

Analytical Thinking of Mathematic Problems Among Students with Autism Spectrum Disorder

Mohammad Nayef Ayasrah^{1*}, Mohamad Ahmad Saleem Khasawneh²

¹Associate Professor of Special Education, Al Balqa Applied University/ Faculty of Educational Sciences, Special Education Department, Irbid University College. Postal code 1293, Irbid, Jordan.

²Assistant Professor, Special Education Department, King Khalid University, Saudi Arabia

Abstract

This research is a qualitative study with the objective of describing the analytical thinking abilities of students with autism with regard to their comprehension of fractions. Students diagnosed with verbal autism served as participants in this research. Interviews, observations, testing, and documentation were the several methods of data collecting that were used in this research. In order to ensure that the data are accurate, it is important to use strategies such as greater persistence of observation and triangulation. Reducing the amount of data, presenting the data, and generating conclusions are the phases involved in data analysis. Even though they are all part of the same group—the verbal group—three autistic kids were found to have distinct ways of thinking, according to the findings of the research conducted on them. Not all linguistic communities possess the capacity for Analytical thinking and not all of them have the same degree of comprehension. There are only two autistic pupils overall, but each of them has superior cognitive abilities and makes the content much simpler to comprehend than one other student.

Keywords: Analytical Thinking • ASD • Mathematical Learning

Introduction

Researchers noticed several uncommon characteristics in the clinical histories of autistic children, which may be related to the social challenges faced by autistic persons. Children who are diagnosed with autism are said to have extremely significant difficulties in all elements of communication. A relationship between intellectual challenges and autism has also been brought to the researcher's attention [1]. The first example included a charming youngster who did not have any peculiar physical characteristics. This kid did well on various IQ tests, including the building blocks test, and was better at comprehending both verbal and abstract ideas. Despite the apparent delay, the researcher was pleased by the possibility for normal IQ. This was based on what assures consistent results on psychological tests. Children with autism sometimes have talents that are extraordinarily unequal, with nonverbal abilities frequently reaching considerably higher levels than verbal abilities [2].

When asked "What is autism?" by the majority of individuals, the responses that are offered might be in the form of viewpoints that characterize autism with a broad variety of factors. The response may come in the form of a series of characteristics or symptoms, such as children who prefer to spend time by themselves, who are unable to communicate, who are exceptionally talented in music, who excel in mathematics, who are exceptionally gifted at drawing, who are extremely intelligent, and who have a variety of other accompanying characteristics [3].

***Address for Correspondence:** Mohammad Nayef Ayasrah, Associate Professor of Special Education, Al Balqa Applied University/ Faculty of Educational Sciences, Special Education Department, Irbid University College. Postal code 1293, Irbid, Jordan.; E-mail: mohammadmtlaq@bau.edu.jo

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Received: 09-Dec-2022, Manuscript No. CSRP-22-82903; **Editor assigned:** 11-Dec-2022, Pre QC No. CSRP-22-82903 (PQ); **Reviewed:** 21-Dec-2022, QC No. CSRP-22-82903 (Q); **Revised:** 25-Dec-2022, Manuscript No. CSRP-22-82903 (R); **Published:** 28-Dec-2022; doi: 10.3371/CSRP.MMWY.100135.

Autism spectrum disorders are characterized by a set of symptoms that may be used as diagnostic criteria. These symptoms can be seen in children who have autism. This condition is often referred to as "Wing's Triad of Impairment" [4]. Social contact, language and communication, thinking and behavior are the three aspects that are affected by these diseases. Interaction with others, open conversation, and creative thought. The only real distinction is in how one thinks and acts in conjunction with their imagination. Both descriptions, though, focus on manifestations that aren't all that unlike from one another [5].

The most fundamental and fundamentally important cognitive talent or ability is memory, such as recalling fundamental information or mathematical formulae. Because students with autism will only remember the material or lessons for a longer period of time if they are given the material or lessons multiple times, it is certainly difficult for students with autism to be able to remember all of the lessons or materials that have been given by the teacher in this case [6]. Because autistic children will always be able to recall anything if it is done frequently, and this is a fact.

