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Relationship Between Adversity Quotient (AQ) and Mathematics Learning Motivation Among Generation Z in Digital Era

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A B S T R A C T

This study aims to analyze the effect of Adversity Quotient (AQ) on mathematics learning motivation among Generation Z in the digital era. The background of this research is based on low student motivation influenced by technological distractions and lack of resilience in learning difficulties. This study used a quantitative approach with simple linear regression analysis. Data were collected through questionnaires distributed to students. The results show that AQ has a positive and significant effect on learning motivation, with a regression coefficient of 0.135 and significance value of 0.003 (<0.05). The R Square value of 0.138 indicates that AQ contributes 13.8% to learning motivation. Therefore, it can be concluded that higher AQ leads to higher mathematics learning motivation.

Penelitian ini bertujuan untuk menganalisis pengaruh Adversity Quotient (AQ) terhadap motivasi belajar matematika pada Generasi Z di era digital. Latar belakang penelitian ini didasarkan pada rendahnya motivasi belajar siswa yang dipengaruhi oleh tingginya distraksi teknologi serta kurangnya ketahanan dalam menghadapi kesulitan belajar. Metode penelitian yang digunakan adalah pendekatan kuantitatif dengan analisis regresi linear sederhana. Data dikumpulkan melalui penyebaran kuesioner kepada siswa sebagai responden. Hasil penelitian menunjukkan bahwa AQ berpengaruh positif dan signifikan terhadap motivasi belajar, dengan nilai koefisien regresi sebesar 0,135 dan signifikansi 0,003 (<0,05). Nilai R Square sebesar 0,138 menunjukkan bahwa AQ memberikan kontribusi sebesar 13,8% terhadap motivasi belajar. Dengan demikian, dapat disimpulkan bahwa semakin tinggi AQ siswa, maka semakin tinggi motivasi belajar matematika.

1. Introduction

The rapid advancement of digital technology has fundamentally transformed the way people learn, interact, and process information, particularly among Generation Z, who were born and raised in a fast-paced, fully connected digital environment [1] [2]. Generation Z is widely understood as a generation of digital natives who are highly familiar with technological devices, the internet, social media, and instant, visually driven, multimedia-based access to information [3]. These characteristics have shaped a learning style that tends to be practical, fast, and interactive, but at the same time they bring challenges such as low learning endurance, declining focus, and a tendency toward easy distraction [4]. In the context of education, learning in the digital era demands not only technological proficiency but also the psychological readiness of students to face academic pressure, cognitive demands, and an increasingly complex learning system [5]. Generation Z faces heavy academic workloads, competition for achievement, and the expectation to remain constantly adaptive to developments in digital learning technology [6]. These conditions require the ability to endure and recover from learning difficulties so that students do not easily give up when facing academic obstacles [7].

The development of digital technology has driven major changes in learning practices, particularly for Generation Z, who have been accustomed to living in a digital environment from an early age [8]. Generation Z tends to obtain information quickly through various technological devices; however, this habit also brings challenges such as declining focus and concentration in learning [9]. This challenge becomes even more complex in mathematics learning, which demands abstract thinking skills and a high level of concentration [10]. Mathematics is often labeled a difficult subject, so it requires a strong level of interest and learning motivation for students to be able to follow the learning process continuously [11]. Several studies have shown that learning

motivation plays an important role in increasing students' engagement, persistence, and success in understanding mathematical concepts [4].

Students with low learning motivation generally display behaviors such as failing to complete assignments, lacking internal drive, showing low enthusiasm in learning, being less interested in solving problems, and lacking clear learning goals [12]. Learning motivation does not arise automatically; rather, it is influenced by various internal factors, one of which is an individual's ability to face academic challenges. Self-evaluation, as an internal factor, has been shown to contribute to increased student learning motivation [13] [14] [15]. Students who are able to manage academic problems effectively tend to have more consistent learning motivation. This ability is known as Adversity Quotient (AQ), which is an individual's capacity to endure, adapt, and recover when facing difficulties [16].

An individual's skill in facing difficulty is known as the concept of Adversity Quotient (AQ), that is, a person's intelligence in responding to, managing, and overcoming the challenges or difficulties they face [17]. AQ comprises four important aspects control, origin and ownership, reach, and endurance which reflect the extent to which an individual is able to control a problem, understand its source, limit its impact, and withstand pressure [18]. In the field of education, AQ plays an important role in shaping learning persistence, a never-give-up attitude, and students' ability to keep trying despite experiencing failure [19]. Generation Z refers to individuals born between 1997 and 2012 who grew up alongside the rapid advancement of digital technology, particularly following the invention of computers and the internet, which transformed world civilization. This generation is known as the internet generation or digital natives because, since childhood, they have been accustomed to using technological devices, social media, and fast, extensive access to information [20] [21]. These challenges become even more complex in mathematics learning, which demands abstract thinking, logical reasoning, problem-solving, and a high level of concentration [16]. Mathematics has always been labeled a difficult and intimidating subject, which has the potential to reduce students' interest and motivation to learn [22]. For Generation Z, a digital environment full of distractions can worsen their already low persistence and focus in studying mathematics in depth [22].

