

Analysis of Logical-Mathematical Intelligence Characteristics on Children With Autism Age 4-5 Years Old

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ABSTRACT

Children with logical-mathematical intelligence tend to have more long and focused lines of thought, are more sensitive in estimating, predicting, and analyzing logically. The research method used qualitative descriptive on 3 children with autism with 1 child in the severe category and 2 children in the moderate category, data collection techniques with observations of children with autism as subjects, interviews with parents, teachers, and consultants, and documentation related to children's data. Based on the research conducted, it can be seen that children with autism with severe categories have an interest in numbers through the results of the habituation process, the skills to use logic with a one-step pattern in solving problems that tend to be random, have a sense of curiosity by observing and holding, the ability to manipulate their environment by playing objects, the tendency to play constructive games without a pattern, and still unable to categorize and arrange hierarchies. Children with autism in the moderate category have an interest in numbers which is known from how children are able to count without being asked and understand the concept of numbers, skills use logic with a one-step pattern but have begun to be structured, have a sense of curiosity shown through a question, the ability to manipulate their environment by demonstrating the function of objects according to their knowledge, the tendency to play constructive games is more in games that have patterns, and are able to categorize objects based on color vertically or horizontally.

Keywords: *Logical-Mathematical Intelligence, Children, Autism*

1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a disorder in which children are more focused on their own world, which causes them to experience obstacles in communicating, interacting socially, or behaving. Autism is a brain disorder that causes children to not be able to think like normal people, which can be observed through how children with autism behave. Symptoms in children with autism can be seen before the child is 3 years old.

People with autism in their intellectual context are classified into three, namely from autistic children with moderate and severe mental retardation with an IQ of less than 50, autistic children with mild mental retardation with an IQ of 50-70, to autistic children who are not mentally retarded with an IQ of more than 70 [1]. Therefore, not all children with autism are mentally retarded, children with autism also have intelligence, talents and potential in themselves. Some children with autism have advantages in academics, these advantages

can be in the form of special abilities in mathematics and those who are highly skilled in the field of Information and Communication Technology [2]. Children with autism have thinking characteristics including very high concentration, sharp memory, paying attention to details, relying more on logic.

Thus, it can be seen that some children with autism also have intelligence like early childhood in general. Gardner argues that no human being is not intelligent, besides that Gardner also argues that the assumption of a person's intelligence is measured only from IQ which only refers to three intelligences, namely mathematical, linguistic, and spatial logic. According to him, intelligence is a person's ability to solve problems, generate new problems, and produce something [3].

Logical-mathematical intelligence is one of the intelligences possessed by children where the ability to logically digest something is more sensitive than other children. Children with logical-mathematical intelligence are more likely to have long and more focused lines of

thought. In addition, children with logical-mathematical intelligence will be more sensitive in estimating, predicting, and analyzing logically [3].

Research related to the intelligence of children with autism has been done before. Research on children with autism was conducted by Febriatmika (2013) with the results of using picture cards effectively to deal with problems in the cognitive aspects of early childhood with a percentage gain of the results of observations on research subjects reached 90.0% higher than 75% indicators of the subject's cognitive abilities [4]. Subsequent research by Mutia (2012) which provides information from this research regarding education that needs to be given to children with autism requires the application of inclusive education that can provide appropriate education for children to achieve success in developing children's abilities.

Then, the roles of parties related to children are expected to be active in their involvement in developing children's independence. With this information, it provides knowledge about the potentials of logical-mathematical intelligence that need to be investigated further [5]. Based on the description above, this study was conducted to analyze the characteristics of logical-mathematical intelligence in children with autism.

2. METHOD

The type of research used in this research is descriptive qualitative which was conducted in Cahaya Nurani Kindergarten, Jember Regency for 2 months. Sources of data obtained from key informants are 3 children with autism who are at severe and moderate levels. Supporting informants in this study were accompanying teachers, parents, and consultants. Methods of data collection using observation, interviews, and documentation.

Observations were made on 3 children with autism as subjects with 1 child in the severe category and 2 children in the moderate category. Interviews were conducted with 3 companion teachers, 3 parents, and a consultant for children with autism as subjects. The documentation in question includes data on children with autism as subjects. The data analysis technique was used through three stages, namely data reduction, data presentation, and data verification.

