Implementation of Steam Learning on Children Aged 5-6 Years at Talenta Kindergarten Semarang

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Abstract

STEAM learning explores creative thinking using a child-centred approach that includes technology-based learning and problem-solving. This study discusses the implementation of STEAM learning in children aged 5-6 years at Talenta Kindergarten Semarang. This study aims to determine the implementation of STEAM learning on children aged 5-6 years at Talenta Kindergarten Semarang. The research method uses descriptive qualitative research with a case study approach. The techniques for collecting data are interviews, observation, and document review. The data analysis technique goes through several stages: data collection, documentation, data reduction, presentation, and verification. This study aims to determine the implementation of STEAM learning in Talenta Kindergarten. The data subjects are the Principal, Kindergarten B Teachers, Parents, and Children. The source of data in this research is based on a document review by looking at the process of learning planning, namely RPPM and RPPH. The results in this study include the following: a) STEAM learning planning for children aged 5-6 years at Talenta Kindergarten Semarang, namely the preparation of learning plans carried out by teachers, b) Implementation of STEAM learning for children aged 5-6 years at Talenta Kindergarten Semarang by looking at the teacher's learning and stimulation of ABK using loose parts, and c) The advantages and disadvantages of STEAM learning which shows that STEAM learning has advantages and disadvantages when applied to children with special needs (ABK) so that proper stimulation is needed. Researchers hope that the implementation of STEAM learning in Talenta Kindergarten can follow children's needs and the expected learning objectives.

INTRODUCTION

Based on Law No. 20 of 2003 concerning the National Education System which explains that early childhood education is a coaching effort given to children from birth to the age of six years by adjusting to the times. The PAUD curriculum currently uses the 2013 curriculum in accordance with Permendikbud No. 17 of 2004 which raises integrative thematic learning using themes that are close to the world of children (Abdul, 2014)

Education aims to improve children's thinking skills in exploring their own world using their own way. Good education should start early, this is because the character formation of children starts early. So it is important for adults to prepare their children to grow up to be a smart generation. As stated by Setyowati (in Artobatama, 2019) states that teaching and learning activities must be able to equip students with life skills that are in accordance with the living environment and the needs of students according to their era, so that through education children can think more effectively and practically. In addition, through this teaching and learning activity it can empower children to act and interact effectively.

The PAUD curriculum currently uses the 2013 curriculum in accordance with Permendikbud No. 147 of 2014. Learning in the 2013 curriculum uses a scientific learning approach which is implemented using integrative thematic learning (Miftahul, 2018). Integrative thematic learning uses themes that are actual, close to the child's world and exist in everyday life. This theme becomes a unifying activity for various types of play taking into account the characteristics of children. Activities carried out by children are carried out by inviting children to explore their world and can bring children closer to their environment (Abdul, 2014).

Children with special needs according to (Desiningrum, 2016) are children who experience deficiencies or advantages in their growth and development that are not owned by children in general.

Children with special needs (ABK) according to the Ministry of Women's Empowerment and Child Protection of the Republic of Indonesia (2013) argue that children with special needs and limitations are experienced physically, mentally, socially and emotionally which can affect the child's growth and development process. The World Health Organization (WHO) explains that children with special needs have many terms such as disability, impairment, and handicap.

Science, Technology Engineering, Art, and Mathematics (STEAM) is a learning approach using five fields of science, namely knowledge, technology, engineering, art and mathematics as a whole related to each other as a pattern of problem solving (Hasnawati, 2019). Meanwhile, according to Thuneberg (in Wahyuningsih, 2020) the application of the STEAM method by using objects that are open and easy to find in the environment around the place of residence (loose parts) that can improve children's development, namely increasing interest in talent and can also stimulate children in solving a problem solving.

21st Century Learning uses learning to have knowledge, skills and attitudes as well as mastery of technology. Along with the times, approaches are carried out creatively and innovatively, one of which is by utilizing objects that are around the child's residence. The STEAM learning model uses a scientific approach that can improve children's mindsets to be able to think critically. In addition, STEAM learning can encourage children to develop curiosity, by asking various questions so that they can build children's knowledge about the surrounding environment by exploring, observing, discovering, and investigating something around them (Munawar, 2019).