The urgency of this research lies in the growing challenges of mathematics learning in the digital era, particularly for Generation Z students, who face demands for abstract thinking, academic pressure, and technological distractions that have the potential to reduce concentration and learning motivation. Low motivation to learn mathematics directly affects students' persistence, engagement, and success in grasping complex mathematical concepts [23] [24] [25]. An in-depth study is needed on the internal factors that can strengthen students' learning motivation, one of which is Adversity Quotient (AQ), defined as an individual's capacity to endure, adapt, and recover from learning difficulties. Research on the role of AQ is important because it not only contributes to strengthening motivation to learn mathematics but is also relevant to the characteristics of Generation Z, who are expected to possess resilience, academic endurance, and readiness to face the dynamics of technology-based learning [26].

Although various studies have examined mathematics learning motivation and the characteristics of Generation Z in the digital era, there remains a research gap regarding the specific role of Adversity Quotient (AQ) in relation to mathematics learning motivation within this generation [17]. Most studies have focused more on the use of digital technology, innovative teaching methods, or external factors such as the learning environment and instructional media in increasing motivation to learn mathematics [27]. Studies that highlight students' internal aspects particularly their ability to face difficulties, pressure, and challenges in learning mathematics through the concept of AQ remain relatively limited. In fact, the characteristics of Generation Z, who live in a digital era with rapid access to information and high levels of technological distraction, have the potential to influence their learning resilience and academic motivation.

The importance of the role of Adversity Quotient (AQ) in mathematics learning has received increasing attention in various educational studies. AQ contributes to students' mental resilience in facing academic pressure, which in turn has an impact on increasing motivation to learn mathematics [28]. Students with high AQ tend to be able to face learning difficulties with a positive attitude, are not easily discouraged, and have the ability to bounce back when experiencing failure in the learning process. This condition is important in mathematics learning because the subject is often considered difficult and requires concentration, accuracy, and

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a high level of logical thinking. With good AQ, students can manage academic pressure more effectively, allowing them to maintain their enthusiasm for learning and achieve their academic goals.

These findings align with previous research confirming that AQ is a psychological factor that helps students keep trying despite experiencing difficulty in understanding abstract and complex mathematical material. Students with a high level of AQ are able to view learning obstacles as challenges to be overcome rather than reasons to stop learning [17]. This shapes students to be more consistent in the learning process and more active in seeking solutions when facing difficult mathematics problems. Conversely, students with low AQ tend to give up more easily, lose interest in learning, and lack confidence in completing mathematics assignments. The relationship between AQ and learning motivation is further reinforced by previous research showing that students with high AQ tend to have strong intrinsic drive in completing academic tasks [18]. This intrinsic drive is reflected in a willingness to learn that arises from within the student, without depending on external pressure or coercion. Students with high AQ will keep trying to complete tasks despite facing various obstacles, such as limited time, difficulty understanding material, or other academic pressures. In the context of mathematics learning, this ability is very important because the process of mathematical problem-solving requires persistence, patience, and systematic thinking.

In the context of mathematical problem-solving, AQ influences students' persistence, which in turn plays a positive role in learning motivation. Persistence is one of the main aspects that determines students' success in understanding mathematical concepts. Persistent students tend to practice solving problems more often, try various solution strategies, and do not easily give up when the answers obtained are not yet correct. This persistence is closely related to AQ, because students who are able to control themselves and withstand pressure are better prepared to face academic challenges. Thus, AQ functions not only as the ability to endure difficulties but also as a factor that drives students to keep learning and developing.

Beyond that, AQ also plays a role in helping students manage the academic stress that arises during the process of learning mathematics. Pressure to achieve high grades, the demand to understand complex material, and academic competition often cause students to experience anxiety in learning mathematics. Students with high AQ tend to be able to control their emotions and remain focused on solving problems, so that their level of learning anxiety can be minimized. This ability shapes students to remain confident when facing exams, assignments, or other learning activities. With a more stable psychological condition, students' learning motivation increases because they feel capable of facing the academic challenges before them.

AQ is an important indicator of students' ability to manage academic stress and maintain learning motivation amid the complexity of curriculum demands. AQ is also regarded as an important character trait for Generation Z in facing educational challenges in the digital era [29]. The higher a student's AQ, the greater their motivation to study mathematics, especially when facing high-difficulty problems [19]. There is a positive relationship among AQ, learning motivation, and mathematics learning outcomes among secondary school students [17]. Various theses and scientific articles published between 2020 and 2025 consistently show a strong relationship among AQ, learning motivation, and mathematics achievement across various levels of education. In technology-based mathematics learning as well as in problem-based learning approaches, AQ plays an important role in supporting learning success by strengthening students' learning motivation [18]. Adversity Quotient (AQ), as an individual's capacity to endure, adapt, and recover from academic challenges, is considered to play an important role in maintaining and increasing motivation to learn mathematics among Generation Z students [17].

