

Application of Science, Technology, Engineering, and Math (STEAM) Approaches with Loose Parts Media on Early Childhood Education (Study on Kindergarten in Ngaliyan District)

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Abstrak

STEAM adalah salah satu pendekatan pembelajaran yang di dalamnya terdapat unsur Sains, Tecnology, Engineering, Arts and Mathematic yang saling terintegrasi dalam kehidupan sehari-hari. Disamping itu dengan menggunakan media lepasan (loose parts) dapat menentukan suatu kegiatan atau pembelajaran yang menarik dan variatif. Penelitian ini bertujuan untuk menelusuri aplikasi dari pendekatan berbasis STEAM dengan media loose part di pendidikan anak usia dini pada TK Kecamatan Ngaliyan Metode penelitian yang digunakan adalah pendekatan penelitian deskriptif kualitatif yang mengarah pada penelitian lapangan (*field research*). Sumber yang digunakan adalah data dari observasi dan wawancara langsung dengan kepala sekolah dan guru kelas. Hasil dari penelitian ini adalah penerapan pendekatan STEAM dengan media loose part dapat mempersiapkan anak untuk berfikir secara kritis, kreatif serta mampu memecahkan berbagai masalah dalam kehidupan sehari-hari sehingga anak siap untuk mengikuti perkembangan zaman di abad 21.

Kata kunci: Pendekatan STEAM, Media Loose parts, PAUD.

Abstract

STEAM is one of the learning approaches with elements of Science, Technology, Engineering, Arts, and Mathematics, which are integrated into everyday life. Besides that, using loose parts can determine an exciting and varied activity or learning. This study explores applying a STEAM-based approach with loose part media in early childhood education in TK Ngaliyan District. The research method used is a qualitative descriptive research approach that leads to field research (field research). The sources used are data from observations and direct interviews with school principals and classroom teachers. The result of this research is that applying the STEAM approach with loose media can prepare children to think critically and creatively and be able to solve various problems in everyday life so that children are ready to keep up with the times in the 21st century.

Keywords: STEAM Aproaches, Loose Part Media, PAUD.

INTRODUCTION

Early childhood has a very important or urgent period in developing its potential or aspects of child development. The period is called the *golden age* or the golden age of children. Children think like *sponges* so that early childhood can absorb various information from their environment (Husna & Suryana, 2022; Husna & Suryana, 2021; Husna & Eliza, 2021). This is because every Child born in this world is pure. As in the hadith narrated by al-Baihaqi and ath-Tabarani in al-Mu'jamul Kabir, the following:

Meaning: "Every Child Is Born In A State Of Fitrah. It is subsequently his parents who make him a Jew or a Christian or a Magian."

The hadith explains that what happens to a child in the future depends on the environment he is in. The environment can be parents or the environment in life. Therefore, in developing aspects of child development, various strategies are needed to provide the right stimulus or stimuli (Eliza et al., 2022; Husna & Nurhafizah, 2022; Husna & Mayar, 2021).

Several strategies need to be adopted as learning for early childhood so that they are more enthusiastic and cheerful in playing. STEAM is a learning medium, and expert educators have discussed it extensively. In addition, using removable media (loose parts) can determine an exciting and varied activity or learning (Princess et al., 2021; Wachidi & Sudarwan, 2021).

STEM started in 1990. STEM is *science, technology, engineering, and mathematics*. STEM comes from the National Science Foundation (NSF) in America. STEM is a field in 21st-century learning (Bilgiler, 2020). According to the Merriam-Webster Dictionary, STEM is a combination of four fields, namely the fields of *science, technology, engineering, and mathematics*. Science is knowledge about nature based on facts and data through various observations and experiments. *The technology* uses knowledge (*science*) to find something (tools) to solve problems. *Engineering* is an effort to create a new product or system or the application of technology in creating a new product in solving problems. *Finally, mathematics* is knowledge of numbers, measurements, number operations, grouping, and comparing (Siantajani, 2020).

According to Buincontro, STEAM integrates the arts into the curriculum where there are elements of science, technology, engineering, and mathematics that give children the opportunity to be creative and innovate in playing activities (Mu'minah & Suryaningsih, 2020; Pratiwi et al., 2021).

