PLUSMINUS
Jurnal Pendidikan Matematika

Adversity Quotient in Mathematics Learning

Andika Putra. R[1], Nurjanah[2*], Dadang Juandi[3], Lucky Heriyanti Jufri[4]
[1,2*,3,4]Department of Mathematics Education, Faculty of Mathematics and Science, Universitas Pendidikan Indonesia
Jalan Dr. Setiabudhi No. 229, West Java, Indonesia
[1]andikaputra.r12@upi.edu; [2*]nurjanah@upi.edu; [3]dadang.juandi@upi.edu; [4]luckyheriyantijufri@upi.edu

ABSTRAK

Tinjauan literatur sistematis ini menganalisis 11 artikel terpilih (2017-2021) dari 78 artikel yang disaring menggunakan Covidence, dengan tujuan untuk mengungkap peran penting Adversity Quotient (AQ) dalam pembelajaran matematika, terutama dalam pemecahan masalah, penalaran, berpikir fleksibel, minat, dan kreativitas siswa. Hasil analisis menunjukkan bahwa siswa dengan AQ tinggi menunjukkan kemampuan unggul dalam memahami, merencanakan, melaksanakan, dan mengevaluasi solusi masalah, serta memiliki kemampuan penalaran semiotik yang kuat. Model pembelajaran inovatif seperti BBL, PBL dan pembelajaran realistik terbukti efektif meningkatkan AQ dan hasil belajar matematika. Selain itu, terdapat hubungan signifikan antara minat belajar, AQ, dan kemampuan berpikir kreatif matematis siswa. Meskipun penelitian ini memberikan kontribusi berharga, keterbatasannya (ukuran sampel kecil, dominasi desain kuasi-eksperimental) perlu diatasi dengan penelitian lebih lanjut menggunakan desain eksperimen yang lebih kuat, sampel yang lebih besar dan beragam, serta menggali lebih dalam interaksi AQ dengan faktor lain dalam pembelajaran matematika.

Kata Kunci: Adversity Quotient; AQ; Pembelajaran; Model.

ABSTRACT

This systematic literature review analyzed 11 articles (2017-2021) selected from 78 screened using Covidence, aiming to uncover the crucial role of Adversity Quotient (AQ) in mathematics learning, particularly in problem-solving, reasoning, flexible thinking, interest, and creativity. Findings reveal that high-AQ students demonstrate superior abilities in understanding, planning, executing, and evaluating problem solutions, along with strong semiotic reasoning. Innovative learning models like BBL, PBL and realistic learning effectively enhance AQ and math achievement. Additionally, a significant relationship exists between learning interest, AQ, and students' mathematical creative thinking abilities. Despite valuable contributions, limitations (small sample sizes, predominance of quasi-experimental designs) necessitate further research using stronger experimental designs, larger and more diverse samples, and deeper exploration of AQ's interaction with other factors in mathematics learning.

Keywords: Adversity Quotient; AQ; Learning; Model.

Article Information:

Accepted Article: 12 Agustus 2023, Revised: 25 Oktober 2023, Published: 30 November 2023

How to Cite:

Putra, R. A., Nurjanah, Juandi. D., & Jufri, L. H. (2023). Adversity Quotient in Mathematics Learning. *Plusminus: Jurnal Pendidikan Matematika, 3*(3), 385-398.

1. INTRODUCTION

Mathematics, as the universal language of science and technology, plays a crucial role in forming individuals' logical, critical and analytical thinking abilities. However, learning mathematics is often a challenge for middle and high school students around the world. This is reflected in the results of the 2022 Program for International Student Assessment (PISA) study, where Indonesian students' mathematics scores decreased compared to 2018, even though Indonesia's ranking rose 5-6 positions (Kemdikbudristek, 2023). This decline in scores shows that there are still challenges in improving the quality of mathematics learning in Indonesia. The low mathematics achievement of middle school and high school students is not only caused by cognitive factors, but is also influenced by non-cognitive factors, one of which is the Adversity Quotient (AQ). AQ is an individual's ability to face, overcome and survive difficulties or challenges (Stoltz, 2000). Stoltz (2000) defines AQ as "the science of resilience", which consists of four main dimensions, namely Control (C), Ownership (O), Reach (R), and Endurance (E).

Based on the bibliographic (SCOPUS data (Figure 1)) related to research related to AQ for geometry material, it can be seen that few have carried out research. Therefore, this is an opportunity to conduct more in-depth research and study with the aim of seeing how AQ influences mathematics learning.