AQ is not only related to students' capacity to face learning difficulties but also reflects an individual's ability to control their emotions, sustain their enthusiasm for learning, and remain optimistic when facing academic pressure [30]. In mathematics learning, this ability is highly necessary because mathematics is a subject that requires a high level of concentration, logical thinking skills, and persistence in solving complex problems. Students with high AQ tend to be better able to overcome fear of failure, possess strong determination, and are not easily discouraged when working on difficult problems.

In the digital era, the importance of AQ becomes increasingly evident because Generation Z lives in an environment filled with technological advancement and an extremely rapid flow of information. While technological progress certainly makes it easier to obtain information and supports the learning process, it also

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presents various distractions that can reduce students' focus and motivation to learn. Social media, digital entertainment, and excessive gadget use often cause students to lose concentration in learning mathematics more easily. This condition means students need strong self-control and mental resilience in order to maintain their learning motivation amid the various digital challenges they face. For this reason, AQ is one of the key internal aspects that helps Generation Z students remain disciplined, focused, and consistent in learning mathematics. Research examining the relationship between Adversity Quotient (AQ) and mathematics learning motivation among Generation Z in the digital era is therefore both relevant and important to conduct, in order to obtain empirical understanding that can serve as a basis for developing more effective learning strategies oriented toward strengthening students' character and learning resilience.

This research is important because most previous studies have focused more on the use of learning technology, innovative teaching methods, and other external factors in increasing motivation to learn mathematics. Meanwhile, research that specifically examines students' internal factors particularly their ability to endure academic difficulties through the concept of AQ remains relatively limited [31]. Yet internal factors have a significant impact on students' success in sustaining their learning motivation over time. In addition, research on AQ is also important because motivation to learn mathematics among Generation Z tends to face more complex challenges compared to previous generations. Generation Z is characterized by a preference for fast, practical, visual, and interactive learning processes. However, these same characteristics also make students more prone to boredom, less patient in going through lengthy thinking processes, and more inclined to avoid learning difficulties that require greater effort. In mathematics learning, this condition can lead to low persistence and interest among students if it is not balanced by the ability to face challenges in a positive way. AQ functions as an ability that helps students maintain their enthusiasm for learning despite facing academic pressure and difficulty in understanding material.

Research on the relationship between AQ and mathematics learning motivation also makes an important contribution to the development of education, particularly in designing learning strategies that focus not only on cognitive factors but also on students' psychological aspects and character. Teachers need to understand that success in learning mathematics is determined not only by intellectual intelligence but also by students' capacity to manage pressure, control their emotions, and sustain motivation when facing learning difficulties. By understanding the importance of AQ, educators can design learning approaches that better support students' mental strengthening, such as problem-based learning, the gradual introduction of learning challenges, and the reinforcement of motivation and self-confidence.

The urgency of this research lies in the increasingly complex challenges of mathematics learning in the digital era, particularly for Generation Z students, who face demands for abstract thinking, academic pressure, and high levels of technological distraction [32]. These conditions have the potential to reduce students' concentration, learning motivation, and persistence in grasping mathematical ideas that are consistently complex [31 [33] [34] [35]. A lack of learning motivation results in diminished engagement and success during the learning process. A study is needed that highlights the internal factors contributing to the maintenance of learning motivation, one of which is Adversity Quotient (AQ) an individual's capacity to endure, adapt, and recover when facing academic difficulties [36]. Various studies show that AQ contributes to students' mental resilience and learning motivation, particularly when dealing with mathematical material that demands high-level problem-solving. In the context of education in the digital era, AQ is an important character trait for Generation Z in managing academic stress, maintaining consistent learning motivation, and improving the quality of learning outcomes. Based on the discussion above, this research considers it important to analyze the relationship between Adversity Quotient (AQ) and mathematics learning motivation among Generation Z students in order to obtain empirical understanding that can serve as a foundation for developing more effective learning strategies oriented toward strengthening students' character [19] [37] [38].

Various studies show that learning motivation plays an important role in increasing students' engagement, persistence, and success in understanding mathematical concepts [14] [19] [37] [39]. Learning motivation encourages students to keep persevering in the face of difficulty, to work harder, and to develop a positive attitude toward learning [37]. Students with high AQ tend to have stronger learning motivation because they are able to manage pressure, are not easily discouraged, and view difficulty as a challenge for growth rather

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than an obstacle [22]. Therefore, this research aims to analyze the relationship between Adversity Quotient (AQ) and mathematics learning motivation among Generation Z in the digital era. Several studies show a positive correlation between AQ levels and mathematics learning outcomes. Adversity Quotient is an individual's ability to face challenges, overcome difficulties, and recover from failure. Meanwhile, mathematics learning outcomes reflect students' achievement in understanding and applying mathematical concepts.

2. Research Methods

This study employed a quantitative approach using a correlational research design. The quantitative approach was chosen because this study aims to measure and analyze the relationship between variables statistically, based on numerical data obtained from respondents. The correlational research design was used to understand the degree of relationship between the Adversity Quotient (AQ) variable and mathematics learning motivation among Generation Z in the digital era, without presenting treatment or manipulation of the variables under study [40].

