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EXPLORING ADVERSITY QOUTIENT AND ITS ROLE IN MATHEMATICAL PROBLEM SOLVING

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ABSTRACT

Mathematics is a discipline in itself, but it can be a tool to help learn and solve problems in many other disciplines. Students' success in problem solving depends on how they react to the problems they encounter while finding solutions to those problems. A person's ability to cope with these difficulties is called (AQ). Each student has a different AQ that has different effects. This research aims to determine the QA and its role in solving mathematical problems. The researcher will use the method of Systematic Literature Review (SLR) to summarize and explain the relationship, collecting many important articles in the research according to the methods and methods described. The results show that AQ is a person's response to various challenges, obstacles, and difficulties in achieving their life goals. QA plays a role in self-control, predictor of performance, motivation, creativity, learning process, strength, hope, emotional health, physical health, persistence, attitude and response to change. The function of Adversity Quotient (AQ) is very important in solving math problems. AQ indicates how strong a person is in trying to overcome challenges, obstacles, and difficulties in achieving their problem-solving goals.

Keywords: Mathematics; Adversity Quotient; Mathematical Problem Solving.

1. Introduction

Mathematics education is a basic science that must be mastered by every individual, therefore mathematics education is needed for all phases. Mathematics plays a very important role in developing a person's thinking abilities. Attitudes and ways of thinking can be developed through learning mathematics, because mathematics has a clear structure and connection between concepts. Apart from that, the ongoing learning process prioritizes students' freedom to solve problems or discover a learning concept in their own way (Rahman, 2018).

Mathematics is one of the subjects that focuses and emphasizes problem solving abilities. This is stated in Minister of Education and Culture Regulation Number 22 of 2016. One of the mathematics learning objectives that students must achieve is problem solving abilities. In the mathematics learning process, problem solving skills need to be prioritized, because by facing problems students are encouraged to think intensively and creatively in solving the problems they face (Sriwahyuni & Maryati, 2022).

According to George Polya, problem solving is an attempt to find a way out of a difficulty in order to achieve a goal that cannot be achieved immediately (Purba & Lubis, 2021). Lester (Branca, 1980) stated that "*Problem solving is the heart of mathematics*".

Before carrying out learning, teachers must pay attention to the stage of students' willingness to learn. Willingness to learn is very important to ensure students gain knowledge from what they learn (Veloo & Muhammad, 2011). Students have difficulty in solving problems due to low problem solving abilities and lack of understanding of basic concepts related to the material (Maharani & Bernard, 2018).

In the problem solving process there are several factors that can influence one of them, namely the Adversity Quotient (AQ). AQ is readiness to face difficulties that originate from within the student (Azizah, 2020). In the student learning process, AQ is very necessary because AQ is "What Can I do?" so it is recognized as a fairly large factor that contributes to academics (Villagonzalo, 2016). By having AQ, students are considered more able to see from the positive side, more willing to take risks, so that demands and

expectations are used as support, and being in class is an opportunity to achieve maximum learning outcomes (Huda & Damar, 2021).

The potential of AQ is really needed in facing difficulties, because basically learning is overcoming difficulties, so the role of AQ can influence the level of student resilience in facing these difficulties. This attitude needs to be instilled in students in learning. AQ is experienced by all groups, including students (Septianingtyas & Jusra, 2020), Therefore, it is necessary to carry out an in-depth study regarding the relationship between AQ and students' mathematical problem solving abilities. The aim of this research is to determine the role of AQ in solving mathematical problems.

2. Research Methods

In this research, the researcher uses a *Systematic Literature Review* (SLR). SLR is carried out by systematically collecting several articles in journals in accordance with predetermined processes and steps. The aim of SLR research is to study, identify, evaluate, analyze and interpret all research that has been selected with a specific focus (Setiawan et al., 2021).

Article meta data is tabulated in a table which includes the author's name and research results (Putra & Afrilia, 2020). The selected articles are articles that have similar research, then the articles are analyzed and then summarized (Putra & Milenia, 2021).

Based on the research method above, the researcher searched for articles from several journals with the help of the Publish or Perish (PoP) application and Google Scholar to search for data with the keywords used, namely "Adversity Qoutient", "Problem Solving" and "Mathematics".

3. Results and Discussion

The results of the research data included in this literature review are an analysis and summary of articles that have been summarized related to AQ in solving mathematical problems, which are presented in the following table.

Tabel 1. List of Journals in Mathematics

Nama	Hasil Penelitian
(Yustiana et al., 2021)	It is important to know the AQ type of each student in order to successfully achieve learning goals. So that students can have mathematical problem solving abilities.
(Parvathy & M, 2014)	Someone who has AQ can influence other people easily and can help others overcome obstacles in their lives.
(Qin et al., 2019)	AQ as a non-intellectual factor plays a very important role in students' mathematics learning.
(Sigit et al., 2019)	There is a significant difference in the average student learning outcomes between male and female students. The learning outcomes of female students are higher than male students.
(Hastuti et al., 2018)	Students who have AQ are able to face mathematics learning in various ways, materials and with different learning models.
(Hadi & Zaidah, 2020)	Mathematics is part of the mathematics learning process that requires AQ in learning
(Permatasari et al., 2022)	There is a relationship between the AQ level and the level of students' mathematical problem solving abilities.
(Yanti & Syazali, 2016)	Each student has a different thinking process based on their respective AQ type based on Bransford and Stein's theory. Climbers tend to have a conceptual thinking process in solving problems. Campers tend to have a semi-conceptual thinking process in solving problems, while quitters tend to have a computational thinking process in solving problems.
(Hakim, 2020)	AQ has a significant effect on problem solving abilities in mathematical proof on the topic of Group Theory.
(Aini & Mukhlis, 2020)	Students' AQ gives different results to students' mathematical problem solving abilities.
(Abdiyani et al., 2019)	In the learning process, students should not only rely on their cognitive abilities, but must have a high AQ because AQ is the fighting power that students must have in overcoming difficulties and problems in learning.

