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Teacher's Language Input for Recognizing the Cognitive Abilities of Autistic Student in Classroom Interaction

Trisna Andarwulan*
Universitas Brawijaya, INDONESIA

Abdul Syukur Ibrahim
Universitas Negeri Malang, INDONESIA

Suparno
Universitas Negeri Malang, INDONESIA

Martutik
Universitas Negeri Malang, INDONESIA

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Abstract: Cognitive is an essential developmental aspect for children. The cognitive barrier is one of the learning barriers experienced by children with autism. From educational perspective, teacher language input can appropriately develop cognitive abilities of autistic students. This study aims to describe (1) teacher's language input for recognizing the cognitive abilities of autistic students in classroom interactions and (2) cognitive abilities of autistic students based on teacher language input in classroom interactions. The approach of the study was conducted qualitatively with case study, while source of data was oral texts from the teacher language input toward autistic students in classroom. The results shows that the cognitive abilities of autistic students can be recognized through teacher's language input in classroom learning by engaging interrogative speech acts, such as representative, directive, expressive, and commissive. The cognitive level is used to see the variants of the teacher's language input. Meanwhile, the acquisition of students' cognitive abilities based on teacher language's input is developed through memorizing, understanding, applying, and analyzing skills with criteria student A and B in the medium category, and G in low category.

Keywords: *Autistic student, cognitive abilities, elementary school, teacher language input.*

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Introduction

Autism is a neurodevelopmental disorder associated with two main areas of the disorder, such as lack of social communication and interaction, orientation toward repetitive and restrictive behavior (American Psychiatric Association, 2013). In addition, autism often leads significant disabilities, including intellectual and language deficiency, adaptive behavior and problematic behavior (Tager-Flusberg et al., 2009).

The community report on Autism in 2020 states that the recent findings of ADDM Network reveals the number of children with ASD in the age of 8-years-old are higher than the previously reported. Approximately 1.85% of 8-years-old children, or 1 out of 54 children were identified with ASD in 2016. The data has been taken within 11 communities in the United States (CDC, 2020.). In relation to this, The National Survey of Children's Health (NSCH) and The National Health Interview Survey (NHIS) considered as the nationally representative surveys in the U.S. estimate that ASD can be found in 25 out of 1,000 children between age 3 to17 years old (Kogan et al., 2018; Zablotsky et al., 2019). The National Health Center for Health Statistics in 2016 stated that the latest common rate of autism can be found in 1 out of 36 children (Zablotsky et al, 2017). This ratio is the same in all backgrounds such as race, ethnic or socioeconomic, but varied in terms of gender. Boys are likely to have four to five times higher tendency on autism than girls (Christensen et al., 2016). In Indonesia it is estimated that 12,800 children are reported autistic and 134,000 have autism spectrum in 2015 (Budiman, 2015). The number of people with autism in Indonesia is believed to scale up. Calculation on the number of people with autism refers to autism incidence and prevalence, where two new cases are reported per 1,000 population per year and 10 cases per 1,000 population (Auticare, 2019). This implies that autism children need more attention from their surroundings.

Even today, the real cause of autism remains unrevealed (Pirzadroozbahani et al., 2018). This includes genetic, metabolic, and central nervous disorders, infections during pregnancy (rubella), digestive disorders to heavy metal

* **Corresponding author:**
Trisna Andarwulan, Faculty of Cultural Studies, Universitas Brawijaya, Malang, Indonesia. ✉ trisna_aw@ub.ac.id

poisoning (Suteja, 2014). Abnormal brain structures such as hydrocephalus also cause autistic children (Yahya et al., 2015). Other suspected cause is highly consumption on seafood indicated with high mercury due to sea water pollution by pregnant mothers. In addition, another cause is the lack of important minerals such as zinc, magnesium, iodine, lithium and potassium (Gardenia & Pratiwi, 2016). Pesticides and poisons originating from other environments and many other environmental factors which are not yet known with certainty also cause autism (Yuwono, 2013).

Children with autism disorders have barriers communication, interacting with other children and lack of attention span, as well as repetitive or preventive behavior (Khoirunnisyak et al., 2017). Communicating in verbal and non-verbal language can be very challenging for autistic children, in addition to their lack of concentration and understanding on any kind of instruction (Ballerina, 2017). This is in line with Diagnostic and Statistical Manual of Mental Disorders (DSM-5), that proposes some criteria for autism spectrum disorders (ASD) symptoms such as children' inability to deliver communication well, as well as limited and repetitive behaviors (American Psychiatric Association, 2013).