STEAM learning focuses on a series of activities or processes from a child's work not only about the results being assessed, but from the manufacturing process this is because there are several aspects in a learning process with the STEAM approach, including exploring creative thinking with the right techniques and the existence of final evaluation to be better, Perignat & Katz (in Wahyuningsih, 2020). The process in this STEAM approach can teach children to proceed through observing, playing, recognizing patterns, and practicing collaboration skills and communicating the results of children's work with the teacher in completing a learning theme. Through STEAM learning, children are also encouraged to solve problems with the teacher and their peers.

Children's cognitive abilities develop rapidly which makes critical thinking skills in children must be honed as early as possible. Critical thinking is one example of a cognitive ability that requires a high level of understanding. The ability to think in children can be seen such as, questions that are considered trivial that children will not ask, about new things that children do not know but are unexpectedly asked by children so that interesting questions arise about the surrounding environment that is difficult for people to suspect mature (Tatminingsih, 2019)

STEAM learning is considered effective for introducing children to the objects around them. STEAM learning uses a project-based learning approach (Project Based Learning) which is a student-centered approach that guides children to think critically using the inquiry process, namely by raising various guiding questions and educating children so that children's knowledge becomes open. The use of this approach is a benchmark for solving a problem seen from various aspects (Apriliana, 2018)

Learning from open materials in the form of pieces that can be moved and arranged and combined with other materials in the natural environment is called loose parts (Helista, 2019). The learning carried out by teachers to their students at school requires an intermediary or media.(Nugraheni, 2019) argues that loose parts can stimulate children's cognitive so that they can build imagination in playing besides that, children can explore their environment. Loose parts come from any objects that we encounter around us, the article is loose parts are pieces of objects that we often see and actually have benefits in exploring children's knowledge, for example, such as sand, stones, twigs, leaves, seeds and so on. many loose parts that we can find in nature without the need to buy media to play.

The application of STEAM learning requires good planning so that the learning process can run according to the expected goals (Dewi & Herman, 2017). Learning planning is a process of planning learning equipped with media, methods and also the right time allocation so that learning can be carried out well during one semester of learning so that learning can run optimally Banghart & Trull (in Sabirin, 2012).

The application of learning can be seen in the learning planning process or commonly referred to as the Learning Implementation Plan (RPP). In compiling a standardized lesson plan, content is a very important thing that is used as a reference in a lesson plan. Learning planning includes the preparation of learning implementation plans, preparation of media, learning resources, learning assessment tools, and learning scenarios. The lesson plan is used for face-to-face activities carried out in several meetings. In addition, the learning implementation plan is made in accordance with the learning approach. RPP is made based on Basic Competencies (KD) and Core Competencies (KI) to suit the developmental aspects of children to be achieved at their age (Muchtar, 2018).

Educators have an obligation to prepare lesson plans properly. The arrangement of good learning must be arranged systematically and clearly, so that learning can take place interactively, and is also fun and encourages students to participate actively according to the talents and interests of children. The arrangement of learning becomes one of the basics in the implementation of learning so that it can run as expected. Preparation of RPP based on Basic Competence (KD) and also the theme applied in a meeting in the classroom (Permendikbud No. 146 of 2014)

Permendikbud No. 146 of 2014 explains that lesson plans are considered relevant when they are directly related to children's lives. So that the preparation of the lesson plans must be carried out properly and systematically so that STEAM learning can be conveyed properly, because a learning plan is an initial stage in achieving the expected learning, so that it can be in accordance with the learning objectives of an institution by using loose parts as learning media that utilizes objects around the child's residence.

The initial step taken by the teacher is planning, such as making the Learning Implementation Plan (RPP). The preparation of the lesson plans aims to make learning run interactively, inspiring, fun and systematic. RPP is prepared based on KI and KD with an interesting theme. This study focuses on reviewing the implementation of STEAM learning for children aged 5-6 years at Talenta Kindergarten Semarang by looking at STEAM learning planning, implementing STEAM learning and knowing the advantages and disadvantages of STEAM planning.

