



The Use of Bamzle (Bamboe Puzzle) to Improve The Ability to Recognize Geometric Shape in Group A at TK Al-Ihlas Pasuruan (Kindergarten)



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Abstrak

Penelitian ini bertujuan untuk meningkatkan kemampuan mengenal bentuk geometri pada kelompok A di TK AL-Ihlas Pasuruan dengan menggunakan alat permainan edukatif Bamzle (Bamboe puzzle). Bamzle merupakan salah satu alat permainan edukatif yang dibuat oleh peneliti, terbuat dari bambu yang banyak tersedia di lingkungan sekolah TK Al-Ihlas. Penelitian ini merupakan Penelitian Tindakan Kelas ((Classroom Action Research) dengan model desain Kemis dan Mc. Taggart dengan tahapan yaitu perencanaan, pelaksanaan, pengamatan dan refleksi. Penelitian ini dilaksanakan 2 siklus, tiap siklus terdiri dari 2 pertemuan. Subyek Penelitian adalah anak kelompok A TK Al-Ihlas Desa Capang Kecamatan Purwodadi Kabupaten Pasuruan. Teknik Pengumpulan data dengan observasi dan dokumentasi. Hasil penelitian menunjukkan bahwa kemampuan mengenal geometri meningkat dari kegiatan observasi awal sebesar 27 % kemudian pada siklus I mencapai 41,67 % dan pada siklus II mencapai 79,67 %. Penggunaan bamzle oleh guru dan siswa sangat efektif ditunjukkan dari hasil observasi penggunaan bamzle oleh siswa mencapai 89 % dan oleh guru mencapai 92,7 %. Hal ini membuktikan bahwa bamzle dapat meningkatkan kemampuan mengenal bentuk geometri kelompok A di TK Al-Ihlas Pasuruan.

Abstract

This research aimed to improve the ability to recognize geometric shapes in group A at TK AL-Ihlas Pasuruan using the educational game tool Bamzle (Bamboe puzzle). Bamzle is an educational game tool created by the researchers made from bamboo, widely available in the TK Al-Ihlas school environment. This research is Classroom Action Research using the Kemis and Mc. Taggart's design model with four stages: planning, implementation, observation, and reflection. This research was carried out in 2 cycles, each with 2 meetings. The research subjects were children from group A, TK Al-Ihlas Kindergarten, Capang Village, Purwodadi District, Pasuruan Regency. Data collection techniques used were observation and documentation. The research results showed that the ability to recognize geometry increased from initial observation activities by 27%, then in Cycle I, it reached 41.67%, and in Cycle II, it reached 79.67%. The use of bamzle by teachers and students was very effective, as shown by the observations of the use of bamzle by students reaching

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|---|--|
| | 89% and by teachers reaching 92.7%. This has proved that Bamzle could improve the ability to recognize geometric shapes in group A at TK Al-Ihlas Pasuruan. |
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INTRODUCTION

A child's world cannot be separated from the world of play, a world full of joy, fun, warmth, and cheerfulness. Playing is the most important way to improve their abilities and development. Playing has significant benefits in developing all aspects of early childhood development: moral, cognitive, language, physical, motor, social, and emotional. Through play, children can increase their understanding of the environment and the world, interact socially with others, develop symbolic abilities, express their ideas, thoughts and feelings, and hone their creativity. Therefore, playing is essential for young children to have fun learning.

According to Vygotsky, as quoted in Kusuma & Listiana (2021), play is important in improving the development of thinking abilities in early childhood. Through the process of playing, children can understand, recognize and learn the form, function and characteristics of objects by interacting directly with the surrounding environment. This makes it easier for children in the learning process to identify and differentiate the shapes, sizes, and colors of objects around them.

Educational Game Tools (*Alat Permainan Edukatif/APE*) are important elements in play activities for children because they can be a fun and educational tool in the learning process. APE is designed to develop various aspects of children's development and has educational values, as Sulastri et al. (2017) mentioned. MierEdu (2020) and Sander (2019) have also revealed many benefits associated with the use of APE in early childhood play and learning activities. Some of the benefits that can be obtained include increasing children's intelligence and providing a fun learning experience through the use of interesting game tools. Moreover, APE also helps develop children's senses and motor skills and improve

critical thinking skills and problem-solving abilities. APE also stimulates children's creativity, increases their concentration power, and positively influences children's social-emotional development.