Besides that, using loose parts can determine an exciting and varied activity or learning (Rachmah et al., 2022). STEAM & Loose Part-based learning can improve the quality of education, especially in early childhood education (Imamah & Muqowim, 2020).

STEAM learning with loose parts media is still not widely applied in PAUD institutions such as RA, TK, and KB due to a lack of training regarding the introduction of STEAM learning to teachers in PAUD institutions (Qomariyah & Qalbi, 2021). However, the results of brief observations made by institutional researchers who have used the STEAM approach, especially in Ngaliyan District, are TK Bunga Harapan, TK Himawari, TK ABA, and TK IT Permata Hati.

Researchers chose kindergarten institutions in Ngaliyan District because schools have implemented the STEAM approach in their learning. Kindergarten institutions in Ngaliyan District have established the STEAM approach as an approach applied to the learning process.

However, what happens in the field of implementing STEAM-based learning is still many obstacles. So the goal of STEAM learning has yet to be maximally achieved. From this explanation, researchers are interested in researching the application of the STEAM Approach in PAUD with Loose Part Media (Learning Studies in Kindergarten PAUD in Ngaliyan District).

METHODS

This study uses a qualitative descriptive approach directed at *field research* with research subjects at four early childhood education institutions (TK) in Ngaliyan District. First, collect data using observation techniques, interviews, and documentation. They are then analyzed qualitatively and objectively. The focus of this research leads to applying the STEAM approach in PAUD with loose part media and the supporting and inhibiting factors in applying the STEAM approach in PAUD with loose part media. The stages in case study research can be seen in Figure 1 below (Fitrah & Luthfiyah, 2017):

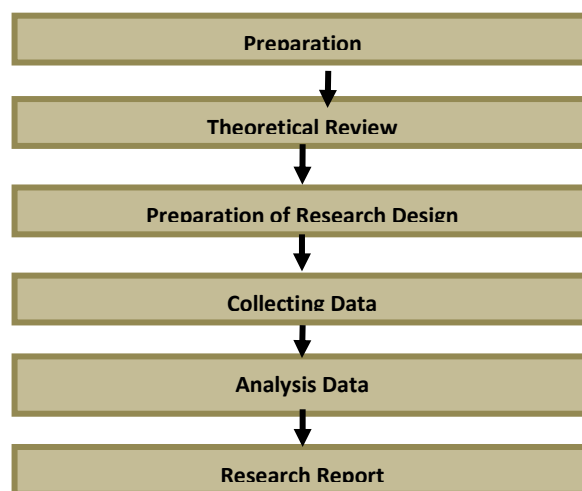


Figure 1. Qualitative Research Stage

RESULTS AND DISCUSSION

STEAM D in Early Childhood Education

One of the characteristics of early childhood is having a high curiosity and trying to solve problems. So through this curiosity, the Child will experiment with various experiments. Then the Child will explore and investigate so that something that makes the Child curious will be answered through the experiment. So it is very attached to STEAM. So that the activities of asking questions, observing, and collecting information then communicating through STEAM-based learning (Azizah et al., 2020).

Play activities using STEAM provide opportunities to collaborate and communicate. They will do various ways to make simple engineering with existing media (Dejarnette, 2018). In addition, STEAM-related education can be said to be effective for preschool-age learning. This is proven through naturalist observations of children and the ability of children to record experiences during free play with various open materials. Children will be able to collaborate with their peers and adults.

Learning with STEAM, children will be able to analyze and solve problems and think creatively (Aktürk & Demircan, 2017). However, the implementation of STEAM-based learning is not fully integrated, so a team of experts needs assistance, and there are no comprehensive learning media (Munawar, Roshayanti, & Sugiyanti, 2019)

This STEAM learning is integrated with the Regulation of the Minister of Education and Culture Number 146 of 2014, which includes the essential competencies of KD related to STEAM, namely KD

2.2; 2.3; 2.4; 3.5-4.5; 3.6-4.6; 3.7-4.7; 3.8-4.8; 3.9-4.9 (Permendikbud, 2014). Furthermore, STEAM learning objectives can be achieved if good cooperation between parents and institutions can be well established (Akturk et al., 2017).