The cognitive barrier is one of the learning barriers experienced by children with autism. Cognitive is an essential aspect of child development related to the ability to learn or think. Cognitive is the domain of "thinking" which focuses on intellectual skills and is very close to the educator (Kasilingam et al., 2014). Furthermore, this domain is also closely related to the process of how students acquire and utilize knowledge. Piaget has developed a cognitive theory in children through his constructivist approach. Based on this theory, children develop through a series of cognitive development stages until adulthood (Pierce, 2013). Another thing that needs to be considered is that cognitive processes in children not only take knowledge from adults but also develop ways of getting to know the world (Ginsburg et al., 2003). Cognitive development is the development of thought patterns and the ability to understand something or solve simple problems (Amalia & Khoiriyati, 2018). The development of this aspect is usually also associated with changes and growth in perception, memory, performance, understanding, knowledge, evaluation, and thinking or reasoning in a sustainable manner (Kazu & Is, 2018; Owens, 2008; Rao et al., 2014; Shaffer & Kipp, 2013). Cognitive development includes all changes such as understanding, remembering, reasoning, deciding, and solving problems in mental processes (Sonmez, 2017). Piaget claims that knowledge and discovery starts from birth to continue throughout life along with the learning process (Yesilyaprak, 2006). Therefore, cognitive abilities are significant in children's lives since they need to be equipped and developed early.

There are many researches in the literature about cognitive abilities of autism student including perception, memory, and language. An old view of ASD's intellectual ability found that up to 75% of individuals have intellectual disabilities (previously referred to as 'mental retardation'), defined by IQ <70, along with impaired daily functioning (Baio et al., 2018; Happé, 1995; Mayes and Calhoun, 2003). However, recent research has found that only about half of children with ASD have an intellectual disability (Bertrand et al., 2001; Chakrabarti & Fombonne, 2005; Charman et al., 2011), other studies report that autistic children have a higher IQ than normal children in general (Chiang et al., 2008; Rutherford & Rogers, 2003; Sigman & McGovern, 2005). Furthermore, the study findings found weak support for different performance IQ (PIQ) and verbal IQ (VIQ) profiles: at the mean level the PIQ group was higher than VIQ (but only by a few points) and when it was examined for difference levels. PIQ-VIQ is clinically significant, the most common profile found is PIQ similar to VIQ (Charman et al., 2011), some vice versa (Caron et al., 2006; Happé, 1995; Lincoln et al., 1995; Long et al., 2011; Mayes and Calhoun, 2003;).

From the research findings stated before, it can be assumed that autistic students have the potential to develop their cognitive abilities optimally. Teachers play an important role in optimizing the cognitive abilities of autistic students. Adequate communication competence in managing the classroom must be possessed by the teacher in order to avoid communication failures. Therefore, researchers are interested in assessing the cognitive abilities of autistic students. The cognitive abilities of autistic students can be recognized and developed by providing appropriate stimulus. The cognitive abilities of autistic students can be recognized through the learning interactions that occur in the classroom between teachers and students. Giving teacher language input, especially in the form of questions, is a reference in recognizing the cognitive abilities of autistic students. Questions can construct students 'knowledge to encourage and elaborate on their previous answers and expand students' ideas and thoughts (Chin, 2006).

Thus, this research aims to describe autistic student cognitive abilities through teacher's language input in learning activities. Specifically, this study aims to describe (1) teacher language input for recognizing the cognitive abilities of autistic students in classroom interactions and (2) the cognitive abilities of autistic students based on teacher's language input in class interactions.

Methodology

Research Approach

This research to describe the teacher language input for recognizing the cognitive abilities of autistic students in classroom interactions. This study is focused on the interaction between teachers and students using pragmatic studies. This study was established in qualitative approach with natural setting, while the researcher acted as the main instrument. This approach is descriptive in nature, and applies meaning as the main concern (Bogdan & Biklen, 1982).

This study was conducted using case study to provide an understanding on factors drawing to attention, social processes, concrete events, or experiences of subject of the case study (Jack, 2008; Prihatsanti, Suryanto, & Hendriani, 2018). The considerations for choosing this approach are: *first*, this research describe the cognitive abilities of autistic students through teacher's language input in classroom interactions; *second*, the subjects of the study are teachers and students with autism in scope of academic classroom (acquiring sufficient language skills); *third*, the data was collected by recording the learning activities in the classroom with real situations and natural settings; *fourth*, the data analysis techniques were not statistical techniques and did not require statistical procedures, while the analytical techniques were developed specifically to analyze the interactions in the classroom.

Participants

This research was implemented at the Autistic Special School Laboratory (SLB) of Universitas Negeri Malang (UM), Malang, East Java, Indonesia. The school was chosen in considering that the school has been used as study center or pilot school for the local autistic schools / institutions, and has been awarded as the best autistic school in Malang, East Java, Indonesia. In addition, this school has the characteristics to develop its curriculum under Universitas Negeri Malang, Indonesia.