Based on initial observations at TK Al-Ihlas Pasuruan, the researchers found that children's ability to recognize geometry still showed a low level. In group A, which consisted of 10 children, only 2 children showed development in recognizing geometric shapes, while the other 8 children did not show the same development. One factor was the limited learning media available in schools. It was also found in the initial observation that the learning activities carried out by the teacher were still lacking in variety, only using Children's Worksheets (*Lembar Kerja Anak/LKA*), so the children felt bored with these activities.

In overcoming this problem, it is necessary to find the right solution to overcome the limitations of learning media and activities to recognize interesting and fun geometry for children so they do not feel bored, one of which is using APE in the learning process. The use of APE (Educational Game Tools) can be a solution to increasing young children's ability to recognize geometric shapes. Several studies have shown that the use of APE is effective in increasing the ability to recognize geometric shapes, as has been proven in several previous studies, including research by P Puspitasari, AA Permanasari (2022) using APE "Petak Pintar", research by W. Wahyuningsih (2021) with block media, research by LA Chusna, MA Ningrum (2019) by developing Dakon Geometri media, research by RH Rasyadi, Y. Solfiah (2022) using Tancap Tower Media.

In an effort to overcome this problem, the researchers conducted classroom action research using an APE called Bamzle (Bamboo Puzzle) to improve the ability of young children to recognize geometric shapes. Bamzle is an APE made from bamboo, available around the school environment, and utilizes these natural resources. Bamzle is made in various geometric shapes, such as triangles, rectangles, and circles, with different color variations. This tool is played like a puzzle; children must arrange or group the shapes and play guessing shapes.

Based on this background, the researchers chose the title "Using BAMZLE (Bamboe Puzzle) to Improve the Ability to Recognize Geometric Shapes in Group A at TK Al-Ihlas Pasuruan".

LITERATURE REVIEW

EDUKATIF GAME TOOLS

Educational Game Tools (APE) have a very important and interesting role as a learning medium for young children. APE is specifically designed to stimulate various aspects of children's development, including religion and morals, language, cognitive, physical motor, and social-emotional, both in the home context and in the school environment (Kemdikbud, 2021).

The use of educational game tools has two goals, as stated by Fadillah (2017): goals for children and for educators. The goals for children include facilitating the child's learning process, training concentration, expressing creativity and imagination, overcoming boredom, improving memory, and as a material for experiments. Meanwhile, the goals for educators include making it easier to deliver material, developing their creativity as educators, overcoming time, place and language barriers, inspiring children's learning motivation, and as a tool for evaluating children's development.

Characteristics of making APE according to Badruzaman & Eliyawati (2007) and Mirawati (2019) in the Ministry of Education and Culture (2021) that the general characteristics of APE are as follows:

1. Educational game tools improve early childhood development, including religious and moral, language, cognitive, physical motor, and social-emotional aspects.
2. Educational game tools have multi-purpose properties or can be used in various ways, forms, and purposes to support the development of various aspects of children's development.
3. The safety of APE for early childhood is very important, ensuring that the materials used are safe and friendly for children, without any toxic or dangerous ingredients.
4. APE is expected to encourage children's activity and creativity and stimulate their imagination.
5. APE must have a constructive element where children can produce something based on their ideas and creativity while playing.

6. APE must contain educational values that are beneficial for young children. In other words, there are values that children can obtain when they play with the APE.

A good APE with educational value has the following characteristics or criteria: it must be appropriate to the child's age, stimulate growth and development, and be interesting and varied. Besides, the play equipment must also be multi-purpose, safe when used, have a simple shape, and can involve children's activities (Fadillah, 2017).

