

## The Effect of Collaboration Puzzle Games to Increasing Social Interaction of Autism Students

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**Abstract:** *This research aims to test the effectiveness of joint puzzle games in improving the social interaction skills of autistic students. The method used in this research is quasi-experimental using a one group pretest post test design. The treatment was carried out 5 times at a consecutive time to strengthen the positive behavior that occurred during the treatment. The data collection technique in this research uses learning outcomes test techniques, especially in the affective and observation aspects using tools in the form of learning outcomes test instruments and observation instruments. The results of the research show that joint puzzle games are effective in improving the social interaction skills of autistic students. This is also shown by the results of the Wilcoxon test analysis which shows a result of  $0 \leq 0$  with a significance of 5%, so it can be said that joint puzzle games are effective in increasing the social interaction of autistic students.*

**Keywords:** *Puzzle Games, Autism, Social Interaction*

**Abstrak:** Penelitian ini bertujuan untuk menguji efektivitas permainan puzzle bersama terhadap peningkatan keterampilan interaksi sosial siswa autisme. Metode yang digunakan dalam penelitian ini yaitu kuasi eksperimen dengan menggunakan desain one group pretest post test. Perlakuan dilaksanakan sebanyak 5 kali dengan waktu yang berurutan untuk menguatkan perilaku positif yang terjadi selama memberikan perlakuan. Adapun teknik pengumpulan data dalam penelitian ini menggunakan teknik tes hasil belajar khususnya pada aspek afektif dan observasi menggunakan alat berupa instrumen tes hasil belajar dan instrumen observasi. Hasil penelitian menunjukkan permainan puzzle bersama efektif untuk meningkatkan keterampilan interaksi sosial siswa autisme. Hal ini juga ditunjukkan dengan hasil analisis Wilcoxon test yang menunjukkan hasil  $0 \leq 0$  dengan signifikansi 5% sehingga dapat dikatakan bahwa permainan puzzle bersama efektif terhadap peningkatan interaksi sosial siswa autisme.

**Kata kunci:** Permainan puzzle bersama, autisme, interaksi sosial

### 1. INTRODUCTION

Autism Spectrum Disorder is a developmental disorder characterized by impairments in communication, social interaction, repetitive behaviors, and adaptive behaviors. Kauffman & Pullen (2016) also define autism as a disability that occurs in verbal and nonverbal communication and social interaction before the age of 3. According to the American Psychiatric Association (2013), the main characteristics of autism spectrum disorder are (1) difficulty establishing relationships with the social environment, (2) difficulty in two-way communication because the child's communication style tends to repeat newly heard words (echolalia), difficulty initiating conversation, confusion in language, a tendency to use nonverbal language, and lack of eye contact during communication, (3) limited activities and interests that still exhibit specific stereotypes, such as hitting, repetitive hand movements, and whole-body movements. Social skills are behaviors that involve the process of interacting with others so that a person is indirectly involved in a social activity (Kaya & Zohre, 2022). Social skills can also be defined as communication skills for interacting with others (Cartledge & Milburn in Siregar, 2023). These social skills are very important for improving children's ability to carry out activities in social

environments that involve reciprocal interactions between individuals so that good interpersonal relationships can be established (Aghniarramah, 2021; Wahyuni & Sari, 2022). In the school environment, these skills are vital for cooperation and receiving good treatment from friends and teachers at school (Mazurik-Charless, 2010; Mahabbati, et al., 2019).

Based on this, the social skills that must be possessed in order to balance one's life are the ability to understand other people's thoughts and emotions, the ability to process information, the ability to initiate conversation, understanding the consequences of social interaction, forming moral judgments, listening attentively to conversations, communicating verbally or non-verbally, and trying to provide reciprocal responses (Smith et al., 2014). Meanwhile, according to Gresham & Elliot (1990: 22–23), to fulfill social skills, there are five aspects that must be considered, namely cooperation, assertion, responsibility, empathy, Self-control. The basic principle in the implementation of social skills requires interaction between one individual and another. Social interaction is one of the main indicators in carrying out social activities. In the school environment, children interact with school staff, teachers, and their peers. Children are expected to interact appropriately, both verbally and non-verbally, during the learning process or playtime.

