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Analysis of ADHD Students' Adversity Quotient and Understanding of Mathematical Concepts

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Abstrak

Pembelajaran matematika seringkali dianggap sulit termasuk bagi siswa ADHD. Penelitian ini bertujuan untuk menganalisis antara daya juang (adversity Quotient) siswa ADHD pemahaman konsep matematikanya. Penelitian ini bersifat deskriptif kualitatif dengan studi kasus pada siswa ADHD. Subyek penelitian ini adalah 3 siswa dari tiga SLB di Kota Pekanbaru. Instrumen penelitian ini berupa angket, lembar observasi, dan wawancara. Teknik analisis data dengan menggunakan deskriptif dan triagulasi. Hasil Penelitian: Daya juang siswa ADHD berbeda-beda, tergantung pada tingkat ADHD dan usianya. Rata-rata tingkat Adversity Quotient (AQ) siswa ADHD dalam pembelajaran matematika berada pada kategori sedang. Pemahaman konsep matematika siswa ADHD berada pada kategori sedang. Faktor yang mempengaruhi kemampuannya adalah siswa sering melupakan materi atau konsep sebelumnya. Upaya yang dilakukan guru untuk meningkatkan pemahaman konsep matematika adalah dengan memperbanyak penggunaan media pembelajaran visual, baik 3D maupun 2D, dan belajar dengan cara permainan. Oleh karena itu guru diharapkan menggunakan media visual dalam pembelajaran matematika pada siswa ADHD.

Kata Kunci: Adversity Quotient; Attention Deficit; Hyperactivity Disorder; pemahaman konsep matematis; siswa berkebutuhan khusus.

Abstract

This research aims to describe mathematics teachers' perceptions of geometry concepts Learning mathematics is often considered difficult, including for ADHD students. This study aims to analyze ADHD students' adversity Quotient and their understanding of mathematical concepts. This research is descriptive qualitative with a case study of ADHD students. The subjects of this research were 3 students from three special schools in Pekanbaru City. The instruments for this research are questionnaires, observation sheets and interviews. Data analysis technique using descriptive dan triangulation. Research Results: The fighting power of ADHD students varies, depending on the level of ADHD and age. The average Adversity Quotient (AQ) level of ADHD students in learning mathematics is in the medium category. ADHD students' understanding of mathematical concepts is in the medium category. A factor that influences their ability is that students often forget previous material or concepts. Efforts made by teachers to increase understanding of mathematical concepts are by increasing the use of visual learning media, both 3D and 2D, and learning through games. Therefore, teachers are expected to use visual media in teaching mathematics to ADHD students.

Keywords: Adversity Quotient; Attention Deficit; Hyperactivity Disorder; understanding of mathematical concepts; Students with Special Needs.

I. INTRODUCTION

Learning mathematics is essentially learning concepts. Mathematical concepts become a complete and continuous unity. Therefore, in the learning process, educators must be able to provide these concepts to students and how students can understand them. This is in accordance with the goals of mathematics learning in schools as stated by Permendiknas No. 59 of 2014 (Permen Nomor 59 Tahun 2014, n.d.), namely understanding mathematical concepts, explaining the relationship between concepts and applying concepts accurately, flexibly, efficiently and perfectly in solving problems (Herdiana & Soemarmo, 2014). In accordance with the objectives of learning mathematics, it appears that understanding mathematical concepts is one of the goals to be achieved. Therefore, developing an understanding of mathematical concepts is an effort to increase the achievement of mathematics learning goals in schools. The success of the teaching and learning activity process in mathematics learning can be measured by the success of students who take part in these activities. Success can be seen from the level of understanding, dominance of the material and students' learning achievements at school. The higher the understanding and mastery of the material, the higher the learning achievement of students, so understanding mathematical concepts at school is very important for students in learning mathematics.