Loose Parts as Learning Media in Early Childhood Education

Loose part is a term pioneered by Simon Nicholson, who is concerned about an object and the environment being interconnected. Simon believes that children have creative minds. Creative activities will create an open mind, such as student expressions, information processing, and the emergence of students' creative ideas. (Qomariyah & Qalbi, 2021) . So that children will take the initiative to ask unique questions through their active activities when playing in their social environment. (Lindeman, Jabot, & Berkley, 2014) .

Loose parts are transferable materials, easy to carry and redesign, and can be put back together. Loose parts bring back creativity and imagination without limits in children (DIKMAS, 2019). The seven components of loose part materials (Siantajani, 2020) namely from natural materials, metal, glass and ceramics, plastic, wood and bamboo, yarn and cloth, and used goods. Examples: stones, stumps, sand, gravel, cloth, twigs, wood, pallets, balls, buckets, baskets, crates, boxes, boxes, logs, stones, flowers, ropes, tires, balls, shells, and seed pods.

The theory of loose parts leads to games that allow children to play by utilizing the surrounding environment (Putri, Khasanah, & Kusumaningtyas, 2019). Children are given the freedom to play (Azizah, Munawar, & Ds, 2020).

An environment with loose parts is much more stimulating and engaging than a static game. The playing environment needs to support imaginative play. According to (Safitri, Lestarinigrum, & Nusantara, 2021), children's rights must be fulfilled in supporting imaginative games. Loose parts allow children to play freely and not depend on other people's rules (Nugraheni, 2019).

Application of the STEAM Approach with Loose Part Media in Early Childhood Education in All Districts Ngaliyan

Researchers determined and selected four institutions in the Research on Application of STEAM Approach with Loose part media in PAUD (TK) in Ngaliyan District. The four research institutes were: Bunga Harapan Ngaliyan Kindergarten Semarang, Himawari Ngaliyan Kindergarten Semarang, ABA Supervisory Kindergarten 54 Ngaliyan Semarang, IT Permata Hati Ngaliyan Kindergarten Semarang.

a. Application of the Steam Approach Using Loose Parts at TK Bunga Harapan Media

TK Bunga Harapan applies the STEAM approach using loose parts media in its learning activities. Before starting the implementation, you must first make an RPPH. RPPH on STEAM is the same as RPPH in general. The only difference is that the activities contain elements of *Science, Technology, Engineering, Arts, and Mathematics* and use loose parts media.

The following are children's play activities at Bunga Harapan Kindergarten with a STEAM approach and loose parts media in the 1st Child:

1. The 1st Child (TK B) transfers the bottle cap from a container filled with water to a plastic cup using a wooden stick with the theme of the universe.
2. Loose parts media used: bottle caps, pebbles, wooden twigs, water, transparent containers, used plastic cups

Table 1. Analysis of the STEAM Approach with Loose Parts Media for the 1st Child at TK Bunga Harapan

<i>Science</i>	<ul style="list-style-type: none"> - 1st Child Know the shapes and colors of bottle caps - child 1 knows the element of the earth, namely water - child 1 knows the twigs are part of the plants - child 1 knows the concept of weight and light, which is why bottle caps float and stones sink
<i>Technology</i>	- wood earrings
<i>Engineering</i>	- child 1 uses wooden twigs as a tool to move objects
<i>Arts</i>	- child 1 sing English songs 1-10 while moving the bottle cap
<i>Math</i>	- child 1 Count the number of bottle caps transferred

The following are children's play activities at Bunga Harapan Kindergarten with a STEAM approach and loose parts media in the 2nd Child:

1. The 2nd Child (TK B) makes a toy car with loose parts with a vehicle theme
2. Media used: used bottles, scissors, sticks, banana stems (wheels)

Table 2. Analysis of the STEAM Approach with Loose Parts Media for the 2nd Child at TK Bunga Harapan