(Huda & Damar, 2021)	AQ can help individuals strengthen their abilities and perseverance in facing daily life challenges by sticking to their principles and dreams.
(Andi Nurlaelah et al., 2021)	The higher the student's AQ, the higher the student's problem solving abilities.
(Kuhon, 2020)	AQ is able to bridge the gap for students to achieve high and better academic achievements.

Based on the results of the article analysis, it was found that AQ was first discovered by Paul G. Stolz stating that AQ is the intelligence that a person has in overcoming life's difficulties (Siti Azizah, 2020). AQ is also known as the science of resilience, trying to measure a person's ability to handle difficulties in life (Singh & Sharma, 2017). According to Stotlz (2000), AQ can help overcome difficulties and process these difficulties into challenges to be resolved so that they become the desired success. AQ can be an indicator to find out how strong a person can survive in facing a problem they are facing, because in general students often give up when they experience difficulties in learning and also in solving mathematical problems. AQ is not a permanent or innate intelligence, but AQ can be improved and improved (Yustiana et al., 2021).

Hidayat & Sariningsih (2018), stated that AQ is one of the psychological aspects of facing difficulties. Masfingatin (2012), also stated that AQ has an important role in the mathematics learning process. AQ is very necessary for students to solve problems in mathematics. This is in line with the opinion of Effendi, Mohd, Khairani, & Razak (2015), that AQ is needed by students in struggling to face difficulties in achieving success. A person must have AQ to recognize one's own difficulties and process them into the potential to become challenges that can be faced.

AQ is a psychological and emotional factor that is very important and must be strengthened for students to have in addition to mathematical intellectual abilities in learning activities (Laili, 2021). Qin et al., (2019) divides AQ into three types:

a. Quitters type, the type of student who easily gives up in the face of difficulties
b. Campers type, the type of student who has tried to face existing problems and problems, but easily gives up
c. Climbers type,the type of students who always struggle to face existing problems even though these problems always arise.

Stoltz (2005), further stated that believes that students who have a high AQ will mobilize all their potential to provide the best results, and will always be motivated to excel. Being able to face mathematics learning in various material areas and with different learning models (Hastuti et al., 2018) it will be more encouraged to direct himself to the best results with optimal efforts to take advantage of opportunities, actively act, including learning independently (Novilita, 2013). Facing threats as a temporary matter, so that we can survive and have hope (Huda & Damar, 2021).

On the other hand, individuals who have low AQ will respond to difficulties as something that is permanent and cannot be changed, giving rise to an attitude of helplessness. Students with a good AQ level will be able to survive in facing various difficulties in learning mathematics, therefore AQ is very important from a psychological and emotional perspective which must be strengthened for every student, mathematical intellectual abilities in learning activities (Laili, 2021) including problem solving mathematics (Parvathy & Praseeda, 2014). With AQ, students will be more encouraged to exert themselves for the best results with optimal efforts to take advantage of opportunities, actively act, including solving the problems they face (Novilita, 2013).

AQ has four dimensions, each of which is part of a person's response in facing problems. These dimensions include control function (C/control), origin and ownership (O2/origin and recognition), reach (R/reach) and endurance (E/endurance). The greater the AQ value, the greater the intelligence in facing difficulties (Yanti, 2016).

AQ is a factor in student success in the learning process (Kuhon, 2020). Students often feel stressed when carrying out mathematics learning activities at school. The stress experienced by students tends to be caused by students' feelings of inadequacy in dealing with various situations, events and challenges that exist during mathematics learning activities (Hariadi et al., 2021).

Each person's way of overcoming difficulties is different. Likewise, a person's

intelligence level is relatively different, each individual has their own AQ (Lathifaturrahmah, 2020). AQ is able to bridge the gap for students to achieve high and better academic achievements (Kuhon, 2020). AQ is able to align a person's attitudes and behavior (Hidayat et al., 2019) because student success in learning depends on how students overcome existing difficulties.

Factors that can influence AQ are competitiveness, productivity, creativity, motivation, taking risks, improvement, perseverance, learning, embracing change, tenacity, stress, pressure and setbacks (Risma, 2016). Apart from that, AQ can be influenced by students' ability to process existing problems into challenges (Fudin et al., 2022).

AQ can help to strengthen abilities, hard work, tenacity, responsibility and perseverance in facing daily life challenges by sticking to principles and dreams. The higher the AQ, the more likely someone is to be optimistic and innovative in overcoming difficulties and take responsibility for solving problems. They don't complain easily and don't give up easily no matter how bad the conditions are. On the other hand, the lower a person's AQ level, the easier it is for a person to give up, avoid challenges and experience stress and complain all day long when facing problems and it is difficult to see positively behind all the problems they face (Afri, 2018).

4. Conclusions

Based on a literature review, the results show that AQ is a person's response to various challenges, obstacles and difficulties in achieving their life goals. AQ plays a role in self-control, predictor of performance, motivation, creativity, learning process, strength, hope, emotional health, physical health, perseverance, attitude and response to change. The Adversity AQ function is very important in solving mathematical problems. AQ shows how strong a person is in trying to overcome challenges, obstacles and difficulties in achieving their problem solving goals. So it can be said that the higher the student's AQ, the higher the student's mathematical problem solving ability, and vice versa.

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