According to Ismail (2012:158-161), there are several basic principles in Educational Game Tools (APE), including:

1. Productivity, where APE can generate new knowledge, experience, and creativity in children.
2. Activity, where APE is expected to encourage children to become more active in play activities. This principle can help develop motor skills, both gross and fine motor skills, in early childhood.
3. Principle of creativity, through playing using educational game tools, children can develop and bring out their creative powers. Thus, increasing the creativity of early childhood.
4. Principles of effectiveness and efficiency, educational game tools must provide maximum benefits with efficient time, energy, and costs. In a sense, these game tools can provide useful results with effective use of resources and do not require excessive time, energy, and costs.
5. The principle of fun education, educational game tools must be able to create fun for young children when playing. In this way, children do not realize that they are learning or participating in an educational process that can develop their abilities in various aspects of development.

According to the Ministry of Education and Culture (2021), types of educational game tools based on the manufacturing process are divided into 3:

1. Manufacturers, Educational Game Tools (APE) which are produced by factories and usually sold in children's toy stores.

2. Homemade, APE which is made using materials that can be found or are available in the environment, such as used materials, plastic bottles, cardboard, bottle caps, etc. independently by educators or parents..
3. Available in nature, APE uses natural resources found in the environment, such as leaves, flowers, turmeric, wood, bamboo, seeds, soil, sand, etc.

BAMZLE (Bamboe Puzzle)

Bamzle is an APE in the form of a puzzle made from bamboo. This puzzle consists of pieces in geometric shapes, such as rectangles, squares, triangles, and circles. This Bamzle is used as an APE to improve the ability of children aged 4-6 years to recognize geometric shapes. The concept of puzzle itself, according to Patmonodewo (in Misbach & Muzamil, 2010), refers to puzzles in English. Meanwhile, Pangatuti (2019) stated that puzzles are games or media that usually take the form of puzzles in the form of pieces of shapes that need to be assembled into one complete shape.

The advantage of this Bamzle is that it is light and easy to carry anywhere. It is more economical because the basic ingredients for making it can be found around TK Al-Ihlas, so there is no need to buy it. However, the drawback of Bamzle is that its size is limited because it depends on the diameter of the bamboo as the basic material for making it.

The benefits of using Bamzle are similar to the benefits of puzzle games as mentioned by Pangastuti (2019), including:

1. Stimulate fine motor skills: Children are invited to arrange the Bamzle pieces according to the picture.
2. Practice patience: Children learn to be patient in completing the challenge of arranging Bamzle.
3. Improve thinking skills: Children learn to focus and concentrate on matching and arranging Bamzle pieces.
4. Practice hand-eye coordination: Children carry out matching or pairing activities and arrange several Bamzle pieces into one image shape involving eye-hand coordination.

5. Improve cognitive thinking skills: Children are invited to think logically in recognizing geometric shapes through selecting and arranging Bamzle pieces.
6. Improve social skills: especially the ability to interact with others, such as sharing and collaborating in solving puzzles.

Thus, using Bamzle has benefits similar to puzzle games in developing various aspects of children's development.

In Pangastuti's research (2019), there are game rules for using puzzles, which can be summarized as follows:

1. Various types of puzzles are collected, and then children freely choose the picture and type of puzzle they like.
2. After children choose one type of puzzle according to their wishes, they will be guided by asking about the picture and shape they chose.
3. Children are asked to match and install the puzzle pieces one by one to form a complete picture.
4. Challenges are given to children to complete puzzles quickly, and they are encouraged to increase their speed in completing the puzzle.
5. Finally, thanks and praise are given to the children for the efforts they have made.

Because there are similarities in the use of Bamzle with Puzzle, the researchers used the results of this research as a reference for compiling steps for using Bamzle. The steps for using Bamzle to get to know geometry are as follows:

1. Children are given the freedom to take various types of bamzle shapes (quadrangles, triangles, circles) and name their shapes.
2. Children choose a picture of a geometric shape according to the bamzle they chose.
3. After that, the teacher asks the children about the geometric shapes and images they chose.
4. Then, the child continues by installing and matching the bamzle pieces with the picture and connecting them with their names.
5. After that, children can play by grouping the balls according to their shape.
6. Children arrange several bamzle pieces to form an object around them according to their creativity.

7. Children are challenged to do it faster and with a variety of activities, for example, running to pick up bamzles and pair them.
8. Give praise if the child can pick up the bamzle correctly according to the geometric shape and name and provide motivation for children who still cannot do it.