However, it is important to remember that, in practice, studying mathematics at school is certainly not only for normal students in public schools, but studying mathematics is also intended for Students with Special Needs (SSN). This is confirmed in the National Education System Law No. 20 of 2003 article 5 paragraph two which states that "people in the country who have physical, emotional, mental, intellectual and/or social disabilities have the right to receive special education"(UU NO 20 Tahun 2003, n.d.). The term students with special needs is not a new word, but has been used to describe students who have learning difficulties. Referring to Lundqvist, et.al., (2016) in the book (Rasmitadila, 2020) that students with special needs are children with special characteristics that are not the same as children in general in terms of mental, physical, emotional, behavioral and intellectual aspects. One type of student with special needs is Attention Deficit and Hyperactivity Disorder (ADHD) or what is known as hyperactive children. If normal students also experience difficulties in learning mathematics(Netriwati & Mulya, 2021; Zaiyar et al., 2023), then children with specific needs, the ADHD type, certainly have difficulty learning mathematics(Re et al., 2016; Marlina & Usodo, 2018).

Until now, students with special needs are still a concern in order to fulfill their learning needs and access to education is still limited, as a result of this, there are still many children with special needs who experience learning difficulties. from Mastropiere & Scruggs (2007) in the book (Rasmitadila, 2020) revealed that one of the characteristics of students with special needs (including the ADHD type) is in learning "mathematics", where almost two thirds of students with learning difficulties experience difficulties in mathematics,

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especially regarding information, rules, mechanisms, and mathematical concepts. This is confirmed by the results of previous research (such as (Novitasari, 2016); (Elvierayani & Susanti, 2018); (Kurnia et al., 2018); (Cahyani et al., 2018);(Nur Sya'ada & Samsudin, 2022)). Furthermore, the low mathematical understanding ability of students with special needs was also seen at the research site, from the results of initial observations carried out by researchers at one of the Special School (SS) in Pekanbaru City, where the results of the researcher's interview with one of the teachers obtained data that students' mathematical understanding had special needs. specifically for the type of ADHD, it is not yet fit for purpose. During classroom observations of students studying mathematics, researchers saw that many ADHD students had difficulty maintaining focus, were restless, moved and talked too much and were slow to grasp what the teacher was teaching. The challenge of difficulty concentrating and hyperactivity is what makes it difficult for students to understand mathematical concepts at school. Then from another point of view, based on facts in the field, researchers see that there are other factors which are also the cause of students' learning difficulties, including lack of self-confidence, easy giving up, and difficulty controlling themselves, so in accordance with this the researchers assume that students' opportunities Understanding mathematics is related to how strong one's fighting power is. The results of interviews with mathematics teachers in class confirmed that fighting spirit is a necessity for ADHD children in understanding learning. That's why the mathematical ability of students with special needs needs to be studied and familiarized with. This fighting power is known as Adversity Quotient (AQ). AQ is very influential on student learning outcomes. This is in accordance with the results of research from (Mulyani, Wahyuningsih, & Natalliasari, 2019; Muhayana et al., 2021; Sari, Sukestiyarno, & Walid, 2022; Puspita, Herman, & Dahlan, 2023; Fitria & Hayati, 2023.; Mefiana et al., 2023; Putra, Juandi, & Jufri, 2023) which states that mathematical fighting power greatly influences students' mathematical learning outcomes.

In accordance with the results of previous research and the symptoms that occur in the field which have been previously stated, students' mathematical understanding and students' mathematical fighting power need to be paid attention to, because if this is left permanently and there is no appropriate action by educators (Rochim, Herawati, & Nurwiani, 2021; Damayanti & Kartini, 2022; Syaifuddin & Rahmasari, 2023), it will have a huge impact on mathematics learning for the future. the future where the goals of teaching mathematics will be hampered and become a big problem in the future. If students in general/normal conditions can still have difficulty understanding mathematical concepts (Amallia & Unaenah, 2018; Safitri et al., 2019; Mufidah & Setyawan, 2020; Zuliani & Puspita Rini, 2021), of course students with ADHD type can also experience difficulties. Therefore, this research is a challenge for researchers. The aim of this research is to analyze the

Adversity Quotient (AQ) of students with specific needs of the ADHD type and the ability to understand mathematical concepts. The objectives of this research in detail are as follows.

1. To find out how strong adversity Quotient students with special needs ADHD are in learning mathematics.
2. To find out how students with special needs ADHD type understand mathematical concepts.
3. To find out the factors that influence the ability to understand mathematical concepts of students with special needs of the ADHD type.
4. To find out how teachers handle students with special needs, ADHD type who have low ability to understand mathematical concepts at school.