This research is focused on autistic students in elementary school. In learning activities, this school divided the class based on students' level of ability. The academic class was chosen by the researchers as the object of research because the class has the same autism type and good verbal ability. The subjects of this study were teachers and students. The teacher acted as the main teacher in the academic class, while the students were those with similar autistic type and grade. There are three students, A and G students of grade VI, and B student of grade V. Data retrieval is based on the form of Designated Autistic Classes as well as the application of education in schools. This is in line with Siegel's (1996) view which states that the application of the Designated Autistic Classes form is a form of transition from individual handling to classical class forms, where a group of children who are all autistic learn together following a specific type of instruction. Data was taken from 9 meetings in odd semester when learning process was conducted

Data Collection

The research was conducted at primary school for 8 weeks to observe the learning process in the classroom in which performed using thematic/integrated learning models. Subjects observed during the learning process were Bahasa Indonesia, Mathematics, Social Sciences (IPS) and Natural Sciences (IPA). To maintain the authenticity of the data, the researchers record and observe of the whole learning activities of autism students. The researchers directly joined the learning activities in classroom without showing their identities or striking attributes, to let the students produce their speech naturally. The data was collected using observation method with competent free listening techniques, recording techniques, and note taking techniques (Sudaryanto, 1993). The free listening technique was allowed the researcher tap into the subject's speech and record the subject's nonverbal actions by acting as outsider and not actively followed the subject's activities while the researcher recording the data (Dawud, 1998). This technique was expected to help the researcher obtain verbal data (speech) in each interaction. After collecting, selecting, coding and analysing the data using data analysis guidelines in accordance with the problem being examined are required.

Data Analysis

Data analysis is required after collecting the data. The teacher's language input data (teacher's questions) in class interactions is used as an indicator to recognize cognitive abilities of autistic students. Bloom's taxonomy on revision and dimensions of cognitive processes (Anderson, et al., 2001; Krathwohl, 2002) were adapted to recognize the cognitive abilities of autistic students through teacher language input in classroom interactions.

In analyzing the data, the researcher used an interactive procedure model which was classified into three stages, namely data reduction, data presentation, and conclusion (Miles & Huberman, 1992, p. 14). The data reduction is a form of analysis that sharpens, classifies, directs, selects, eliminates unneeded, and organizes data in such a way to assure that the conclusions are true and accurate. The data was presented in activity when the data was arranged so as to draw conclusions and reference for further action.

Finding / Result

This study aims to describe (1) teacher's language input for recognizing the cognitive abilities of autistic students in classroom interactions and (2) the cognitive abilities of autistic students based on teacher's language input in classroom interactions. These two research focuses are described in the following.

(1) Teacher's Language Input to Recognizing the Cognitive Ability of Autistic Students in Classroom Interaction

Language input in this research is defined as all language inputs, such as vocabulary, grammar, and behavior that the teacher teaches to the autistic students in classroom interactions. The research findings suggest that the teacher's language input which can explore the cognitive abilities of autistic students is performed through interrogative speech

acts. The findings of the teacher's questions data which contains representative, directive, expressive, and commissive act are presented in the following table.

Table 1. The teacher's language input in the form of spoken questions

Teacher's Language Input	Utterances	Student
Representative		• A, B, G
- A question 'who'	1. Who doesn't want to learn?	• A, B, G
- particles 'yes'	2. Tired? sleepy? are you guys tired?	• A
- particles 'yes'	3. Dito put the toy into the box. Is that so, A?	• A
- Repeatition of word	4. What blink A? in the sky, which one is flickering?	• A
- the question word 'what are you doing'	5. What are you doing at home? Help your Mum?	• B
- selection	6. What day is it, Saturday or Sunday?	• B
-mention of the subject	7. Oo… go with Dad?	• G
-A question 'what'	8. Already? Is that how it was, Miss G?	
Directive		• A, B, G
-particles 'yes'	1. Next week is a holiday, do you remember it?	• A, B, G
-particles 'yes'	2. Let's pray first, okay?	• A
- Aquestion 'who'	3. Do you like your friend? Who is his friend?	• A
-a question 'why'	4. According to A, why should the equipment must retu after playing?	• B
-a question 'where'	5. Have you ever seen a clown? Where?	• B
-selection	6. B, can you eat when you fast?	• G
-particles 'okay'	7. G, please close the door, okay?	• G
-particles 'no'	8. Did your mom go with you?	• G
-a question 'where'	9. Try to remember about last text, where is Ina and Dit play?	
Expressive		
- particle 'yes'	1. How come you are so weak?	• A, B, G
-said 'who'	2. Who is smart today?	• A, B, G
-a question 'how long'	3. How long has it taken?	• A
-particles 'yes'	4. Wow, A is great huh?	• A
-rhetorical	5. Mr B is very smart huh?	• B
-A question why, how	6. Why isn't there? How did you say there was, didn't there?	• B
-particles 'yes'	7. Great huh?	• G
-particles 'yes'	8. There is no word box, memorizing huh?	• G
Commissive		
-particles come on and who -said 'who'	1. Come on who wants to tell a story?	• A, B, G
-particles 'yes'	2. Who is sad today?	• A, B, G
-Question 'what'	3. Is there a train on the bridge?	• A
-particles 'yes'	4. Are monkeys eating bananas? A also eats bananas, do you like not eating bananas?	• A
-selection	5. Ok, did you ride a train to Batu with Mr D?	• B
-particles 'no'	6. You already use powder, have you taken a bath or not?"	• G
	7. G want to cry? Just cry!	• G