The results of research conducted at SLB Bina Anggita in Magelang City show that autistic students still experience difficulties in performing social skills, especially social interaction. When viewed from the five important aspects of social skills according to Gresham & Elliot (1990: 22–23), first, in the aspect of cooperation, students experience difficulties when playing together in a group. Second, in terms of assertion, students have difficulty asking for their friends' toys, difficulty refusing by saying "no," and difficulty asking for help by saying "please." Third, in terms of responsibility, students should be able to wait their turn when playing, give their friends a chance to play with toys, ask permission when they want to borrow toys, and tidy up after themselves toys. However, students have not yet carried out these activities and exhibit behaviors such as grabbing their friends' toys, not waiting for their turn, and tending to want to complete group activities individually. Fourth, in terms of empathy, students tend to be indifferent to friends who need help when their toys fall and show a flat expression. Fifth, in terms of self-control, the attitude that often emerges is that students hit their friends when they refuse to play and grab their friends' toys.

When viewed from the perspective of social interaction problems experienced by autistic students, there are several strategies that can be implemented to improve their social interaction aspects, namely through play activities. Play activities that involve autistic students in enjoyable play situations teach them to practice problem-solving skills, practice social interaction in the form of reciprocal communication, and cooperate with their peers (Barus & Tanasyah, et al., 2023). When viewed from the perspective of elementary school students' age development, play activities are an exciting method that can provide opportunities for children to engage in social situations (Irmansyah & Lumintuarso, et al., 2020). Play activities can affect all areas, structures, and functions of the brains of autistic children who have adaptive behaviors, adaptive responses, and limited social interactions. Play activities are intended to help children appreciate their mental abilities and level of development. Play activities can also help autistic children engage in play situations according to their interests and choices to express themselves in the most comfortable way (Tuber & Eidman, et al., 2022).

One of the play activities that can be done by autistic students is through group play activities using puzzles. Puzzle games have not been implemented in schools to intervene in social interaction skills. Puzzles are a type of cooperative game that involves players in a game from the planning stage to the activity itself, which can help children interact with their peers (Nilasari, 2020). Puzzles can be used to optimize children's intelligence by arranging the pieces correctly (Amini & Firmawati, 2023). Group puzzle games are designed according to the needs of students, namely to carry out group play activities by paying attention to five important aspects in social skills activities, namely cooperation, assertion, responsibility, empathy, and self-control.

Based on the above conditions, testing is needed to prove that playing puzzles together has an impact on the social interaction process of autistic students. The discussion in this study is the use of playing puzzles together for autistic students at SLB Bina Anggita in Magelang City. During the social interaction intervention process, joint puzzle games have never been used in the learning process for students, so the researcher wanted to test the effectiveness of joint puzzle games on the social interaction

skills of autistic students. Therefore, the purpose of this study was to determine the effectiveness of joint puzzle games on improving social interaction skills in autistic students at SLB Bina Anggita in Magelang City.

## 2. METHOD

The method used in this study was a quasi-experimental design with a quantitative approach. This study employed quasi-experimental design using a one-group pretest-posttest structure (O1–X–O2) to examine the effectiveness of collaborative puzzle play in improving the social interaction skills of children with autism. The research was conducted over seven days during the second semester at SLB Bina Anggita, Magelang, selected because several students demonstrated significant social interaction challenges. The participants were elementary-aged children diagnosed with autism across mild, moderate, and severe categories who met inclusion criteria, namely experiencing social interaction difficulties, being able to follow verbal and nonverbal instructions, and showing interest in puzzles; participants were selected using purposive sampling. The intervention consisted of five sessions of collaborative puzzle activities administered between the pretest and posttest sessions. Data were collected through performance tests using a 1–3 Likert scale questionnaire and through observational non-test measures using a 1–2 Likert scale instrument, with all data analyzed descriptively in percentage form. To assess the significance of differences between pretest and posttest scores, the Wilcoxon nonparametric test was applied, appropriate for small paired ordinal datasets with non-normal distributions, using a significance level of 0.05 to determine the effectiveness of the intervention in relation to the research objectives.

## 3. RESULT AND DISCUSSION

The research subjects used in this study were three student of 6-9-year-old autistic students. Based on the assessment results in the social aspect, the child still needs attention in self-management, sharing (doing sharing activities), and in understanding the conditions in the surrounding environment. Based on the research results, SKA needs guidance related to social skills, cooperation, and sharing activities to improve interaction and collaboration with the hope that SKA's social skills will improve.

IBM is a 9-year-old male student in the 2nd grade. Based on the results of a non-academic social skills assessment, IBM is able to thrive in group situations. IBM is sensitive to the emotional state of his teachers. IBM is able to quickly adapt to new environments and does not refuse to socialize with new friends. Based on the results of the study, IBM needs guidance in carrying out reciprocal interactions, performing cooperative activities, and expressing his desires so that IBM's social development can be optimal and make it easier for IBM to interact with others.