II. METHOD

The type of research used is qualitative research with descriptive methods because this research aims to describe the mathematical abilities of students with special needs through questionnaires, tests and interviews. According to Adiputra et al., (2021) descriptive research is research that aims to describe existing phenomena to analyze or describe the results of the subject, but is not intended to provide a broader meaning. The approach used is a case study approach. This approach is research where the researcher explores a particular reality (problem) at a particular time and activity (program, event, process, institution or social group) and collects data in detail and in depth using various data collection procedures within a certain period of time (Sri, 2013).

The instruments used were researchers as the main instrument as well as interview guides, AQ questionnaires, observation sheets, and document analysis through student mathematics exercise books as supporting instruments. The data analysis technique in this research uses triagulation. The object of this research is the mathematical understanding ability and mathematical adversity intelligence of students with special needs. Research subjects were determined using purposive sampling techniques. The subjects of this research were 3 students with special needs of the ADHD type from 3 SS, namely SS Intan Mutiara, SS Panam Mutiara, and SS Pelita Hati.

This research begins by giving AQ questionnaires to students, then asking questions regarding students' understanding of mathematical concepts. The researcher will select several students who suit the research needs based on the results of the AQ questionnaire and their ability to understand mathematics to be interviewed, after that all the data obtained will be analyzed descriptively then the research results and discussion are presented.

This research was conducted from September to October 2023 at 3 Special School (SS) in the city of Pekanbaru, namely SS Intan Mutiara, SS Panam Mutiara, and SS Pelita Hati.

III. RESULT AND DISCUSSION

The questionnaire given to students' mathematical fighting power consists of 20 statement items which are arranged based on indicators of mathematical AQ. This questionnaire sheet was filled in by

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students from three SS, namely SS Insan Mutiara, SS Panam Mulia, and SS Pelita Hati. The completed questionnaire data was then analyzed to obtain the results presented in the following Figure 1.

School	N	Questionnaire Score	The Calculation Results		Category
			$\bar{X}$	SD	
SS Insan Mutiara	1	75			Medium
SS Panam Mulia	1	72	62,4	14,19	Medium
SS Pelita Hati	1	67			Medium
Total	3	214			

Figure 1. Recapitulation of Students' Mathematical

Students' mathematical AQ is very necessary in studying mathematics, researchers have given a number of questionnaires to research subjects, from the questionnaires that researchers distributed to three schools it was found that overall the average SSN has a moderate mathematical AQ with scores obtained above the average value, namely 62.4%. Where SS Insan Mutiara has the highest mathematical fighting power score with a score of 75, followed by SS Panam Mulia with a score of 72, and the third is SS Pelita Hati with a score of 67. Furthermore, based on the results of the SSN questionnaire score for ADHD type from the three schools against 7 indicators Mathematical AQ, It can be seen which indicators are more dominant for students, as in Figure 2.

No	School	Indicator(s)																			Total	Inf
		Students respond positively to a situation			Have strong control over the difficulties experienced		Students assume sources of difficulty come from other people or from outside and assign their roles naturally			Students are able to judge what they do is right or wrong		Students are able to learn from mistakes as a form of difficulty faced and correct them			Students limit the scope of their problems to the events they are facing			Students view that the difficulties they face are temporary				
		Statement																				
		1 (-)	2 (-)	3 (-)	4 (-)	5 (+)	6 (-)	7 (-)	8 (+)	9 (-)	10 (-)	11 (+)	12 (+)	13 (+)	14 (+)	15 (-)	16 (+)	17 (-)	18 (-)	19 (+)	20 (-)		
1	SE Insan Mutiara	4	4	4	4	3	2	4	4	4	4	4	4	4	4	4	4	2	4	4	4	75	Medium
2	SE Panam Mulia	4	4	3	4	4	4	3	4	4	2	3	2	4	4	4	3	4	4	4	4	72	Medium
3	SE Pelita Hati	4	4	4	4	4	2	3	3	4	1	4	4	2	4	4	3	3	4	3	3	67	Low
Total		12	12	11	12	11	8	10	11	12	7	11	10	10	12	12	10	9	12	11	11	214	

Figure 2. Results of the Mathematical Struggle Questionnaire Score for SSN Students Types of ADHD Based on Indicators

If we look more closely, there are no SS who have high mathematical AQ, from the questionnaire distributed there are 2 SS who have moderate mathematical fighting ability, and 1 SS who is identified as having low fighting ability.