Note:
A = Agus, a boy, Grade VI
B = Budi, a boy, Grade V
G = Gadis, a girl, Grade VI

The data shows that the teacher's language input contains representative, directive, expressive, and commissive act. The representative act on the teacher's questions was carried out by using assertion variants (data 1, 6), expressing sympathy (data 2), concluding (data 3, 5, 7), describing (data 4), and closing the conversation (data 8). The teacher's questions which function as representative are done in the form of question patterned question word "who", question word "why", question word "what", followed by particle "yes", choice, repetition of word, and mentioning the subject.

The directive act on the teacher's questions was carried out by using variants of reminding (data 1), inviting (data 2), asking for information (data 3, 5), asking for opinions (data 4, 6), ordering (data 7), ensuring (data 8) , and checking knowledge (data 9). The directive function of the teacher's questions is done in the form of question-patterned question words 'who', 'why', 'where'; followed by the particles 'yes', 'okay', 'no'; and rethorical.

Expressive act on teacher questions were carried out using variants of complaining (data 1, 3), praising (data 2, 4, 7), expressing gratitude (data 5), and expressing surprise (data 6, 8). The expressive function of the teacher's questioning is done in the form of question-patterned question words 'who', 'why', 'how', 'how long'; the particle 'yes; and rhetorical.

Commissive act on teacher questions was carried out using variants of offering (data 1, 2), suggesting / checking (data 3, 4, 6, 7), and scaring (data 5). The teacher's questions that have a commissive function are carried out in the form of a question patterned question word "what", "who"; particles 'yes', 'come on', 'no'; and options. Based on teacher's language input data,

It can be seen that the cognitive level of the teacher's question (as a form of teacher's language input) in interacting with autistic students. It is shown in the following table:

Table 2. Cognitive level of teacher's language input

Teacher Language Input	Teacher Strategies	Cognitive Level
Representative	• Verbal / direct: Ask directly, confirm, repeat, provoke • Nonverbal: phonetic, visual	▪ remembering ▪ understanding ▪ analyzing
Directive	▪ Verbal / direct: invites thinking, presuppositions, visualization, repetition, inducement, visuals, confirmation ▪ Nonverbal: visual, phonetic	▪ remembering ▪ understanding ▪ applying ▪ analyzing ▪ evaluating
Expressive	▪ Verbal: ask directly, inducement ▪ Nonverbal: visual, phonetic	▪ remembering ▪ understanding
Commissive	▪ Verbal: direct asking, repetition, guidance ▪ Nonverbal: visual, phonetic	▪ remembering ▪ understanding

Cognitive level (referred to Bloom taxonomy) is used to measure the teacher's language input level. Language input in form of interrogative speech was conducted in various approaches to indicate the cognitive level in term of remembering, understanding, applying, analyzing, and evaluating. Teacher's language input in form of question speech with expressive and commissive functions indicates the level of remembering and understanding; the representative function indicates the levels of remembering, understanding, and analyzing; directive functions indicate the remembering, understanding, applying, analyzing, and evaluating levels. From the data, it can be concluded that the level of language input provided by teachers to autistic children engages the ability to remember, understand, apply, analyze, and evaluate.

(2) Autistic Students Cognitive Ability Based on Teacher's Language Input in Classroom Interaction

Autistic student cognitive abilities are divided into two parts, cognitive knowledge and language knowledge of autistic students. Each category is described follows.

The Knowledge of Autistic Students Based on Teacher's Language Input

The results of data analysis signify that the knowledge of autistic students through teacher's language input in learning activities apply two-dimensional references, such as the dimensions of knowledge and dimensions of cognitive processes. Dimensions of knowledge of autism student include: (1) factual, (2) conceptual, (3) procedural, and (4) metacognitive knowledge. While, dimensions of cognitive processes, include (1) remembering, (2) understanding, (3) applying, (4) analyzing, (5) evaluating, and (6) creating. Both dimensions can be classified in the table below.