The population in this study consisted of 154 Generation Z students who were taking mathematics courses at MA Muhammadiyah 2 Cipondoh. This population was selected because its characteristics are relevant to the research objectives, namely students within the Generation Z age range who are actively engaged in mathematics learning within a formal education setting. The sampling technique used was probability sampling, with the simple random sampling method, in which every member of the population had an equal chance of being selected as a research sample [41]. This technique was used to reduce sample selection bias and increase the representativeness of the population.

The random selection of respondents was carried out through the following four systematic stages:

Stage 1: Preparation of the Sampling Frame. The researcher compiled a list of names of the entire population (154 Generation Z students actively studying mathematics). Each student was assigned a unique sequential number ranging from 001 to 154. This list of numbers and names served as the sample control record.

Stage 2: Preparation of the Randomization Instrument (Lottery Rolls). The researcher wrote the sequential numbers 001 through 154 on small pieces of paper of identical size and color to avoid visual bias. These pieces of paper were then tightly rolled so that the numbers inside were not visible from the outside, and all of them were placed into a single transparent glass container.

Stage 3: Shuffling and Random Drawing Process. The container holding the 154 paper rolls was shaken thoroughly so that all the papers were randomly distributed. The sampling process was carried out without replacement. The researcher, or a representative, drew the paper rolls one at a time from the container, reshaking the container after each draw. This process was repeated continuously until the minimum sample quota was met (for example, 61 rolls for a 10% margin of error).

Stage 4: Identification and Determination of Respondents. The sequential numbers drawn from the lottery container were matched against the sampling frame prepared at the outset. Students whose sequential numbers were drawn in the lottery were officially designated as research respondents, who were then given the Adversity Quotient (AQ) and mathematics learning motivation questionnaires.

The sample size was determined using the Slovin formula, as follows:

$$n = N / (1 + N \cdot e^2) \qquad (1)$$

Where: n = sample size N = population size e = error tolerance

Based on this calculation, the final result was n = 60.63, rounded up to 61.

The following are several key academic reasons why the Slovin formula is widely used in probability sampling methods (particularly simple random sampling):

1. Requires Only Population Size (N) Information. In many studies, researchers do not have access to advanced statistical data such as standard deviation, variance, or population distribution proportions. The Slovin formula offers the most practical solution, since only the known total population size (finite population) is needed to calculate the number of respondents.

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2. Flexibility in Determining the Level of Accuracy. The Slovin formula includes a margin of error (e) component that can be determined by the researcher according to the desired level of precision for the study. A value of e = 10% (0.10) produces a smaller sample, typically chosen when time and budget constraints are the main limiting factors.
3. Ensures Data Fairness (Representativeness). For random sampling techniques to work properly, the sample size must not be too small. The Slovin formula ensures that the resulting sample size meets the minimum threshold required to validly represent the general characteristics of the population.

Data analysis in this study was carried out through several stages. Data were collected using a closed-ended questionnaire based on a five-point Likert scale, consisting of an Adversity Quotient (AQ) questionnaire and a mathematics learning motivation questionnaire. Before hypothesis testing, prerequisite analysis tests were conducted, including tests of normality and linearity. Once these prerequisites were met, the data were analyzed using the Pearson Product Moment correlation test to examine the relationship between Adversity Quotient (AQ) and mathematics learning motivation. All stages of data analysis were carried out using SPSS statistical software.

In this quantitative correlational study, the minimum sample size from a population of 154 students was determined using the Slovin formula. The use of this formula was grounded in several theoretical foundations of research methodology, as follows:

1. Certainty of Population Size (Finite Population). According to basic statistical concepts, the Slovin formula is specifically designed for populations whose total number of members is known with certainty (finite population). States that the Slovin formula is a practical tool in quantitative research for determining a sample size considered capable of representing the entire measured population [41].
2. Population Homogeneity Criteria. Theoretically, the Slovin formula requires an assumption of homogeneity, in which the variance or characteristics among population members are considered equivalent, without extreme differences. In this study, the population was considered homogeneous because all subjects shared the same group identity: they were within the same age range (Generation Z), pursued an equivalent level of formal education (high school students), and followed a mathematics learning system within a similar digital ecosystem at the same school. When population characteristics tend to be uniform, data variability is low, allowing the sample size to be determined based primarily on population size (N) and the acceptable margin of error (e), without the need for an in-depth calculation of population variance.
3. Alignment with Simple Random Sampling. The Slovin formula has a close mathematical relationship with probability sampling techniques, particularly simple random sampling. The basic assumption of the Slovin formula requires that every member of the population have an equal and independent probability of being selected as a sample. Through pure randomization using the lottery method, selection bias can be minimized.
4. Control of Margin of Error and Data Precision. The theoretical basis of the Slovin formula rests on the concept of an acceptable margin of error determined by the researcher. Drawing on social research methodology theory, the level of precision is measured based on the confidence level. With a 10% margin of error (e = 0.10), statistical theory allows for a more efficient sample size, accommodating practical field limitations while maintaining a 90% confidence level.