Based on the results of the mathematical fighting power questionnaire, SSN from SS Insan Mutiara has a moderate AQ by getting a score of 75, where of the 7 fighting power indicators spread in the SS SSN AQ questionnaire statement, the maximum results were obtained on 4 indicators of the fighting power questionnaire, namely responding positively to something, assess

whether what he did is right or wrong, learn from mistakes, and view difficulties as only temporary. From these four indicators, it can be seen that SSN is actually able to analyze a problem and has the fighting power to solve the problem, but it is still not optimal in terms of the indicator of limiting the scope of the problem to the event it is facing, especially in the statement "I don't expect to get the highest mathematics score in class because my math skills are lacking." In this statement, SSN SS Insan Mutiara chose to answer often, so we can conclude that there is a lack of desire from SSN SS Insan Mutiara to get the highest score in class.

Based on the results of the AQ mathematical questionnaire, SS Panam Mulia's SSN received a score of 72 and was classified as medium. Based on the table, from the 7 indicators of fighting strength spread in the second AQ SSN questionnaire statement from SS Panam Mulia, they got maximum results on the 2 indicators of the fighting strength questionnaire, namely "Having strong control over the difficulties experienced" and "Students perceive that the difficulties they face are temporary", however the SSN is still not optimal in the indicator "students are able to judge what they are doing right or wrong" especially in the statement "I don't expect to get the highest math score in class because my math skills are lacking". Based on this statement, SS Panam Mulia does not yet have the fighting power to get the highest score, so he tends to give up and considers that what is important is that he has done the mathematics assignment given by his teacher.

Next from SS Pelita Hati. Based on the assessment of the mathematical AQ questionnaire which was completed by SSN SS Pelita Hati, it was found that SSN SS Pelita Hati's mathematical fighting power was classified as low, close to medium with a score of 67. If we investigate further, the fighting power is not too bad, SSN SS Pelita Hati was successful. get the maximum score on 2 of the 7 existing indicators, the indicator that has the maximum score is "Students respond positively to a situation" and "Have strong control over the difficulties experienced" but on the 4th indicator the 10th statement of SSN SS Pelita Hati is only getting a score of 1, the statement reads "I only study mathematics to fulfill assignments/orders given by the teacher" based on the statement and score obtained by SSN SS Pelita Hati, it can be concluded that SSN SS Pelita Hati studies or does mathematics problems only to fulfill assignments or carry out orders only, in other words, SSN SS Pelita Hati does its work only to fulfill its obligations, regardless of whether the answer is right or wrong, finished or not finished.

Furthermore, the mathematical resilience of ADHD students was also seen from data from interviews and observations conducted by researchers at the three schools. Description of data from interviews and observations related to mathematical fighting skills and how mathematical understanding of students in each school will be described as follows.

A. Adversity Quotient of Students with Special Needs ADHD Type Towards Learning Mathematics

This questionnaire includes six questions

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Based on the results of interview analysis, observation and document analysis, it shows that the fighting power of students with special needs is at a moderate level. This is also sharpened by the results of the questionnaire data analysis which has been presented at the research results point. As is known, ADHD students enjoy learning through visual images, teaching aids and other learning media. This is supported by the results of previous research (Aini & Suryowati, 2022) and research results (Susiaty et al., 2021).

Apart from that, ADHD students also meet indicators of mathematical resilience, including being able to learn from mistakes they make and correct them. This was proven when researchers conducted interviews and observations of teachers and students. Teachers stated that whenever there was an error in a math exercise or assignment, ADHD students tended to ask the teacher to point out where the error was so that it could then be corrected and asked for a better grade. It turns out that a similar thing was also found in research by Firda et al., (2022) who said that ADHD students want good grades, if improvements are not given, students will become emotional. Therefore, the results of document analysis in the form of exercise books for ADHD students on average show good grades.