The purpose of this study was to find out the STEAM learning planning carried out by the teacher by looking at the process of preparing learning implementation plans such as RPPM and RPPH, then knowing the implementation of STEAM learning in children aged 5-6 years, especially by looking at the implementation of learning carried out by Kindergarten B teachers at the Talenta Kindergarten in Semarang and the stimulation provided by the teacher for children with special needs (ABK) and also to find out the advantages and disadvantages of STEAM learning seen from the advantages of loose parts as a learning medium and the shortcomings of STEAM learning when faced with children with special needs (ABK) who have interference with focus and also psychologically in absorbing STEAM learning.

This study aims to review more deeply related to the implementation of STEAM learning especially for children with special needs. Describing the competence of the teacher in compiling a learning implementation plan that is used as a

reference in teaching and preparing learning media according to the characteristics of the child so as to create fun, active learning and have critical thinking skills in children so that children are expected to have good problem-solving

METHODS

This research was carried out at the Talenta Kindergarten Semarang on children aged 5-6 years (TK B). This study uses qualitative research methods using a case study approach, namely by looking at phenomena that occur in real terms. The purpose of this study was to determine the implementation of STEAM learning in children aged 5 – 6 years at Talenta Kindergarten Semarang. Data collection methods in this study are as follows:

1. Informant

People who can provide the main information needed in the research.

2. Observation

The activity of a process or object with the intention of collecting data from a research

3. Document Review

Complementary data sources from the use of observation and interview methods in qualitative research so that the data obtained are credible and trustworthy.

Data analysis techniques according to Miles and Huberman (in Sugiyono, 2015) are the first flow analysis models or flow analysis models in which three components (data reduction, data presentation, conclusion drawing) are carried out in a flowing manner with the data collection process simultaneously. The second method is interactive analysis (interactive analysis models) in which the components of data reduction, data presentation and conclusion drawing are carried out with the data collection process after the data is collected. This study uses the second method, namely the interactive method.

Miles & Huberman (in Sugiyono, 2015) classifies the stages in research, including the following:

a. Data collection

Data collection was carried out by searching, recording, and collecting data through observation, interviews and documentation to obtain data on how the implementation of STEAM learning in children aged 5-6 years at Talenta Kindergarten Semarang.

b. Data reduction

After the data is collected and recorded, it is then reduced by classifying or, interpreting, discarding the unnecessary. The reduction in

this research is related to the implementation of STEAM learning in Talenta Kindergarten which is done by selecting data and categorizing according to the problem formulation.

c. Data presentation

The data that has been reduced will be able to provide the possibility of drawing conclusions and taking action. After being reduced, the data is presented with a detailed description that makes it easier to find answers to questions in accordance with the research objectives.

d. Data verification

After presenting the data, conclusions can then be drawn and data verification. Drawing conclusions based on data reduction which is the answer to the problems raised in this study.
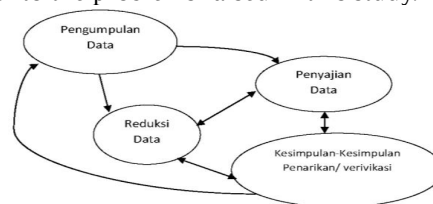
Component charts in Data Analysis (Interactive Analysis Models)

There are 3 stages of research, including:

1. Pre-Research Stage

In this stage the researcher makes a mini research design or concept, makes research instruments, and makes a research permit

2. Research Stage

a. Direct interviews with B grade teachers at Talenta Kindergarten Semarang about the efforts made by teachers in implementing STEAM learning for children aged 5-6 years.

b. Literature review of data collection of information and relevant books.

3. Report Generation Stage

In this stage the researcher compiles the research data to be analyzed and then described as a discussion and formed into a research report.

RESULTS AND DISCUSSION

Talenta Kindergarten Semarang is an inclusive educational institution for early childhood located at Jalan Puspowarno Tengah IX No 6, Salaman Mloyo Village, West Semarang District, Central Java Province. The learning method used at Talenta's Kindergarten is STEAM using loose parts as a learning media.