Special schools, which are one of the possibilities for teaching people who have autism, provide a broader variety of specialized services that are especially geared toward meeting the requirements of autistic children. As part of its normal teaching staff, the institution makes use of a number of special educators who are capable of guiding autistic students through their educational experiences [7]. It is not necessary for the educators who are in charge of the education of autistic children to be in peak physical condition; nevertheless, there are also instructors who are in charge of the education of autistic children who are usually developing. A few of them have more than 10 years of experience working with children who have autism as teachers. Therefore, the educator has substantial real-world experience working within the subject of autism education [8].

The great majority of students do not like learning and would much prefer just spend their time playing. A wide range of different instructional tactics are utilized in order to get a better understanding of the capabilities of each individual learner. The classroom instructors are the ones who really educate the students with autism spectrum disorder in their own classrooms [9]. Because of this, it is ensured that the process of acquiring abilities connected to Analytical thinking is still carried out around the globe.

In addition to this, this guarantees that the mathematical ideas that are taught must adjust to the circumstances of each person so that pupils are able to comprehend the concepts that are being taught by the instructor.

Both the teacher who was in charge of the classroom and the one who was in charge of the homeroom for autistic children reported that there was a combined total of three students in each of the courses. In the classroom, some autistic kids are hyperactive, while others like to parrot, and others are mute; nonetheless, autistic students often have the same character, which consists of aggressive, undirected behavior and being engrossed in their own world. Their personalities and mindsets are likewise quite different from one another [10]. Some cases of autism are caused by environmental factors such as vaccinations or seizures that do not go away. Other cases of autism are caused when a mother consumes seafood while she is pregnant, despite the fact that this kind of food contains very high levels of mercury as a result of sea water pollution. Vaccinations and seizures that do not go away are two examples of environmental factors that can cause autism [11]. There is a wide range of circumstances that might contribute to autism.

Students who frequently parrot, run, or pace in the classroom contribute to an environment that is frequently not favourable to teaching and learning. This is one of the most common problems that arise as a result of the process of teaching and learning. Another common problem is that students who frequently parrot or pace in the classroom contribute to an environment that is frequently not favourable to teaching and learning [12]. In this hypothetical situation, the instructors would carry out their duties in accordance with their own inclinations. On addition to this, pupils are given instruction in the procedures that are required to produce works of art that are fashioned from mire. When it comes to making things, they also have a lot of energy and excitement to put into it.

The teaching and learning process at Special Schools (SLB) is carried out differently from that carried out in other regular schools yet, the content that is taught and the students who are taught it are almost same. Take, for instance, the process of acquiring mathematics. In contrast to physics, which is based only on memorization and without any precise science that can substantiate its assertions, mathematics is a discipline that deals with how the brain really works [13]. The act of thinking and reasoning, as well as logic, which has to be shown logically, is made much easier with the assistance of mathematics. Researchers do not yet have a complete understanding of many aspects of learning, particularly with regard to how to educate and communicate with autistic youngsters. As a result of this, there is a desire among academics to be able to investigate in this area, particularly among instructors in the field of guiding and teaching mathematics [14]. When it comes to enhancing one's capabilities in mathematical analytical thinking, this is the component that bears the greatest weight.

Methods

This research falls under the category of qualitative research, and it takes the form of a case study that employs qualitative methodologies [15]. More precisely, the research was conducted by watching, interviewing, and testing participants, and then recording the results of the study. This categorization is based on the purpose of the study, which is to identify the level of Analytical thinking skills possessed by students with autism when they are engaged in the process of acquiring mathematical knowledge. In the current investigation, the purpose of the case study at hand is to conduct an in-depth investigation into the methods by which instructors instruct students in order to equip them with the ability to engage in Analytical thinking [16]. This investigation is being conducted as part of the current investigation. As a consequence of this inquiry, it will be feasible to provide a detailed account of the activities that contribute to the growth of students' capacities for Analytical thinking.

Because the researcher was the one who personally gathered the data, he himself functioned as the main instrument in this study. As a result, the findings of the study may be attributed to him. The researcher's work was aided by two auxiliary instruments: the first was a written test that consisted

of five questions that was used to evaluate the students' Analytical thinking abilities, and the second was a guide for conducting interviews with autistic teachers [17]. Both of these instruments were used to assist the researcher in his work. Both of these tests were developed with the purpose of evaluating the students' level of Analytical and deductive reasoning. In order to determine whether or not the data are reliable, the researchers in this study used a technique called as triangulation. In-person observations, interviews, practical testing, and written documentation were all used throughout the data compilation process [18].