INTRODUCTION TO GEOMETRIC SHAPES

By the Regulation of the Minister of Education and Culture (Permendikbud) Number 137 of 2014 concerning National Standards for Early Childhood Education, the introduction of geometric shapes in early childhood includes indicators such as the ability to arrange objects based on size, shape, and color, the ability to group or classify shapes, differentiate shape characteristics, showing and arranging different shapes, and recognizing various shapes of objects. Introducing geometric shapes in early childhood is important because it can improve cognitive abilities, fine motor skills, and train children's logic from an early age.

According to Prihandoko Antonius C. (2006:174), geometry is a system in mathematics that starts from the basic concept, namely points. From points, we can form lines, and these lines form planes. In a plane, we can build various plane shapes and many sides. Multiple shapes can also be used to build space shapes.

According to Lestari (2011:14), young children learn to recognize geometric shapes such as triangles, rectangles, squares, and circles. Next, they learn to be creative and use various geometric shapes.

In introducing geometric shapes to young children, there are several stages. According to Vanhiele's theory, there are 5 stages in understanding geometry: the introduction, analysis, sequencing, deduction, and accuracy. Wahyudi (2005) explained 5 stages in introducing geometry to young children, which consist of:

1. Introduction to basic shapes: rectangles, squares, triangles, and circles are the basic shapes that are introduced to children.
2. Differentiating shapes: Children are taught to differentiate between one shape and another.
3. Giving names: Children learn to relate geometric shapes to their names, for example, recognizing and naming circles, squares, and triangles.

4. Classifying shapes: Children are taught to group shapes according to their similarity.
5. Recognizing the shapes of objects around them: Children are introduced to various shapes of objects around their environment and learn to recognize these shapes.

RESEARCH METHODS

In this research, the research method used was Classroom Action Research by applying the Kemmis & Mc Taggart cycle model. The stages carried out consist of planning, implementation, observation, and reflection stages.

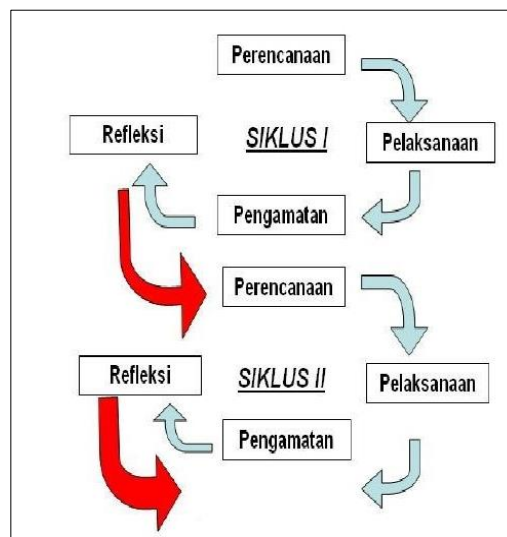


Figure 1. Kemmis & Mc Taggart Cycle

In the planning stage, the researchers made a Daily Learning Implementation Plan (*Rencana Pelaksanaan Pembelajaran Harian/RPPH*). They prepared the learning media to be used, namely Bamzle (Bamboe puzzle), and prepared instruments: observation sheets and assessment sheets.

This research was carried out at TK Al-Ihlas, located at Jl Sidobangun RT. 02 RW. 01 Cengkarukwatu Hamlet, Capang Village, Purwodadi District, Pasuruan Regency. The research was conducted in the 2nd semester of the 2022/2023 Academic Year, with the research subjects being group A children of TK Al-Ihlas, consisting of 10 students (4 boys and 6 girls).

The data source was obtained from group A students at TK Al-Ihlas Pasuruan. Data collection techniques in this research used observation and documentation to determine the use of 'bamzle' in recognizing geometric shapes. Meanwhile, to see the increase in the ability to recognize geometry in group A students at TK Al-Ihlas using oral tests and observation.

According to Arikunto in Elan (2017), descriptive data analysis is used to describe the use of APE Bamzle and to determine the increase in the ability to recognize geometric shapes using quantitative assessment data processing.