Table 3. Cognitive Knowledge of Autistic Student through Teacher's Language Input in a Classroom

Children Knowledge Dimension	Children's Cognitive Processes Through Teacher Language Input					
	remembering	**understanding**	**applying**	**Analyzing**	**Evaluating**	**creating**
Factual Knowledge						
• Day	A, B, G	A, B, G	A, B	-	-	-
• Date	A, B	A, B	A, B	-	-	-
• Month	A, B, G	A, B, G	A, B	-	-	-
• Years	A, B	A, B	A, B	-	-	-
• Time	A, B	A, B	A, B	A	-	-
• Numbers	A, B, G	A, B, G	A, B, G	-	-	-
• Upper- and lower-case letters	A, B, G	A, B, G	A, B, G	B	-	-
• fruits	A, B, G	A, B, G	A, B, G	A, B, G	-	-
• Vegetables	A, B, G	A, B, G	-	-	-	-
• Colors	A, B, G	A, B, G	A, B, G	A, B, G	-	-
• Animal	A, B, G	A, B, G	A, B, G	A, B, G	-	-
• Land transportation	A, B, G	A, B, G	A, B	A, B	-	-
• Air transportation	A, B	A, B	A	A	-	-
• Sea transportation	A, B	A, B	A, B	A	-	-
Conceptual Knowledge						
• Shapes	A, B, G	A, B, G	A, B, G	B	-	-
• Four-legged animal	A, B, G	A, B, G	A, B, G	A, B	-	-
• Profession	A, B, G	A, B	A, B	A, B	-	-
• The function of transportation	A, B	A, B	A, B	A, B	-	-
• Plant parts	A, B, G	A, B, G	A, B	A	-	-
• Song title	A, B	A, B	A	A	-	-
Procedural Knowledge						
▪ Addition	A, B, G	A, B, G	A, B, G	B	-	-
▪ Multiplication	A, B	A, B	A, B	B	-	-
▪ Division	B	A	B	B	-	-
▪ How to make a cake	A	A	A	A	-	-
▪ Become a pilot	A	A	A	A	-	-
Metacognitive Knowledge	-	-	-	-	-	-

Note:
A = Agus, a boy, Grade VI
B = Budi, a boy, Grade V
G = Gadis, a girl, Grade VI

The previous table shows that the cognitive knowledge of autistic students in grades V, and VI is in the factual, conceptual and procedural dimensions. Knowledge of autistic student on the metacognitive dimension has not yet emerged. In the cognitive process through teacher's language input, autistic students generally acquire the ability to remember, understand, apply and analyze. However, the cognitive knowledge that each autistic child has is different.

In factual knowledge, from the cognitive process, Student A was able to 'remember', 'understand', and 'apply' all existing knowledge based on the teacher's language input. The cognitive process at the 'analysis' stage is obtained by providing knowledge about numbers, fruits, colors, animals, land transportation, air transportation and sea transportation. Almost similar to student A, from the cognitive process, student B was able to 'remember', 'understand', and 'apply' existing knowledge based on language input provided by the teacher in classroom interactions. The cognitive process at the 'analysis' stage was acquired after presenting the knowledge of upper- and lower-case letters, fruits, colors, animal and land transportation. Unlike student A and B, not all cognitive processes of 'remember', 'understand', and 'apply' were controlled by student G, in the 'analysis' stage, the cognitive process of 'remembering' and 'understanding' was acquired by presenting S3 the knowledge of days, months, numbers, upper- and lower-case letters, fruits, colors, animals, and land transportation. The cognitive process of 'application' was acquired by student G after having input the knowledge of numbers, upper- and lower-case letters, fruits, colors, and animals while 'analysis' was acquired by presenting the knowledge of fruits, colors, and animals.

In term of conceptual knowledge, from the cognitive process, student A was able to acquire the stages of 'remembering', 'understanding', and 'applying' all existing knowledge based on the language input provided by the teacher. The cognitive process at the 'analysis' stage was acquired by presenting the knowledge of four-legged animals,

professions, means of transportation, plant parts, and song titles. Student B was able to acquire 'remembering' and 'understanding' stages of all available knowledge based on the teacher' language input provided, except the knowledge of song titles in the application stage. The cognitive process at the 'analyzing' stage was acquired by presenting the knowledge about the shape of the building, four-legged animals, the profession, and the function of transportation. At the 'remembering' stage, student G did not acquire the knowledge of transportation and song titles. At the 'understanding' stage, student G did not acquire the knowledge about professions, transportation equipment functions, and song titles, while at the application stage, student G merely acquire knowledge of building shapes and four legged animals.

In terms of procedural knowledge, cognitive process, such as 'remembering', 'understanding', and 'applying' stages, student A did not acquire the knowledge of division, and in the 'analysis' stage, and yet acquired knowledge of how to bake a cake and to become a pilot. In the 'remembering' student B could acquire the knowledge except for 'understanding', 'applying', and analyzing 'stages, only the knowledge of how to make a cake and to become a pilot. While, in cognitive processes of 'remembering', 'understanding', and 'applying' student G acquired the knowledge of additional learnings.