<i>Science</i>	<ul style="list-style-type: none"> - The 2nd Child knows the shape of the bottle - The 2nd Child knows the number of wheels on the car - The 2nd Child knows how a car can run - The 2nd Child knows who often drives the car
<i>Technology</i>	- G scissor
<i>Engineering</i>	- 2nd Child using scissors as a tool to provide a hole in the bottle so that the stick can be inserted as a connecting wheel (banana stem)
<i>Arts</i>	- The 2nd Child makes a work of art (car crafts)
<i>Mathematics</i>	<ul style="list-style-type: none"> - The 2nd child groups sharp objects, and Blunt - The 2nd Child can count the number of wheels

Based on the research data above, applying STEAM and loose parts gives children the opportunity to be creative and think critically. In the beginning, before the activity began, the children asked questions related to the media used. The feeling of wanting in know they appear. Why does this material exist? What is this going to load? What is this thing called? And so forth. When you start an activity, of course, there are problems. For example, how did this thing turn into a car? Alternatively, how to make the bottle caps moveable/they will think about how to solve the problem.

Based on the questionnaire data that has been made, applying the STEAM approach with loose parts media helps stimulate 6 aspects of children's development to produce exciting learning. Besides that, I hone my communication skills and critical thinking skills. In learning using the STEAM approach, the principal and his team must be movers, act strategically, focus on learning and be able to receive input and ideas from other teachers. Therefore, teachers who are professional and able to work together for learning. In addition, schools must be able to embrace the role of parents in supporting school programs. Therefore, what teachers need to

prepare in STEAM learning with loose parts media is to prepare learning tools, implementation of learning, and assessment of child development through the children's play process.

b. Applying the Steam Approach Using Loose Media parts at TK Himawari

The following are children's play activities at Himawari Kindergarten with a STEAM approach and loose parts media in the 3rd Child:

1. The 3rd Child plays with putting water in a bottle.
2. Media used: plastic bottles, funnels, plastic containers, colored water.

Table 3 . Analysis of the STEAM Approach with Loose Part Media for the 3rd Child in Himawari Kindergarten

<i>Science</i>	<ul style="list-style-type: none"> - 3rd Child knows why water can fall when Poured - The 3rd Child knows how to put water in a plastic bottle - The 3rd Child knows the concept of high and low - The 3rd Child knows the earth element (water)
<i>Technology</i>	- Funnel
<i>Engineering</i>	- Using a funnel to transfer water from a container to a plastic bottle
<i>Arts</i>	- Singing a rain song
<i>Mathematics</i>	<ul style="list-style-type: none"> - The 3rd Child counts the length of time until the water runs out and is put into the bottle. - The 3rd Child recognizes the shapes of objects used, such as the shape of a container filled with water, the shape of a bottle, the shape of a funnel, and others.

The following are children's play activities at Himawari Kindergarten with a STEAM approach and loose parts media in the 4th Child:

1. The 4th Child of Kindergarten B plays cooking and makes bee food with animal theme (bee) loose parts. Media used:
2. Pounders, mortars, plastic cups, small stones, sand, spoons, and baskets filled with dry leaves.

Table 4 . Analysis of the STEAM Approach with Loose Part Media for the 4th Child in Himawari Kindergarten

<i>Science</i>	<ul style="list-style-type: none"> - Child 4th knowing why bees have to eat - The 4th Child knows the leaves' texture before and after being mashed. - The 4th Child knows the color and texture of each object
<i>Technology</i>	- Spoon, plastic cup, pounder, mortar
<i>Engineering</i>	<ul style="list-style-type: none"> - Using a spoon to pick up sand - Use a masher to grind the leaves - Using a plastic cup for the place after the leaves are pounded
<i>Arts</i>	- Singing songs about bees, playing characters in cooking (acting art)
<i>Math</i>	<ul style="list-style-type: none"> - Child 4th grouped each object according to its type - Child 4th recognizes the shapes of objects used, such as glass shapes, mashers, leaf shapes, and so on

Based on the data above and the questionnaire data, Himawari Kindergarten applies the