Adversity Quotient (AQ) in this study was measured based on Stoltz's CORE theory, which comprises four aspects: Control, Origin & Ownership, Reach, and Endurance. The AQ instrument was designed to assess students' capacity to face, manage, and endure difficulties in learning mathematics. Each statement item was developed based on indicators that proportionally represent the four dimensions of AQ. The blueprint of the Adversity Quotient (AQ) instrument is presented below:

Table 1. Blueprint of the Adversity Quotient (AQ) Instrument

No	Indicator	Number of Items
1	Self-control (Control)	6
2	Awareness of cause and responsibility (Origin & Ownership)	6

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3	Limiting the impact of difficulty (Reach)	6
4	Endurance and persistence (Endurance)	7
Total		**25**

The mathematics learning motivation instrument was designed to measure students' level of internal and external drive in participating in mathematics learning. The instrument was developed based on a review of learning motivation theory, which includes the dimensions of learning interest, external drive, learning persistence, and goal orientation. The instrument's blueprint was constructed systematically so that each indicator of learning motivation would be represented in a balanced way and relevant to student characteristics. The blueprint of the Mathematics Learning Motivation instrument is presented below:

Table 2. Blueprint of the Mathematics Learning Motivation Instrument

No	Indicator	Number of Items
1	Interest and enjoyment of learning	6
2	External drive	5
3	Learning persistence	6
4	Learning goal orientation	8
Total		**25**

Source: researcher's data processing, (2026)

The research instrument used a closed-ended questionnaire with a five-point Likert scale: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA). The five-point Likert scale was chosen because it allows for a sufficiently wide range of responses, enabling respondents to express their level of agreement more precisely. This scale also facilitates quantitative data processing and improves the reliability of the measurement of student attitudes and perceptions. Positive statements were scored from 1 to 5, from SD to SA, while negative statements were scored in reverse, from 5 to 1. This scoring technique was intended to maintain the consistency of score meaning and avoid response bias.

3. Results and Discussion

Based on the results of the study conducted on 61 Generation Z student respondents at MA Muhammadiyah 2 Cipondoh, data were obtained regarding the levels of Adversity Quotient (AQ) and mathematics learning motivation. The descriptive analysis results show that most students had AQ levels in the moderate to high category. This indicates that students were relatively able to control themselves, understand the source of difficulties, limit the impact of problems, and demonstrate endurance in facing the challenges of learning mathematics. Meanwhile, students' mathematics learning motivation was also in the moderate category, as indicated by the presence of learning interest, persistence in completing tasks, and a reasonably good orientation toward learning goals although some students still showed low motivation due to digital technology distractions.

Before hypothesis testing was conducted, prerequisite analysis tests were carried out first. The normality test results showed that the data for both variables were normally distributed, while the linearity test showed that the relationship between Adversity Quotient (AQ) and mathematics learning motivation was linear. With both prerequisites met, the analysis proceeded using the Pearson Product Moment correlation test. The test results revealed a positive relationship between Adversity Quotient (AQ) and mathematics learning motivation. This means that the greater a student's ability to face and manage difficulty (AQ), the greater their motivation to learn mathematics. The SPSS output is presented below:

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Table 3. Regression Analysis Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.372[a]	.138	.124	4.206

a. Predictors: (Constant), AQ
Source: Researcher's data processing, (2026)

The normality test in this study was conducted using the One-Sample Kolmogorov-Smirnov method to determine whether the data distribution of both variables was normal. The test was conducted at a significance level of $\alpha = 0.05$, with the criterion that if the Asymp. Sig. (2-tailed) value > 0.05, the data are normally distributed. The normality test results are presented in Table 2 below:

Table 4. One-Sample Kolmogorov-Smirnov Normality Test

Research Variable	Z Test Statistic	Significance (P-Value)	Description
Adversity Quotient (AQ)	0.134	0.201	Normally Distributed
Mathematics Learning Motivation	0.112	0.240	Normally Distributed

Source: Researcher's data processing, (2026)

Interpretation of Normality Test Results: Based on the output in Table 4 the Kolmogorov-Smirnov test statistic for the Adversity Quotient (AQ) variable was 0.134, with a significance value (p-value) of 0.201. Meanwhile, for the Mathematics Learning Motivation variable, the test statistic was 0.112, with a significance value (p-value) of 0.240. Since the significance values for both variables were greater than the established error threshold (0.201 > 0.05 and 0.240 > 0.05), it can be concluded that the data for both the Adversity Quotient (AQ) and Mathematics Learning Motivation variables in this study are normally distributed.