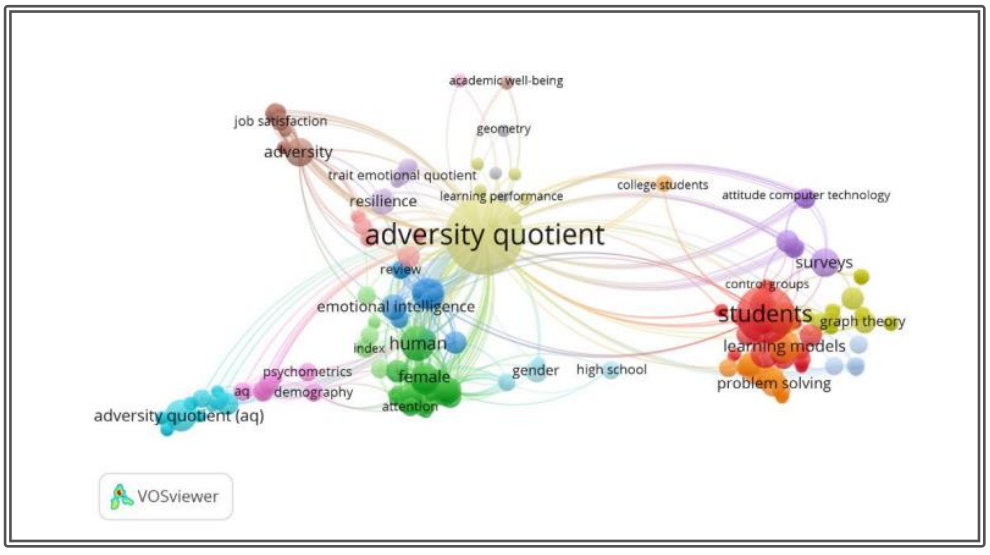


Figure 1. Bibliographic AQ

Kurniati's (2018) research shows that there is a positive correlation between AQ and learning motivation and mathematics problem solving strategies in high school students in Indonesia. Students with higher AQ tend to have stronger learning motivation and are able to apply more effective problem solving strategies in dealing with mathematics problems. This is in line with research by Prihandoko (2016) which found that junior high school students in Indonesia with high AQ tend to have better mathematics scores than students with low AQ. The results of

this study indicate that AQ can be an important factor influencing students' mathematics learning achievement.

2. METHOD

a. Research design

This research will use a systematic literature review approach in accordance with the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. This approach was chosen because it allows for a more comprehensive and objective picture of the research topic, as well as minimizing bias in the selection and interpretation of research results.