STEAM approach because it wants to make debriefing related to learning methods by AUD education. The STEAM approach is a development concept that can be applied in learning activities so that imagination, creativity, and innovation can be applied. STEAM is applied because it adapts to the times and the needs of PAUD education. After all, Knowledge of STEAM is needed in every field of work. Applying STEAM with loose parts media makes children feel enthusiastic, and children's ideas can be released while playing. Therefore, to maximize STEAM and loose parts learning, careful planning is needed both administratively, RPPH, Prota, and Prosem. STEAM has advantages, including integration with the 2013 curriculum, related to daily life, participation with the team, focus on solving problems, teacher as facilitator, authentic assessment, and approach to projects. However, it requires creative teachers, a long time, and a committee to provide various media.

c. Application of the STEAM Approach Using Loose Parts Media at Pembina Aba 54 Kindergarten Semarang

The following are children's play activities at Aba 54 Semarang with a STEAM approach and loose parts media in the 5th Child:

1. The 5th Child plays in groups with the sand.
2. Media used: sand, spoon, straw, leaves, gravel.

Table 5. Analysis of the STEAM Approach with Loose Part Media on the 5th Child in Kindergarten Aba 54 Semarang

<i>Science</i>	- The 5th Child knows the elements that exist in nature, such as stones, sand, and leaves. - The 5th Child knows the texture of each object
<i>Technology</i>	- Spoon
<i>Engineering</i>	- The 5th Child moves the sand using a spoon to pass it through the funnel of the leaves.
<i>Arts</i>	- The 5th Child sings a song while playing
<i>Math</i>	- The 5th Child is counting when he puts the sand into the funnel.

The following are children's play activities at Aba 54 Semarang with a STEAM approach and loose parts media in Child 6:

1. The 6th Child plays the role of cooking with loose parts media.
2. Media used: sand, leaves, pebbles, spoons, twigs, plates, bottle caps.

Table 6. Analysis of the STEAM Approach with Loose Part Media for the 6th Child in Kindergarten Aba 54 Semarang

<i>Science</i>	- The 6th Child knows the various elements of soil elements such as sand, stone, gravel - Child 6th knowing various textures of natural objects such as stone textures, sand textures - Child 6th knowing the various colors
<i>Technology</i>	- spoons, plates,
<i>Engineering</i>	- The 6th Child uses a spoon to stir various components such as sand and

	some to make dishes and uses a plating container as a place to make dishes.
<i>Arts</i>	- The 6th Child is creative in doing works in the form of processed dishes from surrounding goods.
<i>Mathematic</i>	- The 6th child groups objects based on the size of the objects from the smallest to the largest, such as from pebbles to leaves

Based on the data obtained, TK Pembina ABA 54 applies STEAM with loose parts media because learning with this approach is expected to be an exciting method for children. STEAM learning is applied to achieve learning that can build critical thinking (critical thinking). In addition, it can increase children's interest. Children are directed to think and enjoy the process of solving problems. However, applying STEAM with loose parts of media still needs a lot of evaluation, such as providing various media, and requires creative teachers.

d. Application of the Steam Approach Using Loose Parts Media at TK IT Permata Hati

The following are children's play activities at Permata Hati IT Kindergarten with a STEAM approach and loose parts media in the 7th Child:

1. The 7th Child made herbal medicine from turmeric with the theme of plants under the theme of medicinal plants.
2. Media used: glass, spoon, turmeric, water, knife, sugar.

Table 7. Analysis of the STEAM Approach with Loose Part Media for the 7th Child at Permata Hati Kindergarten

<i>Science</i>	- The 7th Child knows various medicinal plants - The 7th Child knows the function of the turmeric plant for health - The 7th Child knows the color of turmeric - The 7th Child knows how to make herbal medicine
<i>Technology</i>	- Spoon, knife, glass
<i>Engineering</i>	- The 7th Child uses a knife to cut turmeric - Child 7th use a spoon to stir the herbs - Child 7th uses glass for herbal medicine
<i>Arts</i>	- The 7th Child makes art in the form of herbs - The 7th Child sings a song about various medicinal plants
<i>Mathematics</i>	- The 7th Child grouped the pieces of turmeric from small to large. - Child 7th counts the rounds when stirring the herbs - The 7th child groups turmeric from short to long