3. RESULTS AND DISCUSSION

In activities that are related to numbers, children with autism as subjects with severe categories have an interest in numbers, shown by how children count numbers without instructions from the accompanying teacher. This response is the result of the habituation given by the accompanying teacher and the child doing it when doing activities. Children with autism as subjects with severe categories respond to games that are related to numbers when the companion teacher uses learning tools such as

cards with colored numbers and pictures of objects with various amounts.

Two children with autism in the moderate category also have an interest in the numbers shown when the child is counting numbers, one child needs a stimulus from the teacher as the beginning of habituation and the next day the child is not asked to count independently. Moderate category of children's interest with autism in numbers is also shown through the response shown by the child when the accompanying teacher brings a game tool. Children with autism with moderate categories as subjects are enthusiastic about playing number-related games such as cards with various numbers of objects, cards with colored numbers, books for writing, and various tools that have many colors.

In his expertise to think using logic, children with autism as a subject with a severe category have random thinking patterns with one step. It can be seen that when observations are made, children with autism as subjects with severe categories show their abilities when the child gets activities that involve their ability to recognize various differences from a pattern, take initiative, and plan. Children with autism as subjects with the moderate category show their thinking skills with logic when children get activities that are related to recognizing various differences, classifications, patterns, taking initiatives, and planning. Children with autism in the moderate category of thinking in random patterns but have begun to be structured. Children with autism in the moderate category are also more sensitive in recognizing various colors, shapes, patterns, sounds, textures, and functions.

Children's curiosity, children with autism with the severe category do not convey it with words, they pay attention to the object they want to know from a distance, pay attention, then touch the object. He didn't speak a question, but he looked at the co-teacher. Children with autism are curious about new objects that can be moved, moved, arranged, and come in various colors. Meanwhile, children with autism with moderate category, he gave questions through speech that was not very clear. In addition to asking questions, when children don't ask questions, they respond to their curiosity by paying attention to objects, touching, and tasting. Children with autism in the moderate category as subjects have a feeling of attraction to new animals, food, colored objects, and things that are of interest to them.

Children with autism with severe category have the ability to manipulate their environment. He plays with objects such as large brown blocks and blocks of various colors by moving the blocks and arranging according to what he thinks. When the arrangement was correct, he would move it as he had imagined. Another response given, the child with autism as a subject with the category is manipulating his environment by imagining something he has experienced; besides that, he demonstrates the function of objects that resemble objects he has previously known.

Children with autism with the severe category as the subject have a tendency to play constructive games. He would come over, pick up and play games like blocks and puzzles. When playing it he will focus on what he is holding and ignore the surroundings. He will arrange games that have a pattern easily, such as a puzzle, he will quickly find out where the puzzle is by paying attention to the pieces of the puzzle. While games that do not have a pattern, he will play them randomly and according to his wishes. Children with autism in the moderate category also have a tendency to play constructive games. In playing it, children as subjects with moderate category gave the same response as children with autism with severe category but were more likely to play patterned games.

Children with special needs with autism with severe category in a tendency to arrange games according to categories or hierarchies need instruction from the teacher and still desperately need help. He can do this with continuous instructions given by the accompanying teacher. Children with autism with moderate category are in a tendency to arrange games according to categories and hierarchies that are already seen as capable. Even though the child does it with orders from the accompanying teacher, the child can complete it with only a little help of instruction. Children with moderate category can group objects that are categorized by color, children with autism with moderate category have also been able to distinguish objects based on long and short. In addition, in arranging objects they always arrange in a horizontal or vertical shape.

The purpose of this research is to analyze the characteristics of logical-mathematical intelligence of children with autism aged 4-5 years at Cahaya Nurani Kindergarten, Jember, 2019/2020 Academic Year. In this study, the data analysis presented was based on the results of observations, interviews and documentation. In this study, the observation was carried out by observing the characteristics of logical-mathematical intelligence that appeared in 3 children with autism as subjects. Observations were made 12 times with each subject observed for 1 day up to 4 meetings. Data collection using interview techniques was carried out by involving 1 consultant, 3 teachers accompanying children with autism as subjects, and 3 parents of students with autism as subjects. Data collection using documentation techniques in the form of Profiles Cahaya Nurani Kindergarten, a list of informants, photos of activities, diagnostic records of children with autism, and children's assessments.