Results and Discussion

Learning process

As a result of their observations of students studying mathematics in autism courses, the researchers were confronted with challenges relating to the students' cognitive abilities as well as their motivation to learn. Two distinct instances of questions were provided by the researchers as part of the sample questions that were presented about fractions. The initial illustration of the issue is presented in the form of graphical fractions in the form of shading, as well as instances of narrative problems presented in the form of fractions. Only one of these two students is capable of understanding and responding appropriately to the sample questions that are presented in the form of graphical fractions.

Pupils have difficulty reading and comprehending the issue when it is presented in the form of a story with fraction questions. This is due to the fact that students are neither vocal nor nonverbal communicators. While this is going on, there are other pupils in the class who have no interest in learning and who pace, repeat after the teacher, and fall asleep on the floor. In situations such as this one, one solution that can be provided is for the instructor to make use of props or items that are linked to fractions in the fractional content that they are teaching so that students are constantly engaged. Because, as a matter of fact, autistic pupils are often more interested in things.

Because of this, we may simultaneously encourage kids to learn by using these many teaching tools. Even in this particular subject, instructors should refrain from using the lecture style with their pupils an excessive amount. It is important for teachers to interact with more pupils, particularly those who are nonverbal [19].

Evaluation on learning process

Study is carried out by the teacher as part of the learning process, with the instructor's findings being based on interviews and observations carried out by researchers. The teacher will try to cover the same ground in each of the courses by asking the students questions about the subject of fractions. This is part of the instructor's attempt to maintain consistency. Following that, some of them answered to the questions that were posed by the teacher, but others did not react to the queries since there was a lack of contact between them. Feedback that is comparable to this evaluation will be provided to the students on a regular basis by the teacher. In order to make certain that students continue to develop during their stay at our institution [20]. From this vantage point, it is possible to make a noticeable contrast between students who have a firm grasp of the material and those who have a more restricted aptitude for doing so.

In this scenario, the teacher makes sure that the students are studying in an organized fashion, keeps the classroom climate under control, and offers each of his students his undivided attention at all times. Recognize the specific requirements of every single student. The students are in no way required to blindly comply with their professors' whims in any way, shape, or form by their instructors. The ease with which students can concentrate on their studies and their desire to learn more should be the top priority for teachers and other school personnel.

Analysis on students test result

The level of the subject's mathematical analytical thinking was assessed

by employing the constructivism learning theory on the basis of a test that was given to the subject in the form of a fractional test that was given in the form of a description. This evaluation was based on the results of the test. If the students look at the questions that have already been completed, they will see that other students have been able to provide proper answers to the questions in conjunction with the accompanying photographs. In addition to this, children are adept at putting together a myriad of words to create meaningful sentences. Students have the ability to use common fractions to represent playthings like as balls, dolls, and toy autos in their classrooms. This implies that students have comprehended the topic, since they are able to react effectively to any questions that are posed to them.

If the students look at the questions that have already been completed, they will see that other students have been able to provide proper answers to the questions in conjunction with the accompanying photographs. In addition to this, children are adept at putting together a myriad of words to create meaningful sentences. Students are able to calculate the value of each individual piece of watermelon by using conventional fractions once the watermelon has been sliced into pieces according to those fractions. This implies that students have comprehended the topic, since they are able to react effectively to any questions that are posed to them.

According to the written analysis, the subject was aware of what the questions were supposed to accomplish; nonetheless, they still remembered the concepts that they had learned, as shown by the fact that they were only able to answer four questions in a way that was correct and suitable. As a result of the fact that some of the interviewees were unable to grasp the questions, the subjects were only able to provide answers to four of the questions that were asked. This was determined by the results of the analysis of the interviews. When questioned, the people had a difficult time providing satisfactory replies.

According to the findings of the observations conducted in the classroom with autistic pupils, the teacher uses a wide range of instructional methods to cater to the specific needs of each individual pupil. There are certain educators that have a diverse student population and choose a method that is direct with their interactions with those students. The second part of the observation included the researchers talking to the students and asking them questions. The reason for doing this was so that they could determine the amount of Analytical aptitude possessed by the students. Based on the data, it has become abundantly evident that the two of them bring quite different sets of talents to the table. On the test, some of the work was written in scribble, some of it was colored in, and some of the questions remained unanswered. Because of this, each and every one of us feels driven to continue our efforts to educate and steer them in order to prevent their flaws from developing into their weaknesses. Researchers believe that they really have the same capacity given that they are motivated to continue learning new things and growing their knowledge on a consistent basis.