Language Knowledge of Autistic Students Based on Teacher's Language Input

The language knowledge of autistic students based on the language input provided by the teacher in classroom interactions, includes (1) semantic knowledge, (2) syntax knowledge, (3) narrative knowledge, (4) descriptive knowledge and (5) argumentative knowledge. In detail, each linguistic knowledge is described in the following table.

Table 4. Language knowledge of autistic children

No	Language Knowledge	Data	Autistic student
1	Semantic (word and meaning)	Unit of time	
		▪ Day, Date, Year, at 06.00	A, B, G
		▪ at 15.00	A, B
		Profession	
		▪ Farmer, Army, Police, Chef, Clown, Tailor	A, B
		▪ Doctor	B, G
		▪ Nanny, Gardener, Dancer, Astronaut, Barber, Racer, Waiter, Reporter	A
		▪ Nurse, Diver, Technician	B
		▪ Teacher, Farmer, Football Player, Painter	A, B, G
		Vehicle	
		▪ Train, Car, Ambulance, Bus	A, B, G
		▪ Pedicab	A, B
		▪ Airplane, Layer Ship, Carriage	A
		▪ Bajaj	B
		Animals	
		▪ Cat, Elephant, Dog, Bird	A, B, G
		▪ Lion, Horse	A, B
		Shapes	
		▪ Circle, Square, Star	A, B, G
		▪ Crescent	A, B
		▪ Oval, Triangle	A
		▪ Rectangle, Curl, Heart	B
		Part of Plants	
		▪ Root, Stem, Tree, Leaves, Flower	A, G
		Color	
		▪ Pink, Yellow, Green, Orange, Brown	A, B, G
		Flower	
		▪ Rose, Jasmine	G
		Vegetables	
		▪ Cabbage, *Kangkung*	G
		▪ Carrot, Spinach	A, B, G
		▪ Lettuce	A, G
	Syntax	▪ One word	B. G
		▪ Two-three word	A

Table 4. Continued

No	Language Knowledge	Data	Autistic student
2	Narrative	▪ Activities on Sunday	A, G
		▪ Helping mom	A
		▪ Play at home with brother/sister	B
3	Descriptive		
	• Descriptive objective	▪ Profession	A, B
		▪ Four-legged animal	A, B, G
	• Descriptive explanative	▪ Become a pilot	A
		▪ Make a cake	
		▪ Soldier weapon at war	
		▪ Police duty	A, B
	• Descriptive correlative	Watering plant activity with supporting media like picture	A
4	Argumentative	Traffic violation	A

Note:
A = Agus, a boy, Grade VI
B = Budi, a boy, Grade V
G = Gadis, a girl, Grade VI

Based on the previous table, each autistic student acquired different language knowledge. Student A acquired the highest language abilities among all. Where student B ranked in the second place and followed by student G. Student A acquired linguistic knowledge related to semantic, syntax, narrative, descriptive, and argumentative knowledge. Student B acquired semantic, syntax, narrative and descriptive language knowledge but is limited. While, student G, moderately acquired semantic and syntax linguistic abilities and low narrative and descriptive abilities.

Topics/materials taught by the teacher were related to the surrounding environment of the autistic students, such as type of color, type of flower, type of fruit, type of vegetable, type of animal, plant parts, transportation, profession and activities at home. This implies that the accuracy of inputting certain languages by the teacher affects the language knowledge acquired by the autistic students.

Discussion

This study aims to describe: (1) teacher's language input for recognizing the cognitive abilities of autistic students in classroom interaction and (2) cognitive abilities of autistic students based on teacher's language input. These two research focuses are discussed in the following.

(1) Teacher's Language Input for Recognizing the Cognitive Abilities of Autistic Students in Classroom Interaction

Cognitive is an important developmental aspect for children. Each experience carries a unique element that the child's cognitive structure must accommodate. Environmental interaction may change the cognitive structure and allow continual growth in experience. Zhdanko (2019) explains that the identification of students 'cognitive capability will highly affect the students' success in learning. Crane (2017) confirms that children have their respective metacognitive domains. This condition results in the selection of learning sources in accordance with the child's cognitive level. Teacher acts as the main source of learning for autistic children at school. Teacher knowledge plays an important role to determine the intervention method or type of instruction in the learning activities of students with autism. The teacher's input language when delivered appropriately will develop the cognitive abilities of autistic students.