Children's interest in numbers based on children's ability to count has the aim of knowing the basics of learning to count, so that children are mentally ready to accept learning to count at the next level [6]. This statement is in accordance with the ability of children with autism as subjects. Children with autism as subjects have an interest in numbers and this interest is shown from how children know the basics of arithmetic. Children with autism as the subject of the severe category

can count numbers as the beginning of an effort to introduce learning by getting used to counting numbers. Meanwhile, basic numeracy skills are also seen in children with autism as a moderate category subject by starting to be able to understand the concept of numbers. The results of this study are not in accordance with the results of the previous study by Marienzi which stated that children with autism in academics, especially mathematics, do not know and understand the concept of numbers, which researchers see when asking for numbers in children, children respond as they like, for example when the number 5 is answered 8, 2 is answered 3, number 3 is 5 [7].

The ability of children to think using the logic of children with autism as a subject with a severe category has been able to respond when children get activities that involve their ability to recognize various differences from a pattern when playing blocks without assistance or stimulus from an accompanying teacher, take the initiative when facing problems such as being unable to unscrew the jar where the buttons are, and plan by being shown how to arrange the blocks, the child continuously changes the arrangement of the blocks according to what the child wants as an expression of the idea and its realization. Children with autism with a severe category in their skills using logic are still one step with a meaningless or random pattern.

Meanwhile, children with autism with the moderate category of thinking skills using logic are still one step but have begun to be structured. Children with autism in the moderate category also show a response in using their logic when obtaining activities that are related to their ability to recognize various differences from a pattern such as playing the puzzle, taking the initiative to open the lid of the jar where the button is located and looking for the missing slippers, and planning like when a child arranges a board. walkways with various arrangements that are continually changed until the child is satisfied.

Children with autism as subjects with the moderate category also show their ability to think with logic when children get activities that are related to recognizing various differences such as the texture of course and fine objects, classifying objects based on color, recognizing sounds, and the function of objects that have been seen before. The explanation of the results of this study is in accordance with Suminah opinion which states that logical thinking is knowing various differences, classifying, patterning, planning, taking initiatives, and recognizing cause and effect which has been translated into the basic competencies of knowing surrounding objects such as names, colors, shapes, sizes, patterns, properties, sounds, textures, functions, and others [8].

The curiosity of children with autism as a subject is in accordance with the theory presented by Mustari, which explains that curiosity is an attitude and action as an effort to know more deeply and broadly what is learned by seeing or hearing [9]. An opinion about curiosity was also conveyed by Samani who said that

curiosity would motivate oneself to seek and know something new so as to increase knowledge and experience [10]. The curiosity of children with autism in the severe category is not expressed in words.

The child under observation pays attention and tries to move the object he wants to know. In addition, he stared at the picture on the card then looked up while looking at the accompanying teacher in an attempt to ask the name of the picture on the card. Children with autism in the moderate category have been able to ask questions but not in the form of a clear question sentence, apart from being able to express their curiosity by saying, children also pay attention to something they want to know constantly, hold, and taste.

The ability shown by children with autism as a subject with a severe category is by playing the blocks that have been arranged by moving them, besides that the child also mumbles while playing. Meanwhile, children with autism in the moderate category often demonstrate the function of an object that they know or demonstrate events that have been experienced before. This is in accordance with Piaget's theory (in Suparno) which explains that the schema in the child's brain will continue to be modified by 2 processes, namely assimilation and accommodation. Assimilation refers to the process of taking information and then incorporating it into an existing schema. Meanwhile, accommodation is a schema change with the existence of new, different information [11]. Children with autism with severe category are difficult in the process of assimilation and accommodation, while children with autism are starting to be able to process information by assimilating and accommodating new knowledge.