The indicator of success is marked by an increase in the ability to recognize geometric shapes with a percentage score of at least 75% of the indicator for assessing the ability to recognize geometry and 75% of the results of observations of the effectiveness of using bamzle by teachers and students.

RESEARCH RESULTS

This research was carried out in Group A of TK Al-Ihlas in Purwodadi District, Pasuruan Regency. The number of students involved in this research was 10 children, 4 boys and 6 girls. The research was carried out in 2 cycles, each consisting of 2 meetings, which included: planning, implementing actions, observing, and reflecting. The research results regarding students' ability to recognize geometric shapes are summarized in the following Table.

**Table 1 Recapitulation of recognition abilities
Geometric Shapes based on observation and test**

| INDICATOR | Recapitulation of recognition abilities | | |
|--|---|---------|---------|
| | Pre-cycle | Cycle1 | Cycle 2 |
| Getting to know geometric shapes with bamzle | 30 % | 38.33 % | 76.67 % |
| Differentiating between geometric shapes and bamzles | 25 % | 39.17 % | 77.5 % |
| Connecting geometric shapes with their names | 25 % | 39.17 % | 77.5 % |
| Classifying shapes in a group according to their shape with bamzle | 30 % | 49.17 % | 81.67 % |

| | | | |
|--|------|--------|------|
| Recognizing the shapes of objects in their environment | 25 % | 42.5 % | 85 % |
|--|------|--------|------|

| | | | |
|------------------------|-------------|----------------|----------------|
| Overall average | 27 % | 41.67 % | 79,67 % |
|------------------------|-------------|----------------|----------------|

Description of assessment criteria:

1. 0 % - 24 % : Not Yet Developed
2. 26 %-50 % : Starting to Developed
3. 51%-75 % : *Developed* According to Expectations
4. 76 %-100 % : Developed Very Well

The results of initial observations on June 19, 2023 showed that the average ability to recognize geometry in group A was still low, namely 27%, including the assessment criteria starting to develop. In these initial observations, it was found that many children joked and were less interested when the teacher delivered material about recognizing geometric shapes because the teacher used many worksheets in the lesson.

Cycle I learning was carried out on 28 and 30 June, 2023. Implementation of Cycle I learning began with preparing a Daily Learning Implementation Plan (*Rencana Pelaksanaan Pembelajaran Harian/RPPH*), preparing bamzle media, teacher and student observation instruments, and oral tests. The average value of students' ability to recognize geometry has increased from initial or Pre-cycle observations reaching 41.67%. The results of teacher observations regarding the use of bamzle media were 85.5%, while the average observation result of students' use of bamzle was 81.5%. In Cycle I, learning still did not achieve the target according to the success indicators, so it continued with Cycle II activities. The reflection results from Cycle I showed that the use of bamzle was still not optimal because the teacher only introduced it to students. The quantity is still limited, so students have to take turns using it. In terms of the ability to recognize geometric shapes, the result of reflection in Cycle I showed that many students still experienced difficulty in connecting geometric shapes with their names. The result of reflection in Cycle I was used as a reference for taking corrective action and continuing learning in Cycle II, namely by increasing the number of bamzle media and planning RPPH with play activities using bamzle.

In Cycle II learning, which was carried out on 1 and 3 July 2023, corrective actions were taken based on the reflection results in Cycle I. Some of the corrective actions taken included:

1. Increase the number of Bamzles so each child can use them without waiting in line.
2. Prepare lesson plans and carry out activities that are more fun, foster interest and enthusiasm during learning. In the indicator of classifying or grouping shapes into a group according to their shape, activities of playing and running fast are carried out to group Bamzle according to their type. Students are asked to put Bamzle into a container with a picture of a geometric shape attached to it, and then name the appropriate geometric shape. Next, on the indicator of recognizing the shapes of objects around them, students are invited to arrange the shapes of objects using Bamzle according to their creativity, then name the objects they made and mention the related geometric shapes, along with the number of Bamzle used to arrange them.