HLM is an 8-year-old male student in the 2nd grade. Based on the results of academic and non-academic assessments, HLM has academic abilities in line with his cognitive level. Based on the results of the study, in general, HLM still needs improvement in the aspects of collaboration and empathy towards others so that HLM's development can be more optimal in accordance with his chronological age.

Next, the researchers conducted pre-tests and post-tests to determine the students' level of social interaction skills. The results of the pre-test are as follows:

**Table 1.** Social Interaction Assesment Results

| Aspect               | Student SKA   | Student IBN   | Student HLM |
|----------------------|---------------|---------------|-------------|
| Cooperation          | 46.66%        | 66.67%        | 66.67%      |
| Expressing Needs     | 50%           | 66.67%        | 91.67%      |
| Responsibility       | 66.67%        | 58.33%        | 66.67%      |
| Empathy              | 33.33%        | 44.44%        | 44.44%      |
| Self-Control         | 41.67%        | 75%           | 75%         |
| <b>Average Score</b> | <b>48.33%</b> | <b>63.33%</b> | <b>70%</b>  |
| <b>Category</b>      | Good          | Good          | Very Good   |

*Note.* Percentage represent of pretest students' performance on each assessed social interaction

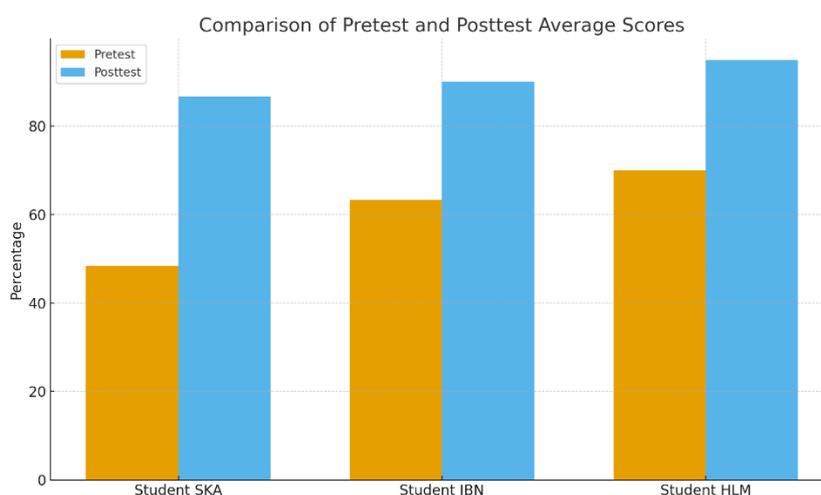
The posttest results for students with the initials SKA, IBN, and HLM, after implementing the intervention with puzzle games, are as follows:

**Table 2.** Social Interaction Assesment Posttest Result

| Aspect               | Student SKA   | Student IBN | Student HLM |
|----------------------|---------------|-------------|-------------|
| Cooperation          | 86,67%        | 86,67%      | 100%        |
| Expressing Needs     | 91,67%        | 91,67%      | 100%        |
| Responsibility       | 100%          | 91,67%      | 100%        |
| Empathy              | 66,67%        | 77,78%      | 77,78%      |
| Self-Control         | 48,33%        | 63,33%      | 70%         |
| <b>Average Score</b> | <b>86,67%</b> | <b>90%</b>  | <b>95%</b>  |
| <b>Category</b>      | Very Good     | Very Good   | Very Good   |

*Note.* Percentages represent of posttest students' performance on each assessed social interaction aspect.

The difference between the pretest and posttest can be seen in the following image:



**Figure 1.** Pretest and Posttest Results Diagram

The analysis of learning outcome test data was calculated using nonparametric statistics by testing the pretest and posttest results with the Wilcoxon test, using the p-table comparison formula and a two-sided significance level of 0.05. Based on the calculation results and the established criteria, it can be seen that  $T_{\text{Calculated}} = 0$  and  $T_{\text{Table}} = 0$ , so  $T_{\text{Calculated}} \leq T_{\text{Table}}$  with a result of  $0 \leq 0$ , which means that there is a difference in the social interaction abilities of autistic students before and after being given treatment, so that the use of puzzle games together is effective in improving the social interaction abilities of autistic students at SLB Bina Anggita in Magelang City.