The teacher's language input which can recognize the cognitive abilities of autistic students is performed through teacher's questions including representative, directive, expressive, and commissive act. The four speech acts use different variants and forms of speech. The teacher mostly uses direct question speech. Language input in the form of questions with a directive act is mostly done by the teacher. This is because the speaking ability of autistic students is still somewhat limited to communicative functions, less initiation, less affirmation, and less turn-taking than the structural aspects (in line with the views of Ziatas et al., 2003). Through directive acts, many questions are asked by the teacher to encourage students to respond so that they continue to speak and can deliver speech according to their knowledge and experience.

In terms of cognitive level (Bloom revision in Krathwohl, 2002), the teacher's language input is categorized as (1) remembering, (2) understanding, (3) applying, (4) analyzing, (5) evaluating. Autistic students who have fairly good cognitive abilities receive more complex language input from the teacher (this can be seen in the speech questions posed to A and B). However, students' cognitive abilities could not properly acquire the teacher's language input. Few

students (student A and B) were able to respond to the teacher's language input at the 'applying' and 'analysis' levels. Student G was able to respond to teacher's language input at the 'analysis' level but very slow, the teacher required semantic tapestry, multimodal stimulation, and encouragement to help student G to produce speech, as mentioned by Chin (2007). The language ability of student G was lower compared to student A and B. In order to interpret other's word, a child combines words into more meaningful units and combine auditory with contextual information. The child, who is slower or incompatible with his/her hearing and visual information is at risk of language misunderstanding. As linguistic input is transferred fast, slow response, even by a few milliseconds, in processing the lexical items will affect the child's ability to produce a sentence (Bavin et al., 2014).

Students often use their intuition, for example by repeating phrases or sentences, quoting grammatical, surrounding text instructions as well as general or personal knowledge about certain topics (Jakonen, 2019). Therefore, diction, the type of language input, for example the questions to be asked are important for the teacher to pay attention to because they affect the cognitive development of the autistic students. The teacher also needs to use the repetition method to strengthen understanding of students with autism (Hallahan, 2015). The teachers may refer to taxonomy level in determining and developing questions to measure the cognitive abilities and develop higher thinking skills of autistic students (Khadijah, 2016).

(2) Autistic Student Cognitive Abilities Based on the Teacher's Language Input in Classroom Interaction

Cognitive autistic student abilities are divided into two parts, cognitive knowledge and language knowledge of autistic students. Each is described as follows.

The Knowledge of Autistic Students Based on Teacher's Language Input

Dimensions of knowledge that encompass factual, conceptual, procedural, and metacognitive adapted by Anderson, et al. (2001) and Krathwohl (2002) are used to determine the cognitive abilities of autistic students. The acquisition of autistic students' cognitive abilities based on the provision of teacher language input can be divided into three categories, such as low, medium, and high cognitive levels. A high cognitive level indicates the more complex level of thinking. The classification is described in the following table. Table 5 classifies the level of knowledge adopted by the autistic student (Krathwohl, 2002)

Table 5. The knowledge level of autistic student adopted by Krathwohl (2002)

Knowledge level	Category
Memorizing and Understanding	Low
Applying and Analyzing	Medium
Evaluating/judging and Creating	High

Based on this classification, the cognitive abilities of student A and B were in the medium category, while student G was the low category. These findings support Hallahan's (2015) view that autistic children find it difficult to learn complex and high-level thinking concepts. Based on the research finding, the highest cognitive dimension of autistic children was at the stage of procedural knowledge. Although all autistic children were at this stage, each autistic child acquired different cognitive knowledge. Among the three autistic children, student G had the lowest cognitive knowledge. Although they were able to remember, understand, apply and analyze, the ability of student G was at the stage of completing answers. There were many feedbacks in multimodal performed by the teachers. In addition, simple reinforcement, including extra time to do favorite activities, attention from adults, stickers, toys, or food draw the autistic children's interests and needs can be effective to improve student's cognitive knowledge (Cockerham & Malaia, 2016). In addition, familiar words are easier to understand and easier to remember than unfamiliar vocabulary (Noyes et al., 2006). Some students could compose words into simple, many were silent. Unlike student B, despite having different levels and ages, he had a fairly good cognitive ability. While student A, had good cognitive abilities. Student A was able to remember, understand, apply, and even analyze all the language input from the teacher such as factual, conceptual, and procedural knowledge. The teacher did not encourage too much to student A. The teacher simply provided multimodal stimulus or use repetitive questions to develop student G's cognitive abilities.

When compared with normal children, of course, the cognitive stages of autistic children are lower. In the context of education that refers to Bloom's taxonomy theory, normal children in grade I of primary school are at the stage of 'remembering' and 'understanding', class II is at the stage of 'understanding' and 'applying, class III is at the 'applying' stage, class IV is at the 'applying' and 'analysing' stage, class V is at the 'evaluating' and 'creating' stage, class VI is at the better 'evaluating' and 'creating' stage (Bujuri, 2018). However, children with autism are very likely to have the ability at the stage of 'evaluating' and 'creating' when they are provided with varied and creative teacher language input.

