

Improving Children's Cognitive Abilities Through

Number Card Media in Group A of Aisiyyah

Bustanul Athfal Mamboro Kindergarten

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ABSTRACT

This study aims to improve the cognitive abilities of 4–5-year-old children in Group A of TK Aisiyyah Bustanul Athfal Mamboro using number card media. A two-cycle Classroom Action Research (CAR) design (Kemmis & McTaggart) was employed (Rahman *et al.*, 2017). Ten preschoolers (2024/2025 academic year) participated. Data were collected via classroom observations, interviews, and assignments, then analyzed descriptively by calculating percentage improvements. The results showed significant increases in cognitive performance from the pre-intervention stage to Cycle II. For example, the proportion of children correctly observing and naming numbers rose from 40.0% (pre-test) to 80.0% (Cycle II), and those recognizing number symbols improved from 36.7% to 80.0% (Cycle II). On average, cognitive skill indicators increased by about 40% between cycles. It can be conclude that using number card media effectively enhanced the children's mental abilities.

Introduction

Early childhood is a critical period for developing foundational cognitive skills such as memory, problem-solving, and symbolic thinking (Evianti & Atika, 2021). These skills support later academic readiness; thus, cognitive development in young children must be maximally stimulated. However, in many TK (kindergarten) settings, cognitive aspects are not always optimally addressed. For example, Rahman et al. (2022) found that some kindergarten students could not recognize basic number concepts due to monotonous teaching methods. Similarly, Trianingsih & Alam (2020) reported that in a TKIT (integrated Islamic kindergarten) setting, children's cognitive abilities – especially creative thinking – remained low because learning activities relied mainly on worksheets and lacked varied media. These findings highlight a need for more interactive media in early learning.

Various instructional media have been shown to improve young children's cognitive skills. Flashcards and games, for instance, provide concrete, engaging stimuli that can boost number and symbol recognition. Evianti and Atika (2021) demonstrated that well-planned flashcards significantly enhanced preschoolers' overall cognitive development. Saragih & Kamtini (2023) likewise found that using flashcard games raised children's cognitive achievement levels, with more children reaching "Very Good" development after the intervention. Research at other TKs confirms that number cards in

particular can greatly aid numerical cognition. Mortisari *et al.* (2023) showed that after applying number-card activities, children progressed from basic recognition to “very well-developed” cognitive performance. In line with these studies, the present research investigates whether implementing a number card learning media can boost children's mental abilities in Group A at TK Aisyiyah Bustanul Athfal Mamboro.

Methods

The study methodology described uses Classroom Action Research (CAR), an approach focused on optimizing teaching practices and introspection to enhance the effectiveness of the teaching staff. This methodological option is vital for resolving teachers' challenges in their professional field, as it allows researchers to systematically identify problems, implement evidence-based solutions, and consider the results in their respective environments. This approach empowers educators, who also serve as researchers, to act as agents of transformation in their respective educational environments. The present study was based on the theoretical model developed by Kemmis and McTaggart, structured in cycles composed of four main stages: planning, implementation, observation, and reflection.

The survey was conducted at the Aisyiyah Bustanul Athfal Mamboro nursery school. The study focused on a sample of ten children from Group A, comprising three girls and seven boys, enrolled for the 2024-2025 school year. As part of the preparatory phase, the researcher

made preliminary observations to assess the children's cognitive abilities. The research was then structured into two cycles of activities, each subdivided into four stages. As part of the preparatory phase, the researcher developed a daily activity plan (DAP), designed digital cards, and selected a study topic. During the implementation phase, the DAO was integrated into learning activities that emphasized using these cards. Teaching staff carried out the observation phase, analyzing teachers' teaching practices and student interactions using a pre-designed observation sheet. As part of the continuous improvement process, the reflection phase was initiated to evaluate the results of the current cycle and design improvements for the next cycle.

Data collection for this study was carried out through observation, tasks, and records. Children's cognitive skills were measured through specific activities, such as naming and recording numbers, sequencing numbers, and identifying numerical symbols. In addition, the children's behaviors and skills during learning activities were observed. Documentation was used to collect complementary data, including reference data on the children and images of the activities. Qualitative data were converted into quantitative data using percentage methodologies to assess the effectiveness of the activities. The analysis of data related to children's activities is performed using the following

formula:
$$P = \frac{f}{N} \times 100\%$$

Explanation: P = Percentage, f = Frequency, N = Number of Children

Meanwhile, for the analysis of teacher activity data, the following formula is used:

$$\text{Average Score (AS)} = \frac{\text{Total Score Obtained}}{\text{Maximum Possible Score}} \times 100\%$$

The assessment categories used are “Developing Very Well” (BSB), “Developing as Expected” (BSH), “Starting to Develop” (MB), and “Not Yet Developing” (BB), with a minimum success target in the BSB and BSH categories.

Result and Discussions

The results of the observation and evaluation are presented per aspect of cognitive ability and per cycle. Tables 1-3 summarize the percentage of each aspect category.

Pre-intervention Results (Baseline). Before the intervention, most children were in the low category. Table 1 shows the ability to observe and name number cards: 20% of children were in the BSB category, 20% in BSH, 20% in MB, and 40% in BB. For number sequencing, 10% were in the BSB category, 20% in the BSH category, 30% in the MB category, and 40% in the BB category. For symbol recognition, 20% were in the BSB category, 20% in the BSH category, 30% in the MB category, and 30% in the BB category. These conditions indicate that 60% of children had not yet reached the “developing as expected” category or higher in the cognitive aspects measured.

