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The Effectiveness of Interactive Game Use in Improving Cognitive Abilities of Children Aged 5–6 Years at TK Khairani

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Abstract

The Effectiveness of Interactive Game Use in Improving Cognitive Abilities of Children Aged 5–6 Years at TK Khairani. *Undergraduate Thesis. Early Childhood Teacher Education Study Program, Faculty of Teacher Training and Education, Bina Bangsa Getsempena University. Supervisor I: Liza Fidiawati, M.Pd. Supervisor II: Raudha Meutia, M.Ed.The This study aimed to determine the effectiveness of using interactive games in improving the cognitive abilities of children aged 5–6 years at TK Khairani, located on Medan–Banda Aceh Road, Lubok Batee Village, Ingin Jaya District, Aceh Besar Regency. Cognitive ability is an important aspect of early childhood development, including the ability to recognize numbers, understand simple arithmetic concepts, and solve problems. Therefore, innovative and engaging learning media are needed to support children's cognitive development. This study employed a quantitative approach using a Pre-Experimental Design with a One-Group Pretest–Posttest Design. The research was conducted in 2026 and involved 11 children aged 5–6 years as participants. Data were collected through observation using a cognitive ability assessment sheet and were analyzed using normality tests, homogeneity tests, and a Paired Sample t-Test with the assistance of SPSS software. The results showed that the average cognitive ability score increased from 6.18 in the pretest to 13.00 in the posttest. The Paired Sample t-Test revealed a significance value of 0.000 ($p < 0.05$) and a calculated t-value of -13.603, indicating a significant difference between the pretest and posttest scores. Based on these findings, it can be concluded that the use of interactive games is effective in improving the cognitive abilities of children aged 5–6 years at TK Khairani, Aceh Besar Regency.*

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1. INTRODUCTION

Early childhood education is a crucial stage of education that plays an important role in supporting children's growth and development, particularly in the cognitive domain. The cognitive abilities of children aged 5–6 years include thinking, remembering, understanding, problem-solving, and recognizing their surrounding environment. According to the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 137 of 2014 concerning National Standards for Early Childhood Education, cognitive development in early childhood includes learning and problem-solving skills, logical thinking, and symbolic thinking. These abilities need to be stimulated from an early age because they serve as a foundation for children's readiness to learn at the next level of education.

Khadijah and Amelia (2021) stated that cognitive development refers to children's ability to acquire knowledge through the processes of thinking, remembering, and understanding their environment. In line with Piaget's theory of cognitive development, children aged 5–6 years are in the preoperational stage, during which they begin to use symbols, recognize numbers, colors, and shapes, and understand concepts through concrete experiences. Therefore, learning activities integrated with play are considered more effective in stimulating children's cognitive development. Suyadi (2020) argued that play-based learning encourages children to actively construct knowledge through direct and meaningful experiences.The rapid advancement of technology provides opportunities for educators to utilize innovative learning media, one of which is interactive games.

Interactive games are learning media that combine visual, audio, animation, and educational challenges, allowing children to learn while playing. Nurrita (2021) stated that interactive learning media can increase children's motivation and engagement because the learning process becomes more enjoyable and meaningful. Furthermore, Pribadi (2020) explained that technology-based learning media can create active, creative, and meaningful learning environments, enabling children to better understand learning materials.Several previous studies have demonstrated that interactive games are effective in supporting the cognitive development of young children. Hapsari (2020) found that interactive educational games improved the memory and concentration of children aged 5–6 years. Sari and Nugroho (2019) reported that game-based learning media enhanced children's numeracy and letter-recognition skills in kindergarten. In addition, Wulandari (2021) proved that interactive games were effective in improving children's ability to recognize patterns, colors, and shapes.

These findings indicate that interactive game media have significant potential to support various aspects of children's cognitive development.However, based on observations conducted at TK Khairani, the cognitive abilities of children aged 5–6 years still require further development. The learning process is still dominated by conventional teaching methods, while the use of interactive learning media remains limited. As a result, some children tend to lose focus, become easily bored, and participate less actively during learning activities.Although numerous studies have investigated the benefits of interactive games in early childhood learning, most have focused only on specific aspects such as memory improvement, concentration, numeracy skills, or pattern and shape recognition.

Research that specifically examines the effectiveness of interactive games in improving cognitive abilities comprehensively—including number recognition, color recognition, shape recognition, pattern recognition, logical thinking, and simple problem-solving skills among children aged 5–6 years at TK Khairani—is still limited. This condition represents the research gap addressed in the present study.The novelty of this study lies in the implementation of interactive game media to improve the cognitive abilities of children aged 5–6 years in a more comprehensive manner, encompassing symbolic thinking, logical thinking, and simple problem-solving skills within the learning context of TK Khairani.Therefore, this study aims to determine the effectiveness of interactive games in improving the cognitive abilities of children aged 5–6 years at TK Khairani.

