is Pimpa making? What do you use for Pimpa?

Pimpa: Teacher Pimpa wants to tell you, this is Pimpa's wind costume. Today I made a wind face out of blue cardboard because the booklet was blue too, then pasted it on the cardboard. Pimp for it using markers and cardboard. First, draw a picture of his face and cut it out and then stick it with glue.

Teacher: To make the pipe better, what do you give it?

Pimpa: Pimpa's hair also makes her hair beautiful. The problem was that what Pimpa saw in his book of wind, there was no hair because he was a bald man.

Teacher: If Rayaka, what do you make?

Rayaka: Rayaka today wants to make an owl mask. Rayaka borrow this plate to print on paper. The problem is that the Rayaka bird mask wants a round shape. If you use tape, the circle is too small. Rayaka saw on YouTube that an owl has big round eyes and a triangular nose, so Rayaka wanted to make something like that.

Figure 3. making a bird's head

From the activities carried out, it can be seen that the application of STEAM in the area of creativity. For Science, it can be seen when the children observe the tools and materials that the teacher has provided for the children to choose from and use to make costumes. Technology can be seen when the child mentions the tools and materials that will be used to make the wind costume, namely cardboard, markers, cardboard, scissors, and glue. Engineering is seen when the child states that he will draw faces, cut out cardboard, and stick using glue. Art is seen when the child will give a picture of hair on the wind costume. And Mathematics can be seen when the child states that his eyes are big round, and his nose is triangular, which means that the child knows Geometry shapes.

3.4 Implementating the STEAM Approach in the Science Area

The Science Area opens on Wednesdays, this area is open to children who have completed their costume projects. The activities carried out in this area are for children to be creative in making forest projects. Children are freed to be creative in making their own version of the forest using loose parts that have been prepared by the teacher. Previously, the teacher had given the child a fairy tale video about the Arrogant Tree.
Teacher: Kenzo, teacher wants to hear Kenzo's story about Kenzo's forest. Is there anything in Kenzo's forest and how did Kenzo make it?

Kenzo: Kenzo makes a beehive out of bombik. At first, Kenzo wanted to make a big beehive, but the bombik wasn't enough, so Kenzo made a small beehive with a tree. How to make it, Kenzo stacks the bombik so it sticks. This is a forest, right? There must be trees. Then there are small and large trees

Teacher: Where did Kenzo get this idea, the inspiration?"

Kenzo: Kenzo saw the video story of a tree that is arrogant and there is a forest with beehives. Kenzo saw the shape and there was honey then Kenzo imagined.

Razka: This is Razka's forest. Razka made a tree out of paper, colored it with markers and then cut it out. There are people who also want to cut wood in the forest, people are made of colorful stones."

Teacher: How many trees did Razka make and how many stones did the woodcutter use? **Razka**: the tree has two colors of green, the stones have 16 colors (Children count the stones one by one from 1-16)

The STEAM approach in the Science area can be seen when the teacher gives children the opportunity to make forests using loose parts, which are various loose materials that can be sourced from nature or man-made. So that with these loose parts, children can observe the media that will be used to make forests, differentiate, classify, and so on. Children alsoobserve videos that the teacher shows as a source of inspiration. Technology is seen in the presence of bombik, markers, and scissors. Engineering can be seen when the child connects the bombik by inserting one another, coloring it, and cutting it. For Art, it can be seen when the child will color the tree image. And, Mathematics can be seen when children say the wordssmall, big, and counting stones.

3.5 Implementating the STEAM Approach in the Drama Area

The drama area was opened on Thursday with activities carried out, namely children presenting their work by playing roles. After the costumes they made were finished, one by one the children would present by telling stories about what they had made and displaying the work they had made. Before telling the story, the child prepares his own costume and wearshis own costume.

> *"Hello friends I am Micah. Now Micah is a bird, I have two wings so I can fly I can also sing melodiously, on Micah's head there is a bird's crown. Micah made the clothes out of plastic and then cut them, if the wings were made of cardboard, Mummy helped. We draw it first, then cut it, paste it, if Micah's crown is made from paper, draw it in color."*

Figure 4. Role Playing

The STEAM approach is also seen to be implemented in the drama area. In this area, Science can be seen when children are able to name the characteristics of birds, which have two wings, sing melodiously, and have a crown on their heads. Technology, you can see plastic, scissors, and cardboard that will be used to make bird costumes. Engineering can be seen when the child will make wings by cutting and pasting cardboard, and coloring the crown image. Art, seen when the child will color the crown image. And, Mathematics can be seen when the child mentions having 2 wings.