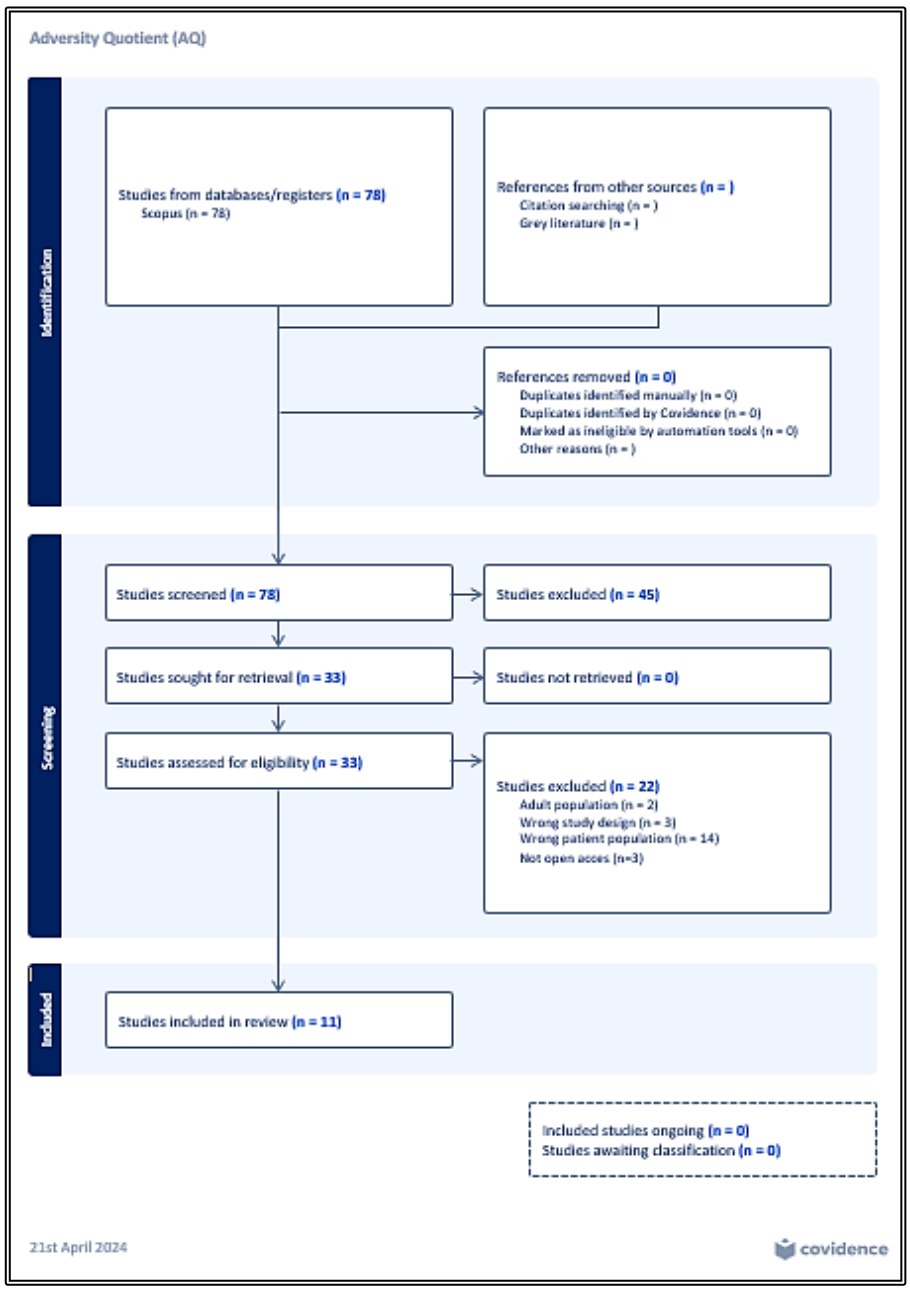


Figure 2. PRISMA Steps

b. Inclusion and Exclusion Criteria

1) Inclusion Criteria

a) Quantitative, qualitative, or mixed-method research published in scientific journals or conference proceedings indexed by Scopus.

b) Research involving Middle School students (SMP-SMA)

c) Research that explicitly measures the Adversity Quotient (AQ) uses valid and reliable instruments, such as the Adversity Response Profile (ARP), or other instruments that have been tested for validity and reliability.

d) Research that reports the results of statistical analysis or qualitative interpretation that are relevant to the research topic, such as the relationship between AQ and mathematics achievement, motivation to learn mathematics, mathematics anxiety, or self-efficacy in mathematics.

2) Exclusion Criteria

a) Research that does not directly discuss AQ in the context of mathematics learning for middle school or high school students.

b) Research that only discusses AQ in general without linking it to mathematics learning.

c) Studies that do not report relevant empirical data or analytical results.

d) Research that cannot be accessed in full (full-text).

c. Literature Search Strategy

A literature search will be carried out using the Scopus database in April 2024. The search strategy will combine keywords related to AQ and mathematics learning, as well as the age limit for participants in secondary school students):

1) ("adversity quotient" OR "AQ")
2) AND ("mathematics education" OR "math learning" OR "math achievement" OR "math motivation" OR "math anxiety" OR "math self-efficacy")
3) AND ("secondary school students" OR "high school students" OR "junior high school students" OR "middle school students")

A search will also be conducted on the bibliographies of relevant articles (snowballing) to identify additional research that may not have been included in the initial search.

d. Data Selection and Extraction Process

The article selection process will be carried out in two stages using Covid-19 software. In the first stage, two independent researchers will screen the titles and abstracts of articles based on inclusion and exclusion criteria. Articles that meet the criteria will be downloaded and read in full in the second stage.

In the second stage, the two researchers will independently assess the complete suitability of the article based on the inclusion and exclusion criteria. Disagreements between the two researchers will be resolved through discussion or involving a third researcher.

Relevant data will be extracted from selected articles using a previously prepared data extraction form. Extracted information includes:

1) Author, year, and research title
2) Research design (quantitative, qualitative, or mixed-method)
3) Participants
4) Main conclusion

e. Data analysis

The extracted data will be analyzed descriptively and thematically. Descriptive analysis will be used to summarize the characteristics of the studies included in the review, such as year of publication, country of origin, study design, and measurement instruments. Thematic analysis will be used to identify the main themes that emerge from the research results, such as the relationship between AQ and mathematics achievement, motivation to learn mathematics, or mathematics anxiety in middle and high school students, as well as factors that moderate these relationships.