Apart from that, researchers also found weaknesses in ADHD students. Based on the confessions of special education teachers in three schools, it was revealed that attitudes that are currently difficult to handle include; 1) the student's attitude is difficult to control and 2) it is easy to get emotional if the ADHD student is disturbed by friends or his own heart condition. Difficulty controlling attitude here can include, for example, doing anything that can attract the teacher's attention, asking the teacher repeated questions when learning mathematics, essentially wanting to get more attention, where if not paid attention, ADHD students tend to get angry. and sad and can even cry. Meanwhile, an easily emotional attitude can be, for example, when a student experiences interference from friends, then the response of ADHD students tends to be tantrums, anger and can even do things that are detrimental to friends, thereby disturbing their comfort in learning mathematics. If this happens outside the teacher's supervision, it can have fatal consequences. The teacher added, if an ADHD student experiences a tantrum, then the student will easily do unexpected fatal things, for this reason the teacher must always supervise the student's every action. This shows that students' emotions are unstable and difficult to control if they get something they don't want. This statement is confirmed by Hanum and Hermaningsih (2019) and Fajriana (2021) who say that ADHD students who have difficulty controlling their emotions can experience difficulties in class. Based on this explanation, it appears that ADHD students have weaknesses in their mathematical abilities, specifically in terms of the difficulty of assessing whether something they are doing is correct. or wrong.

B. Understanding Mathematical Concepts for Students with Special Needs ADHD Type

In general, the understanding of mathematical concepts of students with special needs of the ADHD type in the three schools is in the medium category. This statement is supported by the results of interviews, observations and analysis of documents in the form of students' mathematics practice books. It is known that the indicators for students' understanding of mathematical concepts based on the (Ministry of National Education, 2006) are as follows: 1) Restate a concept; 2) Classifying objects according to certain properties (according to the concept); 3) Provide examples and non-examples of the concept; 4) Presenting concepts in various forms of mathematical representation; 5) Developing necessary or sufficient conditions for a concept; 6) Using, utilizing, and selecting certain procedures or operations; 7) Apply problem solving concepts or algorithms. The following is a description of the results of document analysis, interviews and research observations in the three schools, as in Figure 3.

Understanding Concepts of ADHD Students				
SS		**SS Pelita Hati**	**SS Insan Mutiara**	**SS Panam Mulia**
		Elementary School	**Junior High School**	**Senior High School**
Indicator Understanding Concept	**1**	Students are able to answer correctly.	Students are able to answer correctly.	Students are able to answer correctly.
	2	Students are able to answer correctly but repeatedly	Students are able to answer correctly.	Students are able to answer correctly.
	3	Students are able to answer correctly but are slow and repetitive	Students are able to answer correctly.	Students are able to answer correctly.
	4	Students are able to answer but are slow and repetitive	Students are able to answer correctly but repeatedly	Students are able to answer correctly but repeatedly
	5	Students are unable to answer	Students are able to answer correctly but are slow and repetitive	Students are able to answer correctly but are slow and repetitive
	6	Students are unable to answer	Students are able to answer correctly but are slow and repetitive	Students are able to answer correctly but are slow and repetitive
	7	Students are unable to answer	Students are unable to answer	Students are unable to answer

Figure 3. Description of Conceptual Understanding of ADHD Type SSN Students

Based on Figure 3 it can be seen thatIndicators 1-3: Most students are able to answer correctly, although some are slow and repetitive. This suggests that at a basic level, ADHD students still have the capacity to understand mathematical concepts, but may need more time and repetition to process the information correctly (Susiaty, Firdaus, & Andriati, 2021). Research conducted by Surmilasari et al., (2022) shows that a learning approach based on Contextual Teaching Learning (CTL) can help ADHD students understand mathematical concepts better.

Indicator 4-6: Some students begin to show greater difficulty in answering, either slowly, repeatedly, or even being unable to answer. This indicates a need for a more individualized and intensive learning approach to help them understand

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concepts. Aulia Kartika Syari's research (2024) shows that independent learning and contextual learning approaches can improve the mathematical computational thinking abilities of ADHD students.