The following are children's play activities at Permata Hati IT Kindergarten with a STEAM approach and loose parts media in the 8th Child:

1. The 8th Child did work about cows on the animal theme.
2. Milk cardboard, glue, plasticine, scissors.

Table 8 . Analysis of the STEAM Approach with Loose Part Media for the 8th Child at Permata Hati Kindergarten

<i>Science</i>	<ul style="list-style-type: none"> - Children know cows - Children know the benefits of beef and cow's milk - Kids know how ice cream sticks stick to paper - The Child knows the color of the cow - Children know how to make a cowshed
<i>Technology</i>	Scissor
<i>Engineering</i>	Children use scissors to cut used cardboard
<i>Arts</i>	Children make artworks in the cowshed
<i>Math</i>	<ul style="list-style-type: none"> - The Child counts the ice cream sticks used to make the cage wall - Children make square geometric shapes on used cardboard - Children group objects from short to long

Based on the data that has been obtained, Permata Hati IT Kindergarten applies the STEAM concept with loose part media. However, it still needs to be more optimal. Tk Permata Hati uses the STEAM concept because it wants to try to adapt to the times. The data obtained during direct interviews with the principal and teachers of Kindergarten B for learning at TK Permata Hati is still in the adjustment stage, so it has yet to be implemented optimally. Even still learning a lot and must follow much training on an ongoing basis.

Judging from the practice above, making herbal medicine, turns out that it requires a process and requires various tools. In addition, by making herbal medicine, children will think about how to cut the turmeric? How can turmeric be used as herbal medicine? And so on.

Implementing STEAM, of course, requires various components, such as the preparation of the RPPH. In addition, supporting the implementation of the STEAM approach requires the support of both the media and competent educators and time for good planning.

Effectiveness of Application of STEAM Approach in PAUD Using Loose Part Media (Study on Kindergarten Early Childhood In Ngaliyan District)

In the application of the STEAM approach, it is undoubtedly a practical approach if applied in the world of early childhood education.

a. Kindergarten Flower Hope

Applying the STEAM approach with loose part media is practical but not optimal. This is because implementing STEAM media with media requires careful preparation, starting from preparing the media to the teacher's ability to teach STEAM. Besides, regular training is still needed to finalize teachers' understanding of STEAM learning.

STEAM is effective because it allows children to think critically and not be hung up on the teacher's orders—teachers as facilitators and children who play an active role.

b. Himawari Kindergarten

The STEAM approach concept with loose part media is very effective in Himawari Kindergarten. This is because STEAM can stimulate children by bringing out their creativity. Therefore, children are very enthusiastic about playing with various loose media parts. Besides, STEAM is effective in teaching and learning activities so that the power of imagination, creativity, and innovation can be applied when children play.

Some of the advantages of applying the STEAM approach include being integrated with the

2013 curriculum, relating to daily life, children doing direct practice, children feeling fun in playing, being participatory and teamwork, children focusing on problem-solving, never giving up, and having an entrepreneurial spirit. Moreover, as a facilitator, the teacher conducts an authentic assessment with a project approach.

With STEAM, this means preparing children to adapt to the development of this sophisticated era. So it takes several components to be prepared to apply this STEAM approach, such as increasing human resources (educators). In addition, because the application of STEAM with loose parts, media requires creative teachers, takes a long time, and it is difficult to provide many media.

c. TK Pembina ABA 54 Semarang

Based on the data obtained, applying the STEAM and loose parts approach is effective because the materials are easy to obtain, and children can easily play anywhere. Then learning with the STEAM approach with loose parts media makes the learning situation more enjoyable.

In addition, the curriculum used, namely the 2013 curriculum, is related to the STEAM approach, where children will gain knowledge from their learning experiences to encourage children to be creative and encourage their imagination to think. However, children still need to explore more so that children do not have trouble and want to work together with other friends. Then the teacher must provide many teaching materials.

d. Kindergarten IT Permata Hati

Applying the STEAM and loose parts approach is effective based on the data obtained. However, the implementation is still not fully maximized because STEAM is still newly implemented in this institution, so a lot still needs to be learned.