There is a tendency for children with autism in the severe category to prefer constructive games in school activities. Every time he always walks to pick up blocks without being asked to play by pairing the blocks by attaching the sides of the blocks, the children also arrange the blocks randomly according to their wishes. In addition, children can also play the puzzle, but when the companion teacher gives them the task of playing the puzzle. Children with autism in the moderate category prefer games that have a pattern like a puzzle. Without being asked he always took the game of the puzzle over blocks. This activity is in accordance with the theory presented by Tedjasaputra which explains that constructive play is an activity that uses various objects to create a particular work [12]. Children with autism in the severe category prefer constructive games such as blocks because they like to match irregular patterns to be adjusted, while children with autism as subjects with moderate categories prefer games like blocks to express thoughts from one-way thinking patterns can begin to be structured.

The ability of children in arranging games based on categories and hierarchies is like Shamsudin opinion, which explains that object grouping is an activity of arranging, selecting, collecting, separating objects

according to the same object (size, color, shape) [13]. Children with autism as subjects with a severe category in grouping objects are still with the help of an accompanying teacher. Children are still not able to independently choose objects based on similarities. Meanwhile, children with autism as subjects with moderate category have been able to choose objects based on color without the help of an accompanying teacher. Next, in the ability of children with autism as subjects, both in the severe category and in arranging games hierarchically, have not been able to do it.

The learning that children with autism get in school is integrated, children with autism get learning that puts more emphasis on habituation. The early identification process has been carried out in children when the child enters school through an assessment from a school consultant to provide information related to child development profiles that are adjusted between ages and the Standard Child Development Achievement Level (STPPA) for normal children. To find out the child's condition, the consultant provides a test with a special checklist for children with special needs, for children with autism the tool used is the CARS sheet by paying attention to the behavior shown by children and interviews conducted with parents to find out the mild, moderate, or severe categories of children with autism.

The development of children in school is also considered by the teacher with the existence of a liaison book between the teacher and parents that can be checked every day by the parents, the development of children with autism is reported to the consultant and every 3 months the teacher and consultant provide a report on the child's learning outcomes. The obstacles that exist when providing learning, one of which is in knowing the learning style of each child, providing activities to children, giving activities to children is still a bit monotonous in combining games.

Children with autism in different categories have different needs. Mapping children's potential has not been adjusted based on the principles of children's intelligence. Mapping is done in general by categorizing children based on their abilities, namely being able to care for pure self-help learning such as toilet training, wearing and taking off clothes, using shoes, and so on with regard to their own needs. The category of being able to train is children who have been able to be taught pre-academically, while children with the category of being able to educate are children with autism who can be given learning and are included in the inclusive class.

This study has several weaknesses, including in the data collection process in just 6 weeks, the research subjects were only 3 children with autism with 1 child with severe autism and 2 children with moderate autism.

4. CONCLUSION

Based on the results of research on the characteristics of logical-mathematical intelligence shown in 3 children

with autism as subjects, it can be concluded that children with autism with a severe category of interest in numbers can count numbers, expertise in using logic with a one-step pattern and are not structured or random, in addition to the logical ability of children can be seen when children get activities that involve their ability to recognize various differences from a pattern, take initiative, and plan, children's curiosity is not expressed in words because of communication problems that children have, when children want to know the child will observe and hold objects what he wants to know, the ability of children to manipulate their environment can be demonstrated through the ability of children to arrange objects and play objects according to their wishes without moving their surroundings, the tendency of children to play constructive games is more in non-patterned games. The child's ability to category objects is still not visible and the child is still unable to arrange objects hierarchically.

Children with autism as subjects with moderate categories have an interest in numbers, it is known from how children have been able to count without being asked and are able to understand the concept of numbers, children's ability to use logic with a one-step pattern but have begun to be structured, their logical abilities are also seen when children get activities that are has to do with the recognition of differences, classifications, patterns, initiatives, and plans. Children with autism in the moderate category are also more sensitive in recognizing various colors, shapes, patterns, sounds, textures, and functions. The child's curiosity is shown through questions even though the sentences spoken are not very clear, besides that the child also observes objects he wants to know, moves, to lick feelings. The child's ability to manipulate their environment by demonstrating the function of objects they know and events that they have experienced before. The tendency of children to play constructive games is more in games that have a pattern. The ability of children to classify objects has been able to group objects by color, but children are only able to

arrange objects vertically and horizontally, they are not able to arrange them hierarchically.

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