The linearity test aimed to determine whether the relationship between the Adversity Quotient (AQ) and Mathematics Learning Motivation variables was linear. The test was conducted using the Test for Linearity at a significance level of 0.05. The criterion applied was that if the Significance value for Linearity < 0.05 and the Significance value for Deviation from Linearity > 0.05, then the relationship between the variables is considered linear. The linearity test results are presented in Table 5 below:

Table 5. Linearity Test Between Variables

Test Function	F Statistic	Significance (P-Value)	Description
Linearity	28.412	0.000	Linear
Deviation from Linearity	1.015	0.381	Linear

Source: Researcher's data processing, (2026)

Interpretation of Linearity Test Results: Based on the linearity analysis results in Table 5, the F statistic for Linearity was 28.412, with a significance value (p-value) of 0.000. Since this significance value is less than 0.05 (0.000 < 0.05), this confirms a significant linear relationship between the variables. Furthermore, the Deviation from Linearity test showed an F statistic of 1.105, with a significance value (p-value) of 0.381. Since this significance value is greater than 0.05 (0.381 > 0.05), it can be concluded that the relationship between Adversity Quotient (AQ) and mathematics learning motivation among Generation Z students is linear.

Referring to the results of the simple linear regression analysis presented in the Model Summary and Coefficients tables, the relationship between the Adversity Quotient variable and mathematics learning motivation can be determined. In the Model Summary table, the correlation coefficient (R) was 0.372, indicating

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that the relationship between Adversity Quotient (AQ) and mathematics learning motivation falls into the moderate category. This value indicates a positive relationship between the two variables, meaning that the higher a student's level of AQ, the higher their motivation to learn mathematics tends to be. Conversely, when a student's AQ level is low, their motivation to learn mathematics also tends to be low. This positive relationship indicates that students' ability to face learning difficulties is related to their enthusiasm and drive to engage in the mathematics learning process.

The R Square value of 0.138 indicates that the Adversity Quotient (AQ) variable contributes 13.8% to the variation in students' mathematics learning motivation. This means that AQ plays a role in influencing students' level of learning motivation, although its contribution is not particularly large. On the other hand, the remaining 86.2% is influenced by other factors outside the research model that were not examined in this study. These factors may include the family environment, teachers' instructional methods, social support, use of digital learning media, students' psychological condition, learning interest, level of mathematics anxiety, and students' peer environment. This indicates that mathematics learning motivation is a variable influenced by a complex combination of internal and external factors.

In addition, the Adjusted R Square value of 0.124 indicates that after adjusting for the number of variables and the sample size, the model's ability to explain the dependent variable mathematics learning motivation stands at 12.4%. This value suggests that the research model remains adequate for explaining the relationship between AQ and learning motivation, although other, more dominant variables likely also influence students' learning motivation. The Adjusted R Square value, which is not far from the R Square value, also indicates that the regression model used is fairly stable and does not show a substantial difference after statistical adjustment.

The analysis results also produced a Std. Error of the Estimate value of 4.206. This value indicates the standard error level of the regression model used to estimate mathematics learning motivation based on the AQ variable. The smaller the Std. Error of the Estimate value, the better the model's ability to estimate the dependent variable. This value shows that the regression model has a relatively acceptable error level for social and educational research, meaning the study's results can still be used as a basis for explaining the relationship between AQ and mathematics learning motivation.

The results of this study show that AQ plays a fairly significant role in shaping the mathematics learning motivation of Generation Z students in the digital era. Students with high AQ tend to be able to withstand academic pressure, are not easily discouraged when experiencing difficulty understanding mathematical material, and continue to be driven to complete tasks and achieve their learning goals. This condition makes students more active, more persistent, and more consistent in engaging with mathematics learning. Conversely, students with low AQ tend to become discouraged more easily, lose motivation, and lack confidence when working on difficult mathematics problems.

In the context of learning in the digital era, these results become increasingly relevant, as Generation Z lives in an environment full of technological and informational distractions. The presence of social media, digital entertainment, and excessive gadget use often reduces students' focus on learning [31]. The ability to endure and exercise self-control, as reflected in AQ, is an important factor in maintaining mathematics learning motivation. AQ helps students remain focused, disciplined, and able to withstand the various academic pressures that arise throughout the learning process. Therefore, the results of this simple linear regression analysis show that Adversity Quotient (AQ) has a positive relationship with, and makes a significant contribution to, students' mathematics learning motivation. Although its contribution of 13.8% falls into the moderate category, these results nevertheless confirm that AQ is one of the key internal aspects that can help increase mathematics learning motivation among Generation Z students. Therefore, the development of AQ deserves attention in the field of education as an effort to improve the quality of learning and shape students who are resilient in facing academic challenges in the digital era.

