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The Influence of Picture Number Card Media on the Introduction to Number Concepts and Critical Thinking Abilities in Early Childhood

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ABSTRACT

This research aims to determine the effect of picture number card media on the introduction of number concepts and critical thinking abilities of children aged 4–5 years. Initial observations at PGTK As-Sakinah showed that these abilities had not yet developed optimally. The study involved 30 children, consisting of 46.67% boys and 53.33% girls, divided equally into an experimental group (TKA 1) and a control group (TKA 2). A quantitative experimental method was used, with data analysis through JASP 0.19.10, employing descriptive analysis and the Mann-Whitney U test. The descriptive results indicated a clear difference, with the experimental group achieving a gain score of 6.13 compared to 2.4 in the control group for the introduction of number concepts. In terms of critical thinking, the experimental group had a gain score of 2.4, while the control group scored 0.87. Hypothesis testing showed a p-value of <0.001, indicating that p was smaller than 0.05. Thus, it can be concluded that the use of picture number card media significantly influences the development of number concept understanding and critical thinking abilities in children aged 4–5 years.

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INTRODUCTION

Children's brains develop rapidly and occur very quickly in a short time span at the age of 0-6 years (Kusbiantoro, 2015). Appropriate stimulation must be provided to support the growth and development of early childhood. One important aspect that needs to be stimulated from an early age is cognitive development in the introduction of number concepts and critical thinking skills. The concept of numbers for children is very important as a basis for understanding mathematical concepts at the next level of education (Rakhmawati, et al., 2019). Numbers and also the concept of numbers become important and very necessary because most aspects of life involve numbers, such as size, quantity, distance, time, temperature, costs, money, and many more (Beaty, 2013). After children learn about the concept of numbers, they are invited to relate what they learn to their own experiences. This is the basis of critical thinking skills. The development of critical thinking skills in children at an early age can be seen from the questions they ask, which are often considered impossible by adults (Mukti & Pangestu, 2024).

Introduction to the concept of numbers includes several aspects, including recognizing numbers visually, understanding the relationship between numbers and quantities, ordering numbers and comparing quantities. Meanwhile, children's critical thinking abilities include the ability to form concepts, analyze, evaluate, and draw conclusions or decisions based on observation, direct experience or learning at school. Indicators of critical thinking abilities for

children aged 4-5 years include identifying and classifying, analyzing cause and effect relationships and solving simple problems.

Introduction to number concepts and critical thinking skills that have been carried out at PGTK As Sakinah Ngronggot. Based on interviews with teachers, is still not optimal. This is because teachers still use old methods in introducing number concepts and in stimulating children to think critically. The use of worksheets and magazines is still a mainstay of teachers in daily learning. Based on data from observations through initial assessment activities in class A aged 4-5 years, it was found that on average children were still confused about the concept of numbers. It can be seen that 50% of children still do not understand number symbols. In connecting/pairing number symbols with objects, it was also found that 10 out of 15 children were still not developing as expected. Critical thinking abilities in group A aged 4-5 years also still do not show maximum results. It was found that more than 50% of children still have difficulty classifying objects based on color, shape, size, analyzing cause and effect relationships and also solving simple problems.

To provide a useful learning experience for children, the process of learning to recognize number symbols and critical thinking skills requires tools or media. Media are instruments, strategies and tactics used to increase teacher-student involvement and communication during the teaching and learning process in schools (Hamalik, 1994). Two media that complement each other and are useful for teaching number concepts and symbols are picture cards and number cards (Heruman, 2007). In real practice, teachers often face difficulties in implementing learning approaches that are appropriate to children's developmental stages. Visual media such as picture number cards can help children recognize number concepts and think critically. The stimulation given to children also needs to be repeated in order to provide a meaningful experience and form habituation. Habit is the deliberate repetition of an action so that it becomes a habit. This is based on experience because repetition is the foundation of habit and what is practiced is what is usually done (Gunawan, 2014).

This research aims to examine the influence of picture number card media on the introduction of number concepts and critical thinking abilities of children aged 4–5 years. This research is expected to provide theoretical and practical contributions to support the development of learning methods using visual media. These methods aim to improve children's cognitive abilities in recognizing number concepts and enhancing critical thinking skills.

RESEARCH METHOD

This research employed a quantitative approach with a quasi-experimental method to examine the effect of picture number card media on the introduction of number concepts and critical thinking abilities of children aged 4–5 years. A nonrandomized pretest-posttest control group design was used, dividing 30 participants at PGTK As Sakinah Ngronggot into two groups: an experimental group receiving picture number card intervention and a control group using conventional methods. Each group consisted of 15 children aged 4–5 years, allowing for comparison of outcomes between the two learning approaches.