3. RESULT AND DISCUSSION

a. Result

The following are the extraction results from PRISMA:

Table 1. Analysis of articles related to AQ

No	Writer	Year	Research Title	Research design	Participants	Main Conclusion
1	Kartikaningtyas, V., Kusmayadi, TA, & Riyadi, R.	2018	The effect of brain-based learning with contextual approach viewed from adversity quotient	Quantitative	109	The BBL-contextual learning model is better than direct learning in mathematics learning. There is no significant difference between each type of AQ on mathematics achievement, and there is no interaction between learning model and AQ on mathematics achievement.
2	Purnamasari, FE, Sujadi, I., & Slamet, I.	2019	Effect of adversity quotient of junior high school students on reflective thinking process in mathematical problem solving	Descriptive Qualitative	31	There are differences in students' reflective thinking processes with Adversity Quotient (AQ) scores at the climber, camper and quitter levels.

No	Writer	Year	Research Title	Research design	Participants	Main Conclusion
3	Suryaningrum, CW, Purwanto, Subanji, Susanto, H., Ningtyas, YDWK, & Irfan, M.	2020	Semiotic Reasoning Emerges in Constructing Properties of a Rectangle: A Study of Adversity Quotient	Qualitative	3	There are differences in the semiotic reasoning process of students with low (quitter), medium (champer), and high (climber) AQ in constructing the concept of a rectangle
4	Hastuti, TD, Sari, DR, & Riyadi	2018	Semiotic reasoning emerges in constructing problem-solving of junior high school students based on adversity quotient	Case studies	3	Students with high AQ are able to face mathematics learning in various materials and with different learning models.
5	Safitri, AN, Juniati, D., & Masriyah	2018	Students 2019 Relational Understanding in Quadrilateral Problem Solving Based on Adversity Quotient	Qualitative	3	Climber, camper, and quitter students are able to understand problems, formulate resolution plans, implement plans, and look back. However, the quitter and camper subjects were not able to provide reasons for the steps they had taken.
6	Rahayu, S., & Istiani, A.	2019	The influence of adversity quotient and learning achievement on mathematics problem solving ability	Quasi-experimental	5 classes	The bamboo dancing learning model provides better learning outcomes than the direct learning model. Students in the climber' s category provide the same learning outcomes as students in the camper' s category. Students in the camper' s category provide better learning outcomes than students in the quitters category.
7	Amir, MZ, Risnawati, Nurdin, E., Azmi, MP, & Andrian, D.	2021	*The increasing of mathematics adversity quotient in mathematics cooperative learning through metacognitive*	Quasi-experimental	180	There are differences in students' AQ in mathematics learning in three learning strategy groups (MTPS, MTPQ, CC). The strategy that best influences students' AQ is MTPS. There is an interaction effect between learning strategies and the school system on students' AQ.
8	Dina, NA, Amin, SM, & Masriyah	2018	*Flexibility in Mathematics Problem Solving Based on Adversity Quotient*	Qualitative	3	Climber students show good flexibility and ability to face difficulties, camper students are less able to show flexibility, and quitter students are not able to show flexibility.
9	Sugihatno, ACMS, Budiyono, & Slamet, I.	2017	*Realistic Mathematical Approach through Numbered Head Together Learning Model*	Quasi-experimental	60	The NHT-RMA learning model provides better mathematics learning outcomes than the direct learning model. There are significant differences in student achievement in each AQ category. There is an interaction between the learning model and each student's AQ category.

No	Writer	Year	Research Title	Research design	Participants	Main Conclusion
10	Agoestanto & Masitoh	2021	*Mathematical creative thinking ability viewed from students\u2019 learning interest and adversity quotient through creative problem-solving learning model*	Mixed-Method	30	Students' creative mathematical thinking abilities increase through the CPS learning model. There is a significant influence between students' interest in learning and AQ on their mathematical creative thinking abilities. Students with high interest in learning tend to be in the very creative category.
11	Juwita, HR, Roemintoyo, & Usodo, B.	2020	*The Role of Adversity Quotient in the Field of Education: A Review of the Literature on Educational Development*	Literature Review	18	AQ plays a big role in education, especially in student learning outcomes related to skills.