Next, after carrying out the actions according to the plan, the researchers carried out observations and oral tests. The results showed that the ability to recognize geometric shapes and use bamzle for teachers and students increased. The ability to recognize geometry reached 79.67% with the Very Well Developed (BSB) assessment criteria. Meanwhile, the results of observations on the use of Bamzle by teachers were 100% and students were 96.4%. From these results, learning in the second Cycle has met the success indicator target of 75%. Therefore, learning in the second Cycle can be stopped.

DISCUSSION

The results of the research above, which was carried out in 2 cycles, showed that there has been an increase in the ability to recognize geometry in group A of TK Al-Ihlas. This is illustrated through the graph below.

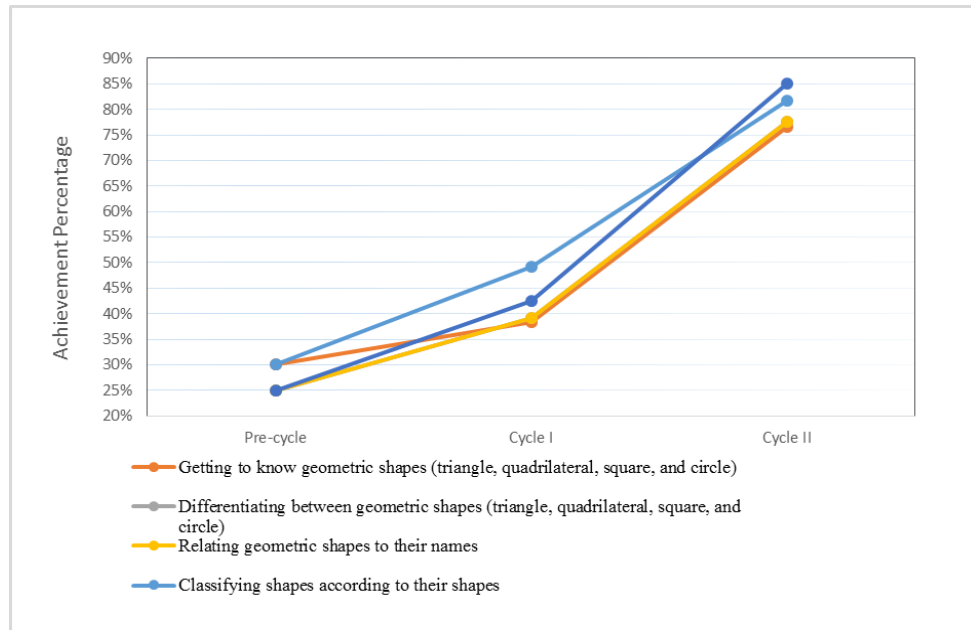


Figure 2. Graph of the ability to recognize geometry

The results of Cycle-1 learning in improving students' ability to recognize geometry still have not succeeded in achieving the target indicator of success, but have experienced improvement. This is because there are still things that need to be improved, including the insufficient amount of learning media for learning.

In Cycle II, indicators of the ability to recognize geometric shapes all increased from Cycle I, including recognizing geometric shapes was 38.37%, distinguishing geometric shapes was 38.3%, connecting geometric shapes with their names was 38.3%, classifying shapes in a group according to its shape was 32.47%, and recognizing the shapes of objects in its own environment was 42.41%. This increase occurred after researchers added APE bamzles and made playing activities more fun, such as grouping bamzles according to their shape while running fast with their friends so that children were more enthusiastic and could practice gross motor skills. The largest percentage increase was in the indicator of recognizing the shapes of objects in their environment. The results of the researchers' analysis of this activity were very popular with children so their ability to recognize geometry succeeded in achieving the target indicators of success. This activity is to arrange the shapes of objects using bamzles according to creativity and imagination. Then, the child names the geometric shapes that make them up and their numbers. This

proves that playing activities, fun learning and using educational game tools during learning can improve abilities and all aspects of early childhood development.

This is in accordance with the explanation by Monks, et al. in Amanda (2018) that children are more interested and enthusiastic when learning is done with games, so there is an increase in the ability to recognize geometric shapes through games and puzzles. Based on Piaget's theory in AShunhaji (2020), children experience a pre-operational phase (aged 2-7 years) where they begin to understand the objects around them through sensory-motor activities and symbolic activities such as the use of educational games. These activities have an impact on the cognitive development of young children.