STEAM learning uses deep project-based learning which is used as a learning model. This project-based learning is a student-centered or child-centered learning model by involving children directly and giving freedom to children

to gain learning experiences through products or works produced by children, according to Afriana (in Meranti, 2015).

Learning is adjusted to the 2013 curriculum by paying attention to HOTS (High, Order, Thinking, Skill) at the stage of child development. Children's cognitive abilities can be done with thinking activities. The ability to reason in HOTS learning is carried out by remembering, understanding, doing, analyzing, evaluating and making activities. The activity was carried out in welcoming the 21st century skills in implementing STEAM – charged learning (Rochanah, 2021). STEAM learning uses a scientific approach which is a series of processes of collecting data through observing, asking questions, conducting experiments, and communicating (Kemendikbud, 2014).

STEAM learning is done with creative, interesting and also fun learning. Using STEAM learning, teachers can stimulate children to discover new things by exploring something that children have never known so far by using materials that exist in nature. In addition, teachers can invite children to solve problems and find a way out of a problem, so that children's abilities can increase in critical thinking activities and children's contributions in a learning process (Prameswari, 2020).

Learning in STEAM has aspects contained in it. Learning activities are carried out by paying attention to the aspects contained in STEAM. These aspects include learning activities in science, technology, engineering, art and mathematics (Wijayanti & Litiana, 2021). Examples of learning activities with the STEAM method carried out by children include the following:

1. Science

Krogh, SL & Slentz, (2008) Activities that must be carried out by teachers in learning the field of science are by planning learning in advance which can be seen from the process of preparing RPPM and RPPH, stimulation provided by teachers in building children's knowledge, preparing classrooms by setting according to the theme raised. Examples of activities in the field of science carried out by children based on observations and interviews at Talenta Kindergarten Semarang include the following:

a. Children can recognize various colors
b. Grouping colors while counting
c. Knowing the process of rain in a simple way
d. Knowing the process of flowing water shown by children when playing.

2. Technology

Some people think that technology includes electronic goods, in contrast to children using simple technology, children already know simple technology (Jackman, 2009). Examples of activities in the field of technology carried out by children aged 5-6 years at Talenta Kindergarten Semarang:

a. Make a miniature airplane from used bottles
b. Knowing the parts of the aircraft and their functions
c. Make a seesaw and slide using tree branches

3. Engineering

Engineering is a process of trying and figuring out how to solve a problem can be referred to as engineering on technology (Anita, 2020). Examples of activities in the field of engineering carried out by children with special needs (ABK) in solving a problem. Based on observations at Talenta Kindergarten Semarang, children with special needs in this case are children who are deaf or children who have hearing impairments can assemble a broken toy knife using plaster without the help of others. This shows that the ability of children with special needs (ABK) in Talenta Kindergarten in solving problems or having good problem solving.

4. Art

Art is one aspect of STEAM learning. Expression arts for children include drawing, painting, making sculptures from plasticine, dance and much more, (Bastomi, 2014). Examples of activities in the field of art carried out by children aged 5-6 years at Talenta Kindergarten Semarang are as follows:

a. Making pizza out of plasticine
b. Make a painting of myself
c. Children and teachers sing and clap
d. Make a house from used cardboard
e. Make slides and make bridges from mahogany tree fruit waste.

5. Mathematics

Mathematics is a field of science in STEAM that deals with numbers and counting activities (Siswanto, 2018). Learning activities in mathematics at Talenta Kindergarten Semarang are as follows:

a. Putting the beads into the bottle
b. Grouping the appropriate sizes and shapes
c. Learn to write numbers with objects

around

d. Show geometric objects in the house.

The learning plan prepared by an educator must be in accordance with the process standards contained in the Regulation of the Minister of Education and Culture Number 137 of 2014 concerning Standards for Early Childhood Education. Learning planning consists of planning semester learning programs, semester planning, weekly program planning, and daily learning planning programs. In the preparation of learning plans, the most important aspects are aspects of child development and indicators of child development which include religious morals, physical motoric, language, cognitive, socio-emotional, and art. These six aspects must be developed in every PAUD institution (Sofiatun, 2018).