1) Descriptive Analysis Results

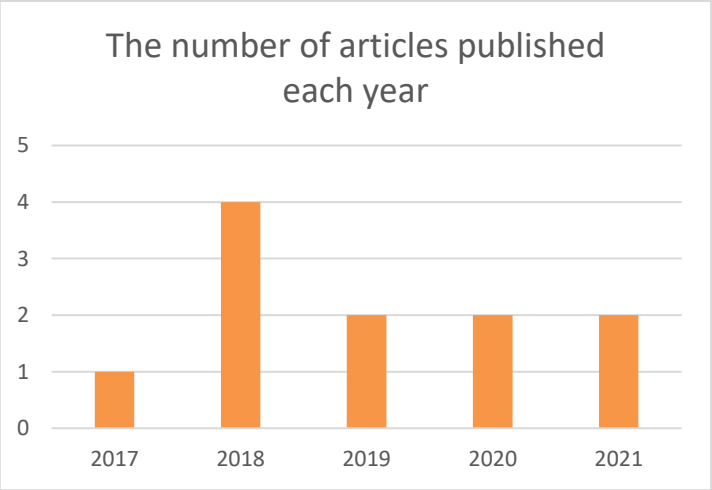


Figure 3. Number of articles per year

The 11 articles reviewed in this literature review were published between 2017 and 2021, with 2018 being the year with the highest number of publications (4 articles). This shows an increase in research interest in the topic of Adversity Quotient (AQ) in mathematics learning during that period.

These studies use a variety of approaches, including quantitative, qualitative, quasi-experimental, case studies, and mixed-methods. Qualitative approaches dominate (36%), indicating a focus on in-depth understanding of how AQ influences students' learning processes. Quasi-experimental research (18%) was also quite popular, indicating interest in testing the effectiveness of learning interventions on AQ and mathematics learning outcomes.

Research topics discussed in these articles include:

a) The influence of AQ on mathematical problem solving abilities: Several qualitative studies (Suryaningrum et al., 2019; Safitri et al., 2018; Dina et al., 2018) show that students with high

AQ tend to be more able to solve mathematical problems and show more flexibility in thinking. better. Students with high AQ are able to deal with various materials and mathematics learning models (Hastuti et al., 2018).

b) The influence of AQ on the semiotic reasoning process: Qualitative research (Suryaningrum et al., 2019) found differences in the semiotic reasoning process of students with different AQ levels. Students with high AQ show better semiotic reasoning abilities in constructing mathematical concepts.

c) Effectiveness of innovative learning models: Quantitative and quasi-experimental research (Kartikaningtyas et al., 2018; Rahayu & Istiani, 2019; Sugihatno et al., 2017) shows that learning models such as BBL-contextual, bamboo dancing, and NHT-RMA can improve AQ and student mathematics learning outcomes. This innovative learning model encourages students to think critically, independently and creatively.

d) Relationship between AQ, interest in learning, and creative thinking abilities: Mixed-method research (Agoestanto & Masitoh, 2021) found a significant influence between students' interest in learning and AQ on mathematical creative thinking abilities. Students with high interest in learning tend to have high AQ and better creative thinking abilities.

These studies provide a comprehensive picture of the role of AQ in mathematics learning and the various factors that influence it. However, it should be noted that the majority of research focuses on secondary school students, so expanding the research to other levels of education could provide greater insight. In addition, some studies only involve a small number of participants, so replication with larger samples is needed to strengthen the validity of the findings.

2) Thematic Analysis Results

A thematic analysis of eleven articles exploring the Adversity Quotient (AQ) in mathematics learning reveals several key themes:

a) AQ as a Predictor of Problem-Solving Ability: Students with high AQ, characterized by resilience, self-regulation, and perseverance, consistently demonstrate superior problem-solving skills. They are more tenacious, employ effective strategies, and adapt readily to mathematical challenges. This aligns with existing research, such as the study by Kartikaningtyas et al. (2018), which emphasizes AQ's critical role in academic achievement and problem-solving across disciplines.

b) AQ and Mathematical Reasoning: High AQ is not solely linked to problem-solving but extends to enhanced mathematical reasoning. These students grasp concepts more deeply, connect ideas, and apply knowledge across diverse scenarios. Strong reasoning underpins comprehensive mathematical understanding and the cultivation of higher-order thinking skills, as evidenced in the research by Suryaningrum et al. (2019).

c) Increasing AQ through Innovative Learning Models: Student-centered and innovative approaches, including brain-based learning (BBL), problem-based learning, and realistic learning, have the potential to elevate AQ. By fostering active engagement, self-directed learning, and critical/creative thinking, these models empower students. Positive experiences and active participation nurture self-confidence and resilience, key components of AQ. This is supported by studies like Rahayu & Istiani (2019) and Amir et al. (2021).

d) Relationship between AQ, Interest in Learning, and Creativity: AQ is closely intertwined with students' interest in mathematics and their creative capacity. High-AQ students exhibit heightened interest, translating to greater motivation and active learning. Additionally, AQ correlates with creative thinking, enabling the generation of novel ideas and unique solutions to mathematical problems. Both interest and creativity are fundamental for meaningful and in-depth mathematical exploration. The research by Safitri et al. (2018) and Dina et al. (2018) provides empirical evidence for this relationship.