2. METHOD

This study employed a quantitative approach using an experimental method. The research design used was a *Pre-Experimental Design* with a *One-Group Pretest–Posttest Design*. In this design, research participants were given a pretest before the treatment and a posttest after the treatment to determine the effectiveness of interactive games in improving children's cognitive abilities.

The study was conducted in 2026 at TK Khairani, located on Medan–Banda Aceh Road, Lubok Batee Village, Ingin Jaya District, Aceh Besar Regency. The population consisted of 30 children aged 5–6 years. The sample comprised 11 children selected using the *systematic sampling* technique.

Data were collected through observation using a cognitive ability assessment sheet developed based on the cognitive development indicators for children aged 5–6 years as stated in the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 137 of 2014. The observed indicators included the ability to recognize number symbols from 1 to 20, recognize simple arithmetic operation symbols, match quantities of objects with the corresponding number symbols, and perform simple addition and subtraction using interactive media.

The data were analyzed using SPSS software through normality tests, homogeneity tests, and a *Paired Sample t-Test*. The normality test was conducted to determine whether the data were normally distributed, while the homogeneity test was used to examine the equality of variances. Furthermore, the *Paired Sample t-Test* was employed to determine the effectiveness of interactive games in improving children's cognitive abilities by comparing the pretest and posttest scores.

3. RESULTS AND DISCUSSION

This study aimed to determine the effect of using interactive games on the numeracy skills of children aged 5–6 years at TK Khairani. The study was conducted on 11 children in Group B4 using a *One-Group Pretest–Posttest Design*.The pretest results indicated that the children's numeracy skills were still relatively low, with a mean score of 6.18. After receiving the treatment in the form of learning activities using interactive games, the mean posttest score increased to 13.00.

The comparison between the pretest and posttest scores showed an improvement in numeracy skills among all research participants.Before hypothesis testing was conducted, the data were analyzed using the Shapiro–Wilk normality test. The results showed significance values of 0.004 for the pretest and 0.377 for the posttest. Subsequently, a *Paired Sample t-Test* was performed to determine the effect of interactive games on children's numeracy skills. The results revealed a t-value of -13.603 with a significance value of 0.0001 ($p < 0.05$). These findings indicate a significant difference between the pretest and posttest scores after the implementation of interactive game-based learning.

Discussion

The findings of this study demonstrate that the use of interactive games effectively improved the numeracy skills of children aged 5–6 years. This improvement is evidenced by the increase in the mean score from 6.18 in the pretest to 13.00 in the posttest. Furthermore, the *Paired Sample t-Test* yielded a significance value of 0.0001, which is lower than 0.05, indicating that the use of interactive games had a significant effect on children's numeracy skills.

The improvement in numeracy skills can be attributed to the engaging and enjoyable learning environment provided by interactive games, which is appropriate for the developmental characteristics of early childhood learners. Through the integration of images, colors, animations, sounds, and interactive activities, children were able to better understand number concepts as well as simple addition and subtraction operations. In addition, interactive games increased children's learning motivation, encouraging them to participate more actively in the learning process.

These findings are consistent with Jean Piaget’s theory of cognitive development, which states that children aged 5–6 years are in the preoperational stage, where learning occurs through symbols, images, and concrete experiences. Interactive games provide meaningful and concrete learning experiences that facilitate children's understanding of basic mathematical concepts.The results of this study are also in line with the findings of Pratama and Kurniawati (2022), who reported that interactive educational games can enhance children's cognitive abilities, particularly in number recognition and basic numeracy skills. Similarly, Sari found that game-based learning provides more concrete learning experiences, making it easier for children to understand fundamental mathematical concepts.

4. CONCLUSION

The results of this study indicate that the use of interactive games has a significant effect on improving the cognitive abilities of children aged 5–6 years at TK Khairani. The improvement in cognitive abilities was demonstrated by the higher posttest scores compared to the pretest scores after the implementation of interactive game-based learning. The results of the *Paired Sample t-Test* showed a significance value of 0.000 ($p < 0.05$), indicating a significant difference between the pretest and posttest scores. Therefore, it can be concluded that interactive games are effective in enhancing the cognitive abilities of early childhood learners. In addition, the use of interactive games was found to increase children's motivation, attention, and active participation during the learning process.

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