The preparation of the learning implementation plan is adjusted to the characteristics of the child. The teacher does the planning by making a Learning Implementation Plan (RPP). This planning is carried out in accordance with the regulations from the government and based on the themes raised in the institution. Learning Implementation Plans are made by teachers based on Core Competencies and Basic Competencies. In STEAM learning the teacher facilitates learning by setting the place according to the theme (Wahyuningsih, 2020).

The theme raised this semester is Growing Tough During the Covid Pandemic with creative, innovative, productive, and talented sub-themes. Next, the teacher prepares learning media, namely loose parts or objects that are close to the child. The teacher provides stimulation to children by using open-ended questions in order to improve children's cognitive abilities, namely critical thinking.

Arrangement of sentences in questions to build knowledge that is posed by the teacher to children using invitation sentences or invitation sentences. Invitiation santence is an activity in order to prepare learning media by inviting children to explore new experiences and knowledge of an object (Cuffaro, H. K, 1995) Examples of invitation sentences given to children are "Let's make geometric shapes", "Let's be creative in making Food Art", and "Let's decorate according to your creativity!". The invitation sentence was made by the teacher to stimulate the children by explaining the theme that was raised that day.

Learning has a learning evaluation that is used to see the extent of the child's development. The application of STEAM learning for early childhood aims to train children's mindset about STEAM learning which is expected to be in accordance with children's growth and development (Zephaya, 2020). Evaluation of learning carried out by teachers at Talenta Kindergarten is by providing an assessment through anecdotal sheets, children's development scales and also the results of children's work.

As for the evaluation and assessment of teachers during learning during this pandemic, teachers also use Whatsapp groups. The Whatsapp group is used by the teacher to provide feedback on the work sent by parents during play and study activities at home. The results of the child's work in the form of pictures or videos that have been made by children during learning both at school and at home are sent to the Whatsapp group so that all parents can know the progress of their child. The assessment process carried out as an evaluation of learning is carried out so that the teacher knows the learning approach applied is appropriate or not and as an evaluation material for further learning.

Assessment according to (Anisa, 2013) is a measuring tool carried out by teachers to measure student achievement about the understanding that has been achieved by students, and also as a strategy used to develop the next lesson. The teacher gives comments that build children's enthusiasm. For children's learning outcomes for one semester, they will be attached to the final assessment or report cards which are explained in detail through the narrative that is used as evaluation material and a measuring tool for children's growth and development for one semester.

The advantages of STEAM learning is that it can increase curiosity by exploring, observing, determining and investigating a problem (Qomariyah & Qalbi, 2021). STEAM learning gives children the opportunity to improve their critical thinking skills by exploring objects close to their environment that makes them closer to their environment and increases their knowledge by using loose parts learning media. The advantage of STEAM learning is that STEAM learning can be applied to children with special needs (ABK) as a learning approach, parents are not burdened by costs because the learning media used are objects around where the child lives. Loose parts learning media allows children to be creative according to their creativity, In addition, children are more critical in solving problems. The disadvantages of STEAM that learning is not fully suitable for children with special needs who have abnormalities or severe disorders in their growth and development, this can be seen from the child's reaction when getting a foreign object, the child will be disturbed and hysterical or experience fear.

CONCLUSION

Based on the results of the study, it can be concluded that the implementation of STEAM learning for children aged 5-6 years at Talenta Kindergarten Semarang is done by planning learning before carrying out learning. While the application of STEAM learning is made for children to have the ability to think critically in solving a problem and have good problem-solving using loose parts as a media of learning. The process of implementing learning includes three stages, namely; a) lesson planning, b) implementation of learning, and c) assessment and evaluation of learning.

The teacher provides stimulation with various open-ended questions that build children's creativity. The learning planning process is prepared by the teacher so that it can run according to the expected learning objectives. The advantage of the STEAM method is that children can be creative using loose parts or objects that are close to the child's environment. The disadvantages of STEAM learning are related to service and teacher readiness in educating children with special needs using loose parts for media learning. Researchers hope that educators are able to implement learning according to the needs of children in the application of STEAM learning so that learning objectives can be achieved optimally and children have good problem-solving.

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