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Table 6. Results of the Partial Test (t-test)

Coefficients[a]

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	69.667	3.618		19.257	0.000
AQ	0.135	0.044	0.372	3.076	0.003

a. Dependent Variable: MB (Learning Motivation)
Source: Researcher's data processing, (2026)

In the Coefficients table, the constant value obtained was 69.667, which means that when the Adversity Quotient (AQ) variable is zero or shows no increase, students' mathematics learning motivation score stands at 69.667. This constant value indicates that students still possess a baseline level of mathematics learning motivation even without the influence of AQ, since learning motivation is also affected by various other factors outside this study, such as the learning environment, teaching methods, family support, learning interest, and students' psychological condition. Nevertheless, AQ still makes a meaningful contribution to increasing students' learning motivation in the process of learning mathematics. The AQ regression coefficient of 0.135 indicates that each one-unit increase in AQ raises mathematics learning motivation by 0.135 units. This positive coefficient value indicates a positive relationship between AQ and mathematics learning motivation. This means that the higher a student's ability to face difficulty, manage academic pressure, and persevere through the learning process, the higher their mathematics learning motivation. Conversely, when a student's AQ is low, their mathematics learning motivation also tends to decline. This positive relationship indicates that AQ is one of the important internal factors influencing students' enthusiasm for learning in the face of academic challenges.

The calculated t-value of 3.076, with a significance level of 0.003 (< 0.05), indicates that AQ has a positive and significant effect on mathematics learning motivation. Since the significance value is smaller than 0.05, the research hypothesis is accepted, confirming that the relationship between AQ and mathematics learning motivation is statistically significant. Thus, AQ is not only theoretically related to learning motivation but has also been empirically shown to influence the mathematics learning motivation of Generation Z students. These results indicate that students' ability to face pressure and learning difficulties plays a real role in increasing their enthusiasm and persistence in learning mathematics. Furthermore, the Standardized Coefficients Beta value of 0.372 reinforces the finding that AQ makes a meaningful contribution to students' learning motivation. This Beta value indicates that AQ has a moderate level of influence on mathematics learning motivation. Although its contribution is not particularly large, these results still show that AQ is an important psychological factor that deserves attention in the learning process. The better a student's ability to manage difficulty and academic pressure, the stronger their internal drive to keep learning and achieve their academic goals.

It can therefore be concluded that the higher a student's Adversity Quotient, the higher their mathematics learning motivation. Students with high AQ tend to have greater determination, are not easily discouraged, and remain more optimistic when facing difficulty in understanding mathematical material. They are able to view difficulties as challenges to be overcome rather than obstacles leading to failure. This attitude makes students more active in the learning process, more persistent in completing tasks, and more confident when facing complex mathematics problems. This finding is consistent with theory stating that Adversity Quotient (AQ) is an internal factor that plays an important role in shaping an individual's resilience in facing academic pressure. AQ helps students remain emotionally stable when facing learning difficulties. In mathematics learning, students often encounter abstract material, complex formulas, and problem-solving processes that require accuracy and a high level of concentration. These conditions often give rise to fear, anxiety, and even a desire to give up among some students. However, students with high AQ are able to manage this pressure and continue to strive to understand the material being studied. This directly contributes to increased learning motivation, as students hold the belief that difficulties can be overcome through effort and persistence.

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In the context of Generation Z in the digital era, these findings become increasingly relevant. The characteristics of Generation Z, who tend to be easily distracted by technological developments, social media, and digital entertainment, require strong self-control and learning resilience. Excessive technology use often causes students to lose focus and reduces their concentration when learning mathematics. AQ is one of the important factors that helps students remain focused, disciplined, and consistent throughout the learning process. Students with high AQ are able to use technology more wisely while still maintaining their academic responsibilities. In addition, students with high AQ tend to be able to view difficulty as an opportunity for growth. They do not easily avoid difficult tasks; instead, they strive to find appropriate solutions and problem-solving strategies. In mathematics learning, this ability is very important because the problem-solving process requires persistence, patience, and logical thinking skills. When students succeed in overcoming academic challenges, they gain confidence and a sense of learning satisfaction, which in turn sustains their learning motivation over time.

These findings are also supported by various previous studies showing a positive relationship between AQ and learning motivation. AQ contributes to increasing students' persistence, engagement, and success throughout the mathematics learning process. Students with high AQ are generally more active in asking questions, more willing to attempt solving problems, and more consistent in participating in learning activities. Conversely, students with low AQ tend to become discouraged more easily and lose their enthusiasm for learning when facing academic difficulties. AQ is an important psychological aspect that supports success in learning mathematics. Strengthening Adversity Quotient (AQ) deserves attention in the learning process, whether through the implementation of challenging learning strategies, the provision of constructive feedback, or the development of student character oriented toward resilience and determination. Teachers can help improve students' AQ through problem-based learning, cultivating positive thinking habits, providing motivation, and creating a learning environment that supports students in not fearing failure. In addition, teachers also need to provide emotional support so that students feel more confident in facing academic challenges.

Overall, this study shows that Adversity Quotient (AQ) plays a significant role in increasing mathematics learning motivation among Generation Z in the digital era. AQ not only helps students face learning difficulties but also strengthens mental resilience, boosts enthusiasm for learning, and shapes students' character to be resilient and adaptive to change. Therefore, teachers and educators are expected to integrate the development of AQ into the learning process as an effort to improve the quality of mathematics learning and to help shape students who are better able to face the challenges of education in the digital era

4. Conclusion

Based on the research and analysis conducted, it can be concluded that Adversity Quotient (AQ) has a positive and significant effect on mathematics learning motivation among Generation Z in the digital era. This is confirmed by the regression coefficient value of 0.135, a calculated t-value of 3.076 with a significance level of 0.003 (< 0.05), and a coefficient of determination (R Square) of 0.138, indicating that AQ contributes 13.8% to students' mathematics learning motivation. These results indicate that the research hypothesis is accepted, meaning that the higher a student's Adversity Quotient, the higher their mathematics learning motivation.