The media with picture number cards is the independent variable in this research, while the dependent variables are introduction to number concepts and critical thinking skills. Instruments that have been tested for validity and reliability through expert judgment tests and inter-risk reliability tests are used as data collection techniques carried out through observation. Parametric or non-parametric tests are used to analyze data by first testing the assumptions of normality and homogeneity. The pretest and posttest results were compared by looking for the gain score to determine the effectiveness of the intervention.

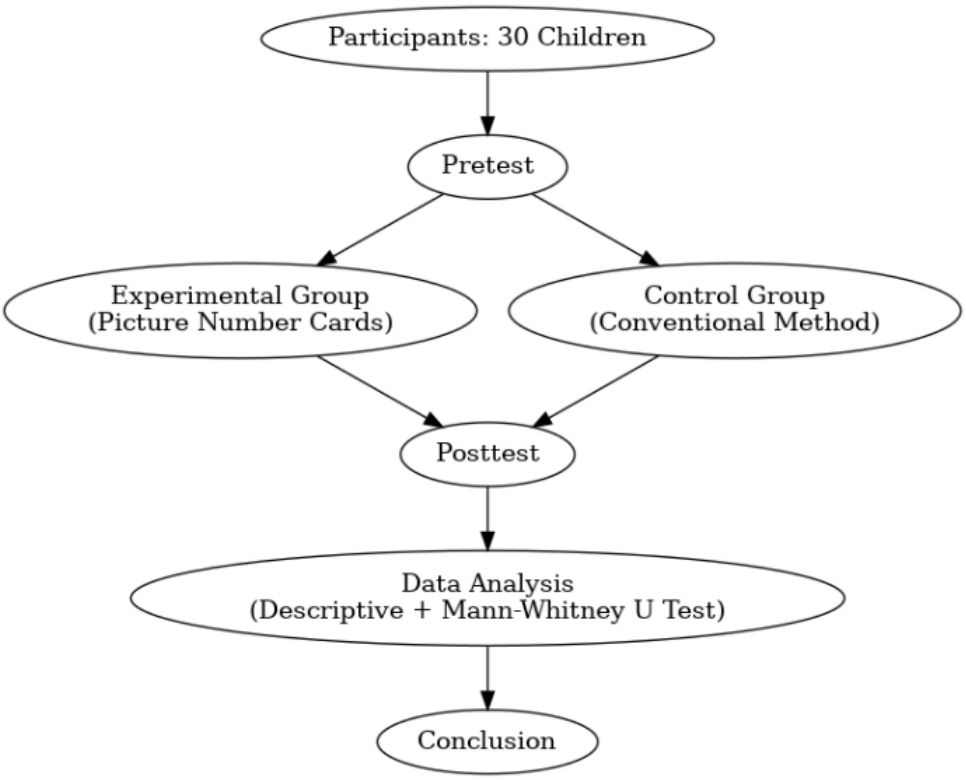

Figure 1. A research flowchart.

This research was carried out systematically through careful data analysis to ensure the production of valid and reliable findings. The process aimed to maintain the accuracy and objectivity of the results in examining the influence of using picture number card media. Through this approach, the research provides valuable knowledge and insights into the introduction of number concepts and the development of critical thinking abilities in children aged 4–5 years.

RESULTS AND DISCUSSION

This research was conducted to examine the effect of picture number card media on the introduction of number concepts and critical thinking abilities in children aged 4-5 years. The results of data analysis can be seen below:

Number Concepts

The results of the descriptive analysis carried out showed that there was an increase in the recognition of number concepts in the experimental group compared to the control group. The average pretest, posttest and gain scores for each group are listed in the following table:

Table 1. Data description introduction to number concepts

Group	Pretest (Average)	Posttest (Average)	Gain Score (Average)
Experimental	19,87	26	6,13
Control	16,35	18,7	2,4

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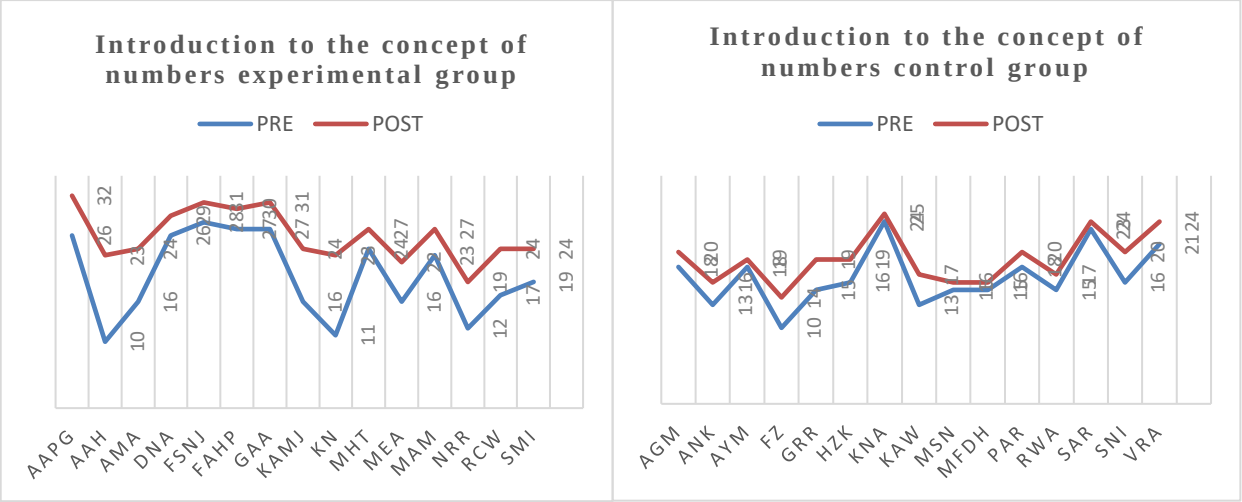