3) Evaluation of Research Quality

The eleven articles encompass various methodologies:

a) Quantitative Research (Kartikaningtyas et al., 2018): Typically employs experimental or survey designs, enabling objective data collection and statistical analysis. However, it may not fully capture AQ's complexity and the learning context.

b) Qualitative Research (Suryaningrum et al., 2019; Safitri et al., 2018; Dina et al., 2018): Utilizes interviews, observations, and document analysis to delve into students' experiences and perspectives. While offering deep insights, generalizability may be limited.

c) Quasi-Experimental Research (Rahayu & Istiani, 2019; Amir et al., 2021; Sugihatno et al., 2017): Assesses the impact of learning interventions on AQ and math outcomes. While less rigorous than randomized experiments, it provides valuable evidence, albeit with potential limitations in variable control and generalization.

d) Case Studies (Hastuti et al., 2018): Offer in-depth examinations of AQ's influence within specific contexts, revealing complexities and interactions. Generalizability remains a constraint.

e) Mixed-Method Research (Agoestanto & Masitoh, 2021): Combines quantitative and qualitative approaches for a comprehensive understanding, mitigating individual limitations. However, it demands more resources and complexity.

f) Literature Reviews (Juwita et al., 2020): Synthesize existing research to identify gaps and new research questions. Reliant on the quality of reviewed studies, they don't generate primary data.

g) Descriptive Qualitative Research (Purnamasari et al., 2019): Thoroughly describes AQ-related phenomena, revealing context and nuances. Limited in generalizability and causal analysis.

Overall, the methodological quality varies. Quantitative and quasi-experimental studies offer substantial evidence for the efficacy of specific learning models, yet some are limited by small samples. Qualitative research provides rich insights, but findings might not generalize broadly. Mixed-method and case studies offer a wider lens, but are fewer in number.

b. Discussion

Quantitative research by Kartikaningtyas et al. (2018) demonstrated that Brain-Based Learning (BBL) with a contextual approach surpasses direct learning in improving mathematics outcomes. This aligns with constructivist theory, emphasizing active knowledge construction. The contextual approach within BBL facilitates connections between mathematical concepts and real-world experiences, enhancing understanding and retention. While no significant differences were found between AQ types on achievement, this doesn't negate AQ's role. Stoltz (2000) posits that AQ impacts the learning process itself, particularly how students respond to challenges, rather than just outcomes. Thus, AQ may influence motivation, persistence, and learning strategies.

Quasi-experimental research provides empirical evidence for how learning interventions can enhance AQ. The bamboo dancing model (Rahayu & Istiani, 2019) and NHT-RMA (Sugihatno et al., 2017) effectively improved AQ and mathematics outcomes. This aligns with prior research highlighting the positive impact of interventions targeting social-emotional skills like AQ on student learning (Zins et al., 2004). Amir et al. (2021) further demonstrated that metacognitive strategies can boost AQ, consistent with metacognition theory's emphasis on awareness and self-regulation. Students with strong metacognition identify their strengths/weaknesses, plan strategies, and monitor progress, enhancing their AQ. Notably, an interaction was found between strategies and school systems, indicating that the effectiveness of strategies can be context-dependent.

Sugihatno et al.'s (2017) quasi-experimental study revealed the Numbered Head Together (NHT) model with Realistic Mathematics Approach (RMA) outperformed direct learning in improving math outcomes. Significant differences in achievement were also observed across AQ categories, indicating AQ's influence on outcomes. This aligns with research showing higher-AQ students typically achieving better than lower-AQ peers. Interestingly, an interaction between the learning model and AQ category suggests the NHT-RMA model's effectiveness varies based on individual AQ levels. High-AQ students may benefit more due to their ability to leverage collaborative and independent problem-solving opportunities.

Agoestanto & Masitoh's (2021) mixed-method research provides comprehensive evidence on the relationship between AQ, learning interest, and mathematical creative thinking. Integrating quantitative and qualitative approaches, the study found that the Creative Problem

Solving (CPS) model enhanced creative thinking, aligning with constructivist theory. CPS offers opportunities for problem exploration, idea generation, and creative solutions. Additionally, learning interest and AQ significantly influenced creative thinking, with high levels in both correlating with better creative abilities. This demonstrates AQ's impact beyond cognitive abilities, extending to affective aspects like interest and creativity.