In addition, the effectiveness of using bamzle media for both teachers and students is very good, as shown by the percentage of observations on the use of bamzle by teachers, which has increased from Cycle I of 85.5% to 100% in Cycle II. The use of Bamzle by students also increased from Cycle I by 81.5% to 96.4% in Cycle II. The graph for increasing the effectiveness of using Bamzle is as follows:

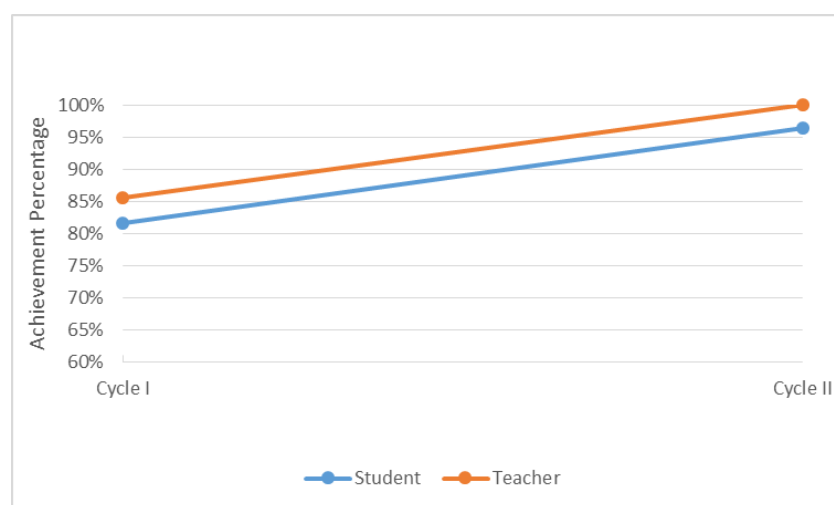


Figure 3. Chart of Bamzle Usage

The description of the research results above shows that this is in line with Fadillah's (2017) opinion regarding the purpose of using educational game tools for children and educators. These goals include facilitating the learning process, training concentration, developing creativity and imagination, overcoming boredom, improving memory, and as experimental material. Some relevant research according to the purpose of using APE includes:

1. Research by Eka Yuni P D (2019) through games using block media could increase the creativity of early childhood.
2. Asdar, A., Fatimah, F., & Rahayu, A. (2021) used tangram puzzle media as effective in developing children's abilities to recognize geometric shapes, both shapes and colors, developing children's ability to work together, training children's fine motor skills, train creativity, socio-emotional, moral and religious values.
3. Pangastuti, R. (2019) used puzzle media to recognize geometric shapes and improve children's cognitive abilities.
4. Amanda (2018) proved that there was an influence of APE geometric puzzles on increasing children's interest in learning.

The research results also align with Vanhiele's theory, which identifies five stages of understanding geometry, including recognition, analysis, sequencing, deduction, and accuracy. In this research, the stage of introducing geometric shapes was carried out well, helping to increase children's abilities and interest in recognizing geometry at an early age. This supports previous research, such as research by Fadlillah, M, Kristiana, D & Prabawati (2018), which examined the influence of the GEOMEWA Puzzle on children's ability and interest in recognizing geometric shapes in the 4-5 year age group at BA. Aisyiyah Ronowijayan.

CONCLUSION

Based on the results of the research and discussions that have been carried out, it can be concluded that the use of Bamzle media has proven effective in improving the ability to recognize geometry in early childhood, especially in group A at TK Al-Ihlas Pasuruan. This is evident from the increase in the average value in recognizing geometry, where there was a significant increase from the conditions before the research by 27% to 41.67% in Cycle I and reaching 79.67% in Cycle II.

Observations results of the use of Bamzle by teachers and students also showed a high level of effectiveness, with use by students reaching 89% and by teachers reaching 92.7%.

Therefore, it can be concluded that the use of Bamzle media effectively has increased the ability to recognize geometry in early childhood, and can be a good choice in the learning process at TK Al-Ihlas Pasuruan.

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