Figure 1. Comparison diagram of introduction to number concepts for experimental and control groups

From Table 1 and Figure 1, a hypothesis test was carried out using the Mann-Whitney U test. The hypothesis results showed a p value <0.001. This shows that the media of picture number cards has an influence on the introduction of number concepts in children aged 4-5 years.

Critical Thinking Ability

Critical thinking skills also showed a significant increase in the experimental group compared to the control group, which can be seen in the following table:

Table 2. Description of critical thinking ability data

Group	Pretest (Average)	Posttest (Average)	Gain Score (Average)
Experimental	11	15,07	2,4
Control	10,13	11	0,87

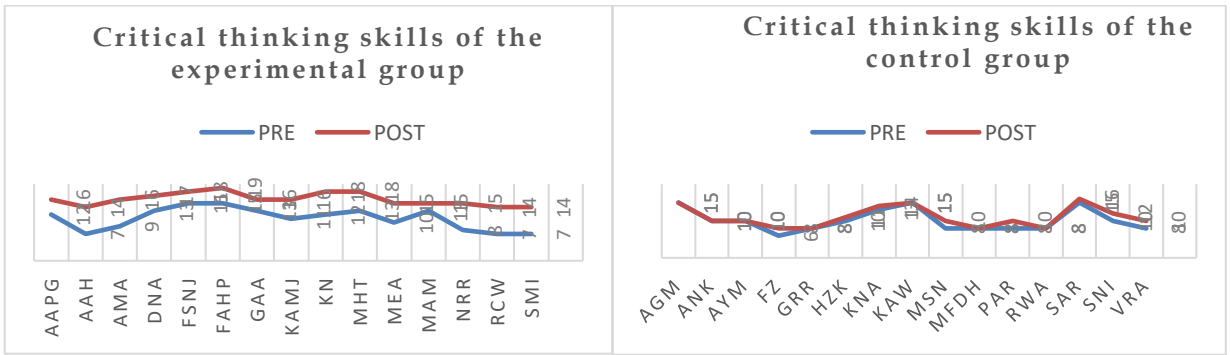

Figure 2. Comparison diagram of critical thinking ability of experimental and control groups

Based on Table 2 and Figure 2, the results of the hypothesis testing showed that the p-value obtained was <0.001. This value indicates a statistically significant difference between the groups being compared. Therefore, it can be concluded that the use of picture number card media has a positive effect on the critical thinking skills of children aged 4–5 years.

The results of this research regarding the use of picture number card media to improve children's ability to recognize the concept of numbers are in line with Jean Piaget's theory of cognitive development. According to Piaget, children aged 4–5 years are in the pre-operational stage, where learning should occur through meaningful and concrete visual experiences.

Through the use of picture number cards, children are able to recognize numbers visually, understand the relationship between numbers and quantities, arrange numbers sequentially, and compare different amounts.

The use of picture number cards also increases children's ability to think critically in identifying and classifying, analyzing cause and effect relationships and solving problems in a simple way according to the child's age. This is in line with what was conveyed by Jean Piaget, where children can recognize numbers on cards and group pictures based on similarities, such as color, number or type of object. These abilities reflect logical development in the preoperational stage. In addition, the selected picture number card media is effectively used in interactive learning, where the teacher provides guidance in the zone of proximal development (ZPD) (Vigotsky, 1962). Problem solving through picture number cards supports logical and spatial intelligence (Gardner, 1983).

CONCLUSION

This research concluded that the use of picture number card media has a significant influence on the introduction of number concepts in children aged 4–5 years, particularly in recognizing numbers visually, understanding the relationship between numbers and quantities, ordering numbers, and comparing quantities. Furthermore, picture number card media significantly enhances children's critical thinking abilities, especially in identifying and classifying objects, analyzing cause-and-effect relationships, and solving problems in simple ways. In addition, the media also contributes to improvements in the cognitive aspects of children's development. Therefore, picture number card media can be utilized as an alternative learning tool to create a fun, contextual, and meaningful learning environment for young children.

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