Metacognition and Adversity Quotient as Correlates of Science Achievement among Junior High School Students

Mary Rose T. Sulatra

Northern Iloilo State University, Estancia, Iloilo, Philippines

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ABSTRACT

This study examined metacognition and adversity quotient as correlates of science achievement among junior high school students. Specifically, it determined the levels of science achievement, metacognition, and adversity quotient and investigated the relationships among these variables. A descriptive-correlational research design was employed, and data were collected from junior high school students using standardized instruments that measured metacognitive awareness and adversity quotient. Descriptive and inferential statistical techniques were utilized to analyze the data. The findings revealed that the students demonstrated a proficient level of science achievement, a satisfactorily developed level of metacognition, and an average level of adversity quotient. The results further showed significant positive relationships between science achievement and metacognition, science achievement and adversity quotient, and metacognition and adversity quotient. These findings indicate that students who possess stronger metacognitive awareness and greater ability to cope with challenges tend to perform better in science. Similarly, students with higher adversity quotient tend to exhibit stronger metacognitive skills, suggesting that cognitive and non-cognitive factors are associated with academic performance. The findings suggest that metacognition and adversity quotient are important correlates of science achievement among junior high school students. Educational interventions that promote reflective thinking, strategic learning, perseverance, and adaptive responses to challenges may contribute to improved science achievement and enhanced learning outcomes.

Keywords: metacognition, adversity quotient, science achievement, junior high school students, academic performance

INTRODUCTION

Science achievement is an important indicator of students' understanding of scientific concepts and their ability to apply knowledge in solving real-world problems. As science education continues to play a critical role in preparing learners for an increasingly complex and technology-driven society, improving students' academic performance remains a major concern among educators and researchers. Academic achievement is influenced by various cognitive and non-cognitive factors that shape students' learning experiences and educational outcomes. According to Álvarez-Bueno et al. (2017), academic achievement is associated with several learner-related characteristics and serves as a key measure of educational success. Understanding the factors that contribute to science achievement is therefore essential in developing effective educational interventions and instructional practices.

One factor that has received considerable attention in educational research is metacognition. Originally introduced by Flavell (1979), metacognition refers to an individual's awareness and regulation of cognitive processes. It involves the ability to plan, monitor, and evaluate one's learning activities. Schraw and Dennison (1994) emphasized that metacognitive awareness includes both knowledge of cognition and regulation of cognition, which contribute to effective learning. Similarly, Veenman et al. (2006) argued that metacognitive skills enable learners to select appropriate strategies, monitor progress, and make adjustments when necessary. In science education, metacognition is particularly important because it supports inquiry, problem-solving, and conceptual understanding (Zohar & Barzilai, 2013). Consequently, students who possess stronger metacognitive skills are generally better equipped to manage learning tasks and achieve academic success.

Empirical evidence consistently demonstrates the positive relationship between metacognition and academic achievement. Young and Fry (2008) found that students with higher metacognitive awareness tend to perform better academically. Likewise, Bao et al. (2024), through a systematic review and meta-analysis, concluded that metacognition positively influences academic achievement by promoting effective learning behaviors and self-monitoring processes. Antonio and Prudente (2022) reported that metacognitive instruction significantly improves students' science learning achievement, while Meher et al. (2024) found that metacognitive interventions contribute positively to academic performance. Similarly, Chen et al. (2024) observed that metacognition-driven instruction enhanced students' learning outcomes by encouraging reflective thinking and active engagement in learning activities. These findings suggest that metacognition plays a critical role in supporting academic success and science learning.

Apart from cognitive factors, students' ability to cope with challenges and setbacks may also influence academic performance. Stoltz (2000) introduced the concept of adversity quotient, which refers to an individual's capacity to respond effectively to difficulties and adversity. Students with higher adversity quotient are generally more resilient, persistent, and adaptable when confronted with academic challenges. Research has shown that adversity quotient is associated with positive educational outcomes. Safi'i et al. (2021) found that adversity quotient significantly influences student performance, learning autonomy, and academic achievement. Likewise, Rahmadani et al. (2025) reported that adversity quotient contributes to the development of academic resilience among students, while Wang (2025) found that adversity quotient positively influences achievement motivation and learning behaviors. Rahmawati et al. (2024) further noted that students with stronger adversity quotient are better able to respond adaptively to academic challenges, leading to more favorable educational outcomes.

The relationship between metacognition and adversity quotient suggests that cognitive and non-cognitive factors may work together in influencing academic achievement. Students who effectively monitor and regulate their learning processes are more likely to adapt to challenges and persist in difficult learning situations. Zimmerman (2002) emphasized that successful learners actively regulate their learning and respond constructively to obstacles encountered during the learning process. Similarly, Panadero (2017), Dignath and Büttner (2008), and Theobald (2021) highlighted the importance of strategic learning behaviors, self-regulation, and persistence in promoting academic success. These perspectives suggest that metacognition and adversity quotient may complement one another in supporting students' learning and achievement.

Despite the growing body of literature on metacognition and adversity quotient, studies examining their relationships with science achievement among junior high school students remain limited, particularly within the Philippine educational context. Most studies have investigated these variables independently, leaving a gap in understanding how they relate to one another and to science achievement. Hence, this study examined metacognition and adversity quotient as correlates of science achievement among junior high school students. Specifically, it determined the levels of science achievement, metacognition, and adversity quotient and investigated the relationships among these variables.

METHODOLOGY

This study