Educators who interact with autistic children and people who have autism spectrum disorder themselves have major duties that go beyond just delivering the material. It is difficult to escape the duty of training students on subjects like the natural world, social etiquette, religion, and most significantly, correct language usage and public speaking. This is because it is impossible to avoid the obligation of instructing students. The autistic children in this class have quite great talents in terms of their Analytical thinking when it comes to mathematics; yet, they have a long way to go before they really understand the theory. The ability for Analytical mathematical thinking is not yet at its maximum and most ideal level for autistic children, in particular. Problematic areas include comprehension, instruction, and the challenges that develop as a direct consequence of a lack of Analytical thinking ability among students [21]. The responsibilities of parents should involve working together with their children's autism homeroom teachers when it comes to the education of their autistic children at home. The goal of this is to provide aid to students in the development of their thinking skills so that they are better able to cope with the challenges presented by teachers who have autism.

In the course of their investigation into the Analytical thinking capabilities

of autistic children in connection to the study of mathematics, researchers have observed and sought to understand what really went place throughout the research. As a consequence of this, the researcher feels that this study will be of tremendous use to increase awareness, especially among educators, that autistic persons still need understanding in their thinking capacities.

This research has the ability to shine light on problems that have been ignored for such a significant amount of time that they have evolved into behaviors for which it is impossible to find a solution. This research is not without its shortcomings, most notably in respect to its presentation and the data collection it carried out. At the time, researchers only demonstrate Analytical thinking skills in conjunction with learning mathematics, which may not be an extremely comprehensive exposure to the subject matter.

Students with autism need to engage in consistent practice in order to hone their talents in the areas of Analytical thinking in mathematics and fractional material [22]. This is essential in order to ensure that students will remember the concepts presented in the content for a much-extended length of time. In addition, students always have the ability to discover solutions to any problem that is related to the curriculum. It should come as no surprise that in this situation, one needs incredibly strong leadership in addition to inspiration in order to be successful. Because in point of fact, autistic children do find delight in their schooling when they are regularly encouraged to enhance their thinking skills by continuously completing practice problems, and this is because of the truth that autism is a spectrum disorder [23]. Additionally, increasing Analytical thinking may also be performed by carefully reading the problems that are supplied in order to enhance one's problem-finding and problem-solving skills. This can be done by paying close attention to what is being read. Individuals that do not want to learn, and who frequently pace and parrot, might have one of many reasons. One of these explanations could be a lack of attention or approach with autistic students themselves. As a direct consequence of this, these kids are actively searching for ways to have fun in their own environment. In the meanwhile, one of the reasons why some students do not want to learn and instead often repeat themselves and pace is because they are not paying attention or taking an appropriate approach [24-34].

Conclusion

There is a wide range of Analytical thinking skills among children with ASD, despite the fact that they all belong to the same language group. These talents rely on the specifics of each case as well as the student's overall capabilities. This is the case regardless of whether or not the students belong to the same speech group. When trying to become successful in mathematics, one of the obstacles that every student has is the difficulty to retain the content that was taught by the instructor. As a consequence of this, the teacher is necessary to continually restate the material that has been presented to the class in order to guarantee that the pupils will remember a concept for a longer period of time. The difficulties that students face in terms of their behavior, their capacity to participate socially, their communication, and their language are the obstacles that teachers must overcome. The instructor makes it a point to address each of his students not only during the formal instruction period but also at other times when they are not in the classroom as part of the efforts that are being made to resolve this issue. These efforts are a part of the larger effort that is being made to find a solution to this problem.

Acknowledgments

The authors extend their appreciation to the Deanship of Scientific Research at King Khalid University for funding this work through Small Research Groups under grant number (RG.P.2 /136/43).

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How to cite this article: Ayasrah MN, Saleem Khasawneh MA, Dr. Awadai MAM "Analytical Thinking of Mathematic Problems Among Students with Autism Spectrum Disorder". *Clin Schizophr Relat Psychoses* 16S2 (2022) doi: 10.3371/CSRP. MMWY.100135