Indicator 7: Some students are unable to answer, indicating significant difficulty in understanding the concept. Research by Andri Mahardhika Birda et al. (2023) shows that the knowledge attention process in ADHD students in solving mathematical problems requires more specific and adaptive strategies to help them understand and solve problems.

C. Factors That Influence the Ability to Understand Mathematical Concepts of Students with Special Needs, ADHD Type

Based on research findings and Figure 3, it can be concluded that most students are able to answer questions about their ability to understand mathematical concepts, but the time varies. Most students take a long time to work on these problems because they forget prerequisite material or previous concepts that can help them in solving the problems they are working on. Research by Anggriyani et al., (2021) stated that students' memory in mathematics is very low, which is the main factor influencing students' ability to understand mathematical concepts. In addition, research by Surmilasari et al., (2022) found that ADHD students often required repetition of material to strengthen their understanding. While research by Birda et al. (2023) emphasize the importance of knowledge attention strategies in solving mathematical problems. Apart from that, a study by Aulia Kartika Syari (2024) shows that a contextual learning approach can increase the learning independence and memory of ADHD students.

D. The Form of Treatment Carried Out by Teachers for Students with Special Needs, ADHD Type Who Have Low Ability to Understand Mathematical Concepts at School

The teacher's role is very important in improving the ability to understand mathematical concepts of ADHD students. Teachers try to serve ADHD students wholeheartedly in any condition, whether the students are hyperactive and seeking attention or when they have difficulty controlling their emotions. Teachers also try to find information and continue to learn about what ADHD students like and don't like. Teachers' creativity in using various visual and audio learning strategies and media really helps ADHD students to learn while looking at pictures, copying pictures, singing and telling stories.

Research by Surmilasari et al. (2022) shows that the use of contextual-based learning (CTL) can help ADHD students understand mathematical concepts better. Additionally, visual-based learning approaches are particularly effective for ADHD students because they are often more responsive to information presented visually. This method includes the use of images, diagrams, videos, as well as interactive whiteboards. Research by Aulia Kartika Syari (2024) also shows that a student-centered learning approach increases their independence and memory.

Teachers and principals do not forget to provide consistent encouragement and encouragement to ADHD teachers and students so that they continue to develop, as well as showing unlimited patience in educating and teaching them. The learning while playing method (gamification) is also effective for ADHD students because it can increase their involvement and motivation. Research by Birda et al. (2023) emphasized the importance of knowledge attention strategies in helping ADHD students solve math problems.

Apart from that, the use of educational games has been proven to be effective and helps students improve their ability to understand mathematical concepts, this is confirmed by research by Kurniawan, et al., (2021) and Musrifah, et al., (2022).

IV. CONCLUSION

Based on the results and discussion of this research, it can be concluded that ADHD students have moderate fighting power (Adversity Quotient or AQ) in learning mathematics, which means they are able to withstand challenges, but still face difficulties in understanding mathematical concepts. ADHD students often experience problems concentrating, easily forget previously learned concepts, and require more time and repetition to understand the material.

The ability to understand mathematical concepts in ADHD students is in the medium category. Students are generally able to recall basic concepts and provide examples, but have difficulty applying concepts to more complex or abstract problems. Factors that influence the ability to understand this concept include low memory abilities, so students often forget material that has been studied previously. In addition, low levels of concentration make them easily distracted, making it difficult to focus for long periods of time

Another factor that influences students' understanding of the concept of ADHD is the support of the learning methods used by the teacher. Strategies that combine visual media, visual aids, and contextual approaches have been proven to help improve students' understanding of concepts. On the other hand, the lack of appropriate learning strategies and the lack of active involvement of students in the learning process become obstacles in improving the ability to understand concepts.

Visual learning strategies, such as pictures, diagrams, and interactive learning, have proven effective in helping ADHD students understand mathematics material better. Using learning methods that involve play activities also helps increase their interest and motivation. Teachers play an important role in creating an appropriate learning atmosphere for ADHD students by paying attention to their special needs and paying extra attention to classroom management and more personalized teaching.

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