Besides, it must pay attention to the situation and conditions when children learn. However, learning with the STEAM approach is only one of the approaches that are most appropriate because, in its implementation, there are still combinations of several other learning models. This means its implementation has not been entirely and maximally regarding this STEAM learning. Then, learning to use loose part media has been implemented in the learning practice so that learning is flexible and varies with various media.

Supporting and Inhibiting Factors in The Application Of The STEAM Approach in PAUD With Loose Part Media (Study on Kindergarten Early Childhood Education in Ngaliyan District)

a. Kindergarten Flower Hope

Several supporting and inhibiting factors in the application of STEAM with loose parts media:

a) Supporting factors

- 1) Media is freely available around, so there is much variety
- 2) A supportive environment, such as the cleanliness of classrooms, parks, and others
- 3) The principal's role is to direct teachers regarding STEAM learning with loose parts of media
- 4) Competent educators to fully understand STEAM and loose parts so that they master the stages of child development
- 5) Fulfillment of learning support facilities and infrastructure

b) Obstacle factor

- 1) Incompetent human resources
- 2) She still needs to understand STEAM implementation with loose parts media fully.
- 3) Lack of teacher sustainability training on STEAM and Loose parts

b. Himawari Kindergarten

Several supporting and inhibiting factors in the application of STEAM with loose parts media:

- a) Supporting factors
 - 1) Availability of media as needed
 - 2) Continuous activity time or child project
 - 3) Institutional support in the continuity of activities
 - 4) A conducive and comfortable school environment for playing
 - 5) The principal's role is to direct educators in implementing STEAM with loose parts media to improve educators' quality.
 - 6) Competent and professional educators
 - 7) Complete understanding of educators on the application of the STEAM approach with loose parts media
- b) Obstacle factor
 - 1) Mastery of the concept of STEAM development by teachers has yet to be maximized.
 - 2) Limited media
 - 3) Lack of time for children
 - 4) Less creative educators will lead to less innovative learning
 - 5) Time management in the implementation of STEAM is still lacking
 - 6) Time is limited, so the Child must be forced to complete the stages that must be passed.

c. TK Pembina ABA 54

Several supporting and inhibiting factors in the application of STEAM with loose parts media:

- a) Supporting factors
 - 1) Ease of getting materials for learning, so that the activities provided are more creative
 - 2) Careful preparation of educators in presenting and packaging learning
 - 3) Educators have the full ability to apply STEAM with loose parts media
 - 4) The principal is a motivator for teachers to always prepare for maximum learning.
 - 5) A supportive school environment in preparing learning materials.
- b) Obstacle factor
 - 1. Some children choose activities they like, so they do not explore other toys.
 - 2. Lack of management in implementing the STEAM approach with loose parts media
 - 3. Lack of coordination between educators and parents. In addition to educators, parents must understand as well.
 - 4. Educators still need to be fully ready to implement this STEAM approach.
 - 5. Educators must still be competent—namely, they lack creativity and innovation.

d. Kindergarten IT Permata Hati

The supporting factors in the STEAM implementation include the school's location, educators' competence, and school management.

- a) Supporting factors
 - 1. A conducive environment when the learning process takes place so that the results will be maximized
 - 2. The role of the principal is to be a motivator for educators so that they will create professional and competent educators
 - 3. Competent educators as facilitators play an essential role in learning
 - 4. Supporting advice and infrastructure
- b) Obstacle factor:

1. Educators must be creative, innovative
2. Lack of regular teacher training
3. Requires careful preparation in providing media

CONCLUSION

Based on the discussion above, it can be concluded that STEAM is a concept of a learning approach in which there are elements of *science, technology, engineering, arts, and mathematics* where these elements are integrated into each other in the learning curriculum to create innovative and effective learning and can encourage children to think. Critical and creative to equip children to follow the development of the 21st century.

In the application of the STEAM approach with loose parts media, it has been implemented in several kindergartens in the Ngaliyan sub-district. However, there are still some that could be more optimal. Effectiveness in implementing STEAM with loose part media is compelling, but many things still need to be evaluated. Its application has to support and inhibit factors affecting the learning objectives.

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