Language Knowledge of Autistic Student based on Teacher Language Input

The findings suggest that all autistic students as subjects of the study acquired the same language knowledge development, while varying in cognitive and linguistic abilities varied. Student A dan student B have a similar competence for the semantic, narrative, descriptive, and argumentative abilities than student G. The teacher's language input was developed through speech acts with questions in representative, directive, commissive, and expressive functions to develop cognitive and linguistic abilities.

As previously stated, student A acquired narrative knowledge. According to Diehl et al. (2006), when compared to non-ASD with similar age, cognitive abilities, expressive and receptive language skill, ASD children did not have any problem in performing story length or syntactic complexity, except for story coherence. Other studies suggest that children with ASD create shorter narratives with syntactic sentences than non-ASD children (King et al., 2013). Peristeri et al. (2017) compares ASD and non-ASD children according to high language levels (HL), low language levels (LL) in terms of language, age and cognitive abilities. The findings convey that children with ASD LL have lower syntactic complexity in producing stories than Non-ASD and ASD HL. However, the research finds no differences between children of HL ASD and non-ASD children with the same age. Thus, it can be concluded that the autistic child has sufficient narrative ability by producing less complex sentences. However, the student G performed different result. Despite the same level and age to student A, student G exhibited different cognitive abilities.

Visualization (picture media) is effective in stimulating autistic students to communicate and recognize certain knowledges despite the incomprehensive conversations. This is in line with Tager-Flusberg et al. (2004) in assuming that linguistic abilities radius in a child across the autism spectrum; makes two main differences. First, several children with ASD are unable to acquire oral language skills to pass the minimum level, which varied from no words spoken to less than 20—30 words (Kasari et al., 2013); this group consists of around 30% of children with autism (Tager-Flusberg & Kasari, 2013). Second, in groups of children who are verbal, some speak normally while others have prominent deficiency in language, such as grammar (Baird & Norbury, 2016; Tager-Flusberg & Joseph, 2003). In writing, the last two groups are often separated by the term of normal autism language (ALN) and autism with language disorders (ALI).

Since ASD (Autism Spectrum Disorder) is on a continuum, there is a significant heterogeneity in phenotypic appearance of children with this disorder. This disorder is varied from mild to more severe. The language skills of children with ASD are different from non-ASD; some children with ASD develop intact language skills, while others develop very little or none (Tager-Flusberg, 2004). In the language-proficient group, pragmatic skills are consistently poor while grammar skills are varied. Several children produce average grammar (Kjelgaard & Tager-Flusberg, 2001; Tek et al., 2014), while others have problems with grammar (Durrleman & Delage, 2016; Eigsti et al., 2007; Modyanova et al., 2017; Roberts et al., 2004; Tek et al., 2014).

The thinking ability of autistic children is likely to be dominated by visual than verbal (Kamio & Toichi, 2000). The switching back pattern to visualize other images can reflect focus on visual stimulation over hearing or display a more particular processing of the accessible images, that is consistent with the previous one (Happé, 1994).

Conclusion

Language input through questions by the teacher to autistic students in class interactions is able to recognize each student's cognitive abilities. The form of teacher questions that functions as a representative, directive, expressive, and commissive act is able to encourage students to develop their cognitive abilities. However, the cognitive abilities possessed by each student are different. This is because the form of questions asked by the teacher to each student is different. Of the three students who were the object of research, student A and B's cognitive abilities were at the medium level, while student G was at the low level. The findings of this study indicate that each autistic child has varied cognitive abilities. Education and age are not perpetually the main factors in cognitive level of autistic children. The autistic students' cognitive abilites may be well developed with correct language input by the teacher. Placing students in the same classroom (with different levels) may not be a determinant for the learning success of autistic children unless the teacher is able to identify and find the right way / strategy to optimize the abilities of each autistic child. This study is expected to help the teachers set the right approach to achieve the learning objectives including the of the cognitive level in each child. Sharpening, strengthening and varying the language input for autistic children can help achieve the autistic children's cognitive abilities.

Recommendations

Further research may be conducted on providing autistic children with varied language input by the teachers, where each teacher acquires different teaching style. The teacher's age and experience in teaching are likely to be determinant factors of teacher flexibility and skills in teaching autistic students. Using creative and appropriate strategies and techniques may develop the autistic children's knowledge. Thus, the research and future findings will encourage the findings of appropriate model in teaching autistic students in the classroom.

Limitations

This research has limited data. Future studies are expected to retrieve data with a greater number of students, as well as the location of the data taken. In addition, this study is also limited to the number of teachers who teach students with autism. Giving language input to each teacher will certainly affect the cognitive abilities of autistic students.

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