Adversity Quotient (AQ) plays an important role in shaping students' capacity to endure, adapt, and navigate various difficulties throughout the process of learning mathematics. Students with high AQ tend to have a never-give-up attitude, are able to manage academic pressure, and continue striving to complete tasks despite facing abstract and complex mathematical material. This ability makes students more persistent, more confident, and possess a stronger drive to learn compared to students with low AQ. Thus, AQ is one of the internal factors that supports the development of positive learning motivation.

In the context of Generation Z in the digital era, these findings become increasingly relevant, as this generation's characteristics are closely tied to technological and digital media developments, which can bring both positive and negative effects to the learning process. Easy access to information and heavy social media use often create distractions that affect students' focus and concentration when learning mathematics. For this reason, students' ability to exercise self-control and cope with learning pressure through AQ becomes very important in

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helping them maintain their learning motivation amid the increasingly complex challenges of digital-era learning.

The results of this study also show that although AQ has a significant influence on mathematics learning motivation, 86.2% of the variation in students' learning motivation is explained by other factors outside this study. These factors may include the family environment, teaching methods, teacher support, students' psychological condition, use of learning media, social environment, and developments in digital technology that influence students' learning behavior. Therefore, increasing mathematics learning motivation cannot rely on AQ alone; support from various other educational aspects is also needed.

This study implies that the development of Adversity Quotient should be a priority throughout the process of learning mathematics in schools. Teachers are not only responsible for explaining subject matter but also need to help students build mental resilience, an optimistic attitude, and the ability to face learning difficulties. Strengthening AQ can be achieved through providing appropriate learning challenges, problem-based learning, offering motivation and positive feedback, and cultivating discipline and a sense of responsibility in learning. With strengthened AQ, students are expected to have greater learning motivation and be better prepared to face academic challenges in the digital era.

In summary, this study demonstrates that Adversity Quotient (AQ) is one of the key aspects associated with mathematics learning motivation among Generation Z. AQ not only helps students face academic pressure but also contributes to increasing persistence, enthusiasm for learning, and students' ability to stay focused on achieving their learning goals. Developing AQ within the field of education is an important step toward producing resilient, adaptive learners who are able to compete amid technological development and the dynamics of modern education.

Mathematics is often perceived as an abstract and highly complex subject, so fluctuations in the learning motivation of Generation Z students in the digital era are also influenced by a broader web of internal psychological and external environmental factors, including:

1. Mathematics Anxiety. Many students experience psychological pressure in the form of excessive anxiety or fear when dealing with numbers, formulas, or mathematics exams. A high level of mathematics anxiety can directly erode students' intrinsic motivation, making them more likely to withdraw, procrastinate on tasks, and even actively avoid the learning process.
2. Self-Efficacy. Students' subjective belief in their own ability to complete complex mathematical tasks plays a crucial role. Students with strong self-efficacy tend to view difficult mathematics problems as challenges to be conquered, giving them far stronger motivation and learning persistence than students who underestimate their own academic capacity.
3. Parental Support. Active parental involvement whether through providing learning facilities at home, offering moral guidance, or placing minimal psychological pressure regarding academic achievement has been shown to strengthen children's learning motivation. This support provides a sense of security for Generation Z students, helping them stay focused on learning despite the heavy flow of digital distractions at home.
4. Teacher Support. In the digital era, the role of the mathematics teacher is no longer limited to transferring material but extends to being a supportive facilitator. A teacher's friendly attitude, the use of interactive teaching methods, and a willingness to give personal attention to struggling students create a positive emotional closeness that reduces students' fear and boosts their learning motivation.
5. Classroom Climate. The physical and socio-emotional atmosphere within the classroom shapes students' comfort in learning. A classroom climate that is conducive and cooperative, that values every step of the trial-and-error process in solving problems, and that is free from peer bullying will foster enthusiasm and healthy competitive motivation among students during mathematics learning.
6. Socioeconomic Status. Parents' economic background indirectly affects access to modern learning facilities that support digital-era education, such as fast internet access, adequate devices, and opportunities to attend supplementary tutoring outside of school. The limitations or sufficiency of facilities stemming from socioeconomic status meaningfully influence the level of students' readiness and motivation to learn.

Thus, although Adversity Quotient (AQ) has been shown to have a formal relationship with the mathematics learning motivation of Generation Z students at SMA Muhammadiyah 2 Cipondoh, comprehensive

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efforts to boost that motivation must not overlook the 86.2% spectrum of other interrelated psychological and external environmental factors present in the field.

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