Based on the existing explanation, it can be seen that the STEAM approach is in five areas, namely the language area, the drama area, the Arts/creativity area, the Mathematics area and the Science area. Science activities carried out in these five areas are observing and gathering information. Before the child starts doing the project, the child will observe and gather information about what he has to make and what is needed to make the project. Like kids did in term 3, a pompous tree theme and with a costume project. Before making a costume, the child will observe pictures from a story book, for example a picture of a bee, a tree and awind, the child will observe what shape it is, what color it is, what parts must be made, what will be needed later to make a bee, wind and tree costume. This observing activity aims to make children understand more deeply about the object that will be used as a project and to increase their curiosity about the object that the child is observing. This is in accordance with what was written by [18] that observing activities are activities that aim to increase children's curiosity, seriousness and accuracy of children towards an object by using their senses. The senses that children use in observing pictures from the arrogant tree story book arethe eyes (seeing). According to [18] observing activities carried out by children areincluded in basic science activities, because this observing activity is the first activity or opening activity of science activities.

When finished making observations, the child will collect whatever information he gets from the observations such as the mango tree has long green leaves, the color of the fruit is yellow, the bee has wings, the color is patterned, the forest has many trees, there are big and small trees. [18] writing by collecting information can develop children's ideas and creativity about what children should do, meaning that in this activity collecting information allows children to determine what actions to take in making costume projects.

The technologies that children use to make these costumes are materials that are around them and easily available to children. This is in accordance with what was stated by [6], who wrote that technology in learning is tools that are around that are often used in daily activities. So, in making costumes children use tools that are easy for them to get and those around them. The purpose of this technology itself is as a tool to solve problems [2], using raincoats, paper bags, cardboard and largeplastic in carrying out costume projects means that children have found tools to solve problems, namely tools to make costumes.

Technique is the way that children make costumes, this is in accordance with the opinion [7] who wrote that the technique in the STEAM approach is a wayto solve a problem. In this costume making activity, the techniques used by children in makingcostumes are cutting, cutting and pasting. The purpose of the three techniques used is to develop children's fine motor skills. This is in accordance with what was written by [18] that how to use tools and equipment used by children can strengthen finger and hand muscles as well as eye and hand coordination. This means that by cutting, cutting and pasting what children do in making costumes, they can strengthen their finger and hand muscles as well as eye and hand coordination.

The art activities carried out by children when making these costumes are to increase children's creativity, this is in accordance with the opinion [8] who wrote that art activities in STEAM include playing with colors using or mixing various colors to develop children's creativity, this

is in line with the opinion [7] who wrote that in addition to increasing the creativity of this art activity it can also stimulate cognitive, socialand physical-motor development. Thus, art activities (art) are carried out by children in thefive areas mentioned which aim to stimulate creativity, cognitive, social and motoric development of children, especially fine motor skills. Mathematical activities occur when children count the number of bees to be made andshow their fingers as many as the results of the count. In addition to counting, children also recognize the AB pattern by arranging the body of the bee using the AB color pattern.According to [18] one of the Mathematics activities found in STEAM, whichincludes recognizing patterns, this is a basic activity that can be given to children to develop their cognitive. In the activity of assembling the bodies of bees using the AB pattern, each child uses a different color, some of them use black-orange and black-and-yellow. In addition to knowing patterns, children also learn to recognize large and small and long and short sizes by using non-standard sizes (using objects around) such as when making a bird mask, theywill use a plate circle because the tape circle is too small, this is done when the child does not use masking tape. the child will communicate to the teacher why he or she doesn't use the loopon the tape. According to [7] Mathematical activities given to children can stimulate the physical, social and cognitive development of children, in this activity besides children learning to recognize the size of the child's size and length and shortness they also communicate, provide explanations which are larger and which are smaller by compare the two things.

Condlusion

The STEAM approach can be carried out in schools with an area learning model using a project approach. The STEAM approach can also be in every area. For its implementation, the teacher needs to make careful planning so that it can facilitate the wishes of every child and the need for tools and materials to realize these desires. Providing reading material or watching shows needs to be done to provide inspiration at the beginning of activities so that children know how a condition, both living and non-living things, is in an environment. Thus what the child makes can be similar to the existing reality.

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