Meanwhile, the Wilcoxon test result shows a two-tailed significance of  $0.109/2=0.05$ , meaning that the two-tailed significance is  $\leq 0.05$ , so  $H_0$  is rejected, indicating that playing puzzles together is effective in improving social interaction skills. The conclusion from the hypothesis test results obtained in this study is that the use of puzzle games is effective in improving the social interaction skills of autistic students at SLB Bina Anggita in Magelang City because there is a difference in social interaction skills before and after the treatment. This is evidenced by the positive changes in the three students with a significance level ( $\alpha$ ) equal to the sample probability, namely  $0 \leq 0$ . The effectiveness of using puzzle games is also supported by behavioral changes during the intervention and the students' pretest and posttest results.

The process of improving social interaction skills can be influenced by five factors, namely cooperation, expressing desires, responsibility, empathy, and self-control (Grasham, 2016: 22-23). Cooperation is an activity carried out jointly because of a desire to help one another. This occurs because

of the emergence of empathy among students to help one another. During the activity, students are encouraged to communicate and carry out activities together. The interaction is also carried out consciously by the students so that each student is responsible for controlling themselves during the joint activity to prevent division. These five aspects are interrelated during social interaction with others. This area is the focus of the research, which is tested through group games in order to obtain good results in terms of students' social interaction.

During the treatment using puzzle games, there was a change in the aspect of cooperation, as shown by the average score increasing from 60% to 91.11%, which is categorized as very good. The cooperation process occurred because of group activities carried out to achieve common goals. In line with the collaborative activities in group games, group play activities can also stimulate reciprocal communication between students, one of which is in expressing desires. During the research, there was an increase in pretest and posttest results in the aspect of expressing desires, with an average score of 69.44% to 94.44%, which is categorized as excellent. This was due to the influence of peers to communicate within a group, encouraging students to engage in reciprocal communication (Widjayati & Pangestu, et al., 2023). Communication among students also served to reduce egocentrism in group play.

Egotism is a condition in which an individual focuses only on themselves without paying attention to others. Egotism in autistic children can have a negative impact on social acceptance because the lower the level of egotism in socializing, the higher the level of social acceptance. Therefore, in social relationships, self-control is necessary. After being given treatment using puzzle games with autistic students, the aspect of self-control increased from an average score of 63.89% to 75%. This can happen because playing puzzles together encourages children to engage in positive behaviors such as taking turns with friends, controlling their anger when experiencing difficulties in playing puzzles, and accepting input from others (Aulia & Sudaryanti, 2023).

Playing puzzles together also has an impact on responsibility, as shown by the average score increasing from 63.89% to 97.22%, which is categorized as excellent. According to Dini (2023), playing in groups can train students' responsibility because there are rules that must be obeyed that can increase students' sense of responsibility, such as tidying up toys after use, accepting and carrying out tasks given by the teacher, and focusing on the goals to be achieved in a group. In a group setting, students will also be trained to be responsible for the roles they must play in a group.

In addition to these four aspects, empathy is the basis for social interaction. During the puzzle game, there was an increase in empathy, as indicated by an average score of 40.73% to 74.07%, which is categorized as very good. This occurred because during the game, students were encouraged to help each other complete tasks, share activities, and give appreciation to others (Tanasyah & Barus, et al. (2023).

Another factor that supports the effectiveness of puzzle games is the prompts given by testers or teachers through verbal and nonverbal prompts. This is demonstrated by providing flashcards to assist SKA and IBN subjects in communicating to reduce echolalia so that they can establish two-way communication with others. In addition, prompts are also used to help subjects when they show reflexes, with the help of sign prompts, namely by the teacher pointing to the fallen object. Prompts are given whenever students experience difficulties and are gradually reduced. The researchers' findings indicate that playing with puzzles together can improve students' social interaction skills because students are directly involved and interact with others.

#### **4. CONCLUSION**

Based on the results of data analysis conducted using the Wilcoxon Test, the calculated t-value was  $0 < sig 0.05$  with the  $H_0$  criterion rejected, which means that playing puzzles together is effective in improving the social interaction skills of autistic students at SLB Bina Anggita in Magelang City. This is also evidenced by the results of the pretest and posttest, which showed an increase during the assessment of the five skills tested, namely cooperation skills, which increased from 60% in the pretest to 91.11% in the posttest; skills in expressing desires, which increased from 69.44% to 94.44%; responsibility skills increased from 63.89% to 97.22%, empathy skills increased from 40.73% to 74.07%, and self-control skills increased from 63.89% to 75%.

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