Hastuti et al.'s (2018) case study offers qualitative evidence on how high-AQ students navigate math learning across materials and models. High-AQ students displayed adaptability, independent learning, and the ability to overcome challenges. This aligns with Stoltz's (2000) CORE dimensions of AQ (Control, Ownership, Reach, Endurance). High-AQ students exhibit better emotional/action control, responsibility for learning, broader thinking, and resilience. These dimensions contribute to their ability to adapt to diverse learning situations and overcome mathematical challenges.

Juwita et al.'s (2020) literature review synthesizes research on AQ and mathematics learning. The findings underscore AQ's importance in education, particularly for skill-related outcomes, echoing expert opinions like Stoltz (2000) and Sternberg (2005). The review highlights the need for further research to understand AQ development in educational contexts. Future studies could focus on developing and testing effective interventions to enhance AQ and its impact on student learning outcomes and skills.

4. CONCLUSION

Adversity Quotient (AQ) has a significant role in mathematics learning, especially in problem solving, reasoning, flexibility of thinking, as well as students' interest in learning and creativity. Innovative and student-centered learning models can improve AQ and mathematics learning outcomes. However, further research with more robust designs and larger samples is needed to understand the interaction of AQ with other factors in mathematics learning.

BIBLIOGRAPHY

Agoestanto, A., & Masitoh, S. (2021). Mathematical creative thinking ability viewed from students' learning interest and adversity quotient through creative problem-solving learning model. *Journal of Physics: Conference Series, 1918*(4), 042074.

Amir, MZ, Risnawati., Nurdin, E., Azmi, MP, & Andrian, D. (2021). The increasing of mathematics adversity quotient in mathematics cooperative learning through metacognitive. *International Journal of Instruction, 14*(4), 841-856.

Aryani, F., Amin, SM, & Sulaiman, R. (2018). Students' algebraic reasoning in solving mathematical problems with adversity quotient. *Journal of Physics: Conference Series, 947*(1), 1-5.

Darmawan, M., Budiyono, B., & Pratiwi, H. (2019). Mathematics learning achievement of vocational high school students' viewed by adversity quotient. *Journal of Physics: Conference Series, 1157*(4), 1-8.

Dewanto, MD, Budiyono, & Pratiwi, H. (2019). The experiment of TAPPS, TSTS, and DL learning models viewed through adversity quotient in mathematics learning achievement. *IOP Conference Series: Earth and Environmental Science, 243*(1), 1-10.

Dina, NA, Amin, SM, & Masriyah. (2018). Flexibility in mathematics problem solving based on adversity quotient. *Journal of Physics: Conference Series, 947*(1), 1-5.

Hastuti, TD, Sari, DR, & Riyadi. (2018). Student profile with high adversity quotient in mathematics learning. *Journal of Physics: Conference Series, 983*(1), 1-6.

Hidayat, W., & Husnussalam, H. (2019). The adversity quotient and mathematical understanding ability of pre-service mathematics teachers. *Journal of Physics: Conference Series, 1315*(1), 1-5.

Hidayat, W., Noto, MS, & Sariningsih, R. (2019). The influence of adversity quotient on students' mathematical understanding ability. *Journal of Physics: Conference Series, 1157*(3), 1-5.

Juwita, HR, Roemintoyo, & Usodo, B. (2020). The role of adversity quotient in the field of education: A review of the literature on educational development. *International Journal of Educational Methodology, 6*(3), 507-515.

Kartikaningtyas, V., Kusmayadi, TA, & Riyadi. (2018). The effect of brain-based learning with contextual approach viewed from adversity quotient. *IOP Conf. Series: Journal of Physics: Conf. Series, 1022*(1), 1-7.

Ministry of Education, Culture, Research and Technology (Kemdikbudristek). (2023). *Indonesia's ranking in PISA 2022 increases by 5-6 positions compared to 2018*.

Kim, M. K., & Kim, B. (2017). The effects of adversity quotient on academic achievement: The mediating role of academic buoyancy. *Journal of Educational Psychology, 109*(4), 506-517.

Kurniati, E. (2018). The relationship between the Adversity Quotient and Learning Motivation and Mathematics Problem Solving Strategies of High School Students. *Journal of Educational and Developmental Psychology, 6*(2), 87-98.

Leung, DYP, & Zhang, L.F. (2006). The role of grit and hardiness in predicting mathematics achievement among Chinese high school students. *Personality and Individual Differences, 41*(8), 1557-1566.