Table 1. *Percentage of Children’s Cognitive Ability Categories Before Intervention (n=10)***

Observed Aspects	★★★★ (BSB)	★★★ (BSH)	★★ (MB)	★ (BB)
Observe the number cards and say them aloud	20%	20%	20%	40%
Sorting number cards in order	10%	20%	30%	40%
Getting to know number symbols	20%	20%	30%	30%

Source: Primary Data

Results of Cycle I. After Cycle I (two meetings), there was an improvement in the good category. Table 2 shows the results of cycle I observations per aspect. For example, the ability to observe numbers improved: BSB 30%, BSH 30% (previously 20%+20%), MB 20%, BB 20%. Table 2 (first row) shows BSB and BSH for 3 children each, MB for 2 children, and BB for 2 children. In the aspect of number sequencing, BSB was 40%, BSH was 20%, MB was 20%, and BB was 20% (compared to 10%, 20%, 30%, and 40% previously). The aspect of recognizing symbols increased to BSB 50%, BSH 20%, MB 20%, and BB 10% (previously 20%, 20%, 30%, and 30%). Overall, the total BSB = 40% (12/30 observations), BSH = 23.33%, MB = 20%, and BB = 16.67%. The combination of BSB and BSH in cycle I = 63.33% of children/activities in the high category.

Table 2. Percentage of Children's Cognitive Ability Categories (Cycle I, n=10)

Observed Aspects	★★★★ (BSB)	★★★ (BSH)	★★ (MB)	★ (BB)
Observe the number cards and say them aloud	30%	30%	20%	20%
Sorting number cards in order	40%	20%	20%	20%

Getting to know number symbols	50%	20%	20%	10%
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Source: Primary Data

Results of Cycle II. A more pronounced improvement was observed following Cycle II. The final results are displayed in Table 3. The percentage of BSB rose in every category: sorting (40%), recognizing symbols (80%), and observing numbers (50%). In terms of observation, five children (50%) were BSB, three children (30%) were BSH, one child was MB, and one child was BB. For sorting, four children (40%) were BSB, three (30%) were BSH, two (20%) were MB, and one (10%) was BB. In terms of symbol recognition, none of the children were BB, one child (10%) was BSH, one child (10%) was MB, and eight children (80%) were BSB. According to the combined total in Table 4.12 of the thesis, the percentages are as follows: MB = 13.33%, BB = 6.67%, BSH = 23.33%, and BSB = 56.67% (17/30). In Cycle II, the BSB + BSH combination equalled 80.00%, which satisfied the success goal of $\geq 75\%$.

Table 3. Percentage of Children's Cognitive Ability Categories (Cycle II, n=10)

Observed Aspects	★★★★ (BSB)	★★★ (BSH)	★★ (MB)	★ (BB)
Observe the number cards and say them aloud	50%	30%	10%	10%
Sorting number cards in order	40%	30%	20%	10%
Getting to know number symbols	80%	10%	10%	0%

Source: Primary Data

From the pre-intervention phase to cycle II, there was an average

increase of 40.00% in BSB+BSH, with a range of approximately 40% to 80%. The development of each element conformed to the anticipated trajectory, with the resultant total of 80.00% being a product of the calculated BSB and BSH values of 56.67% and 23.33%, respectively.

The study's findings suggest that regular use of number cards enhances young children's cognitive skills, especially in the areas of number recognition and sequencing. The BSB and BSH categories demonstrated enhancements in cycles I and II, aligning with the findings of previous research. As demonstrated in the study by Hartati (2022), children aged 4-5 exhibited enhanced cognitive abilities following instruction with picture number card media. Similarly, the findings of Rahmadani (2022) indicated that children aged 5-6 demonstrated comparable improvements. Furthermore, Rahmawati (2021) posited that the utilization of number cards has been demonstrated to facilitate the enhancement of numerical recognition abilities, including the discernment of numerical patterns. The majority of children are successfully placed in the optimal cognitive category by this medium, as evidenced by the 80% BSB+BSH percentage at the end of the study.

Figure 1. Cards Number Media



The utilization of number card media carries with it substantial practical ramifications. According to the prevailing pedagogy, early childhood educators are expected to employ interactive and contextual media to foster children's cognitive development. The Early Childhood Education Curriculum Strengthening initiative, which utilizes play and instructional aids, is supported by these findings from a policy standpoint (Permendikbud, 2014). Research has indicated that children experience heightened engagement and reduced burden when presented with number card media. The integration of such media within early childhood education practice has been identified as a strategy to facilitate the acquisition of number concepts, thereby accelerating the process of mastery without exerting excessive pressure on the children. The holistic and active tenets of early childhood education are also pertinent to this method. Indeed, Piaget's theory that children learn by exploring their surroundings is supported by the use of visual aids such as number cards. Consequently, the integration of multimedia elements in educational materials has been shown to foster

positive attitudes towards early mathematical learning, in addition to enhancing numerical cognition.

Conclusion

The present study demonstrates the efficacy of number cards in facilitating the development of cognitive skills in young children at Aisyiyah Bustanul Athfal Mamboro Kindergarten. Following the intervention, the majority of children demonstrated an improvement in their number recognition and sequencing scores, with the majority of these falling into the expected or excellent category (BSB+BSH = 80%). From the pre-intervention phase to cycle II, there was an average increase of 40%. Suggestions for Further Research: It is recommended that early childhood educators make a conscious effort to integrate number card media into their lessons on fundamental mathematics regularly. To test the effects of number card media quantitatively, it is recommended that future studies employ larger samples, stronger experimental designs (such as control groups), and standardized instruments.

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