Luthar, S.S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3), 543-562.

Martin, A. J. (2002). The relationship between teachers' perceptions of student motivation and engagement and teachers' enjoyment of and confidence in teaching. *Asia-Pacific Journal of Teacher Education, 30*(1), 71-84.

Nahrowi, N., Susanto, & Hobri. (2020). The profile of student's creative thinking skills in mathematics problem solving in terms of adversity quotient. *Journal of Physics: Conference Series, 1465*(1), 1-5.

Prihandoko, A. (2016). The Effect of Adversity Quotient on Mathematics Learning Achievement of Middle School Students. *Journal of Mathematics Education, 4*(1), 15-25.

Purnamasari, FE, Sujadi, I., & Slamet, I. (2019). Effect of adversity quotient of junior high school students on reflective thinking process in mathematical problem solving. *Journal of Physics: Conference Series, 1321*(2), 1-5.

Putri, IWS, Trapsilasiwi, D., Hobri, H., Oktavianingtyas, E., Safrida, LN, & Aini, N. (2019). Creative thinking skills with adversity quotient based on lesson study for learning community. *Journal of Physics: Conference Series, 1211*(1), 1-8.

Rahayu, S., & Istiani, A. (2019). Experimentation on bamboo dancing learning model on student's mathematics learning outcomes viewed from adversity quotient (AQ). *Journal of Physics: Conference Series, 1155*(1), 4 – 9.

Reivich, K., & Shatte, A. (2002). *The resilience factor: 7 essential skills for overcoming life's inevitable obstacles*. New York: Broadway Books.

Safitri, AN, Juniati, D., & Masriyah. (2018). Students' relational understanding in quadrilateral problem solving based on adversity quotient. *Journal of Physics: Conf. Series, 947*(1), 012039.

Shin, H., Lee, H., & Lee, H. (2013). The effects of adversity quotient and social support on academic achievement among Korean adolescents. *School Psychology International, 34*(2), 182-198.

Singh, K., & Jha, S. (2008). Adversity quotient and academic achievement of adolescents. *Indian Journal of Psychometry and Education, 39*(2), 145-152.

Stoltz, P. G. (2000). *Adversity Quotient: Turning Obstacles into Opportunities*. New York: Wiley.

Sugihatno, ACMS, Budiyono, & Slamet, I. (2017). Realistic Mathematical Approach through Numbered Head Together Learning Model. *IOP Conf. Series: Journal of Physics: Conf. Series, 895*(1), 012026.

Suryadi, B., & Santoso, TI (2017). Self-efficacy, adversity quotient, and students' achievement in mathematics. *International Educational Studies, 10*(10), 12-19.

Suryaningrum, CW, Purwanto, Subanji, Susanto, H., Ningtyas, YDWK, & Irfan, M. (2020). Semiotic reasoning emerges in constructing properties of a rectangle: A study of adversity quotient. *Journal on Mathematics Education, 11*(1), 95-110.

AUTHOR BIOGRAPHY

Andika Putra. R., M. Pd.

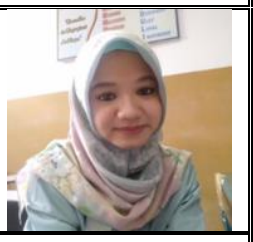
Born in Bukittinggi on February 12, 1991. Lecturer at Tamansiswa University Padang. Bachelor's degree in Mathematics Education from Bung Hatta University, graduated in 2013; Master's degree in Mathematics Education from Malang State University, graduated in 2015 and is currently studying at Indonesia University of Education, enrolled in 2023.

Prof. Dr. Dra. Nurjanah, M.Pd.

Born in Purwakarta on 16 November 1965. Lecturer at Indonesia University of Education. Bachelor's degree in Mathematics Education from IKIP Bandung, graduated in 1989; Master's degree in Mathematics Education from IKIP Malang, graduated in 1996 and Doctoral degree in Mathematics Education from Indonesia University of Education, graduated in 2014.

Prof. Dr. H. Dadang Juandi, M.Si.

Lecturer at Indonesia University of Education



Lucky Heriyanti Jufri, S.Si., M.Pd.

Born in Padang on Agustus 12, 1987. Lecturer at University of PGRI West Sumatra. Bachelor's degree in Mathematics from Indonesia University of Education, graduated in 2010; Master's degree in Mathematics Education from Indonesia University of Education, graduated in 2014 and is currently studying at Indonesia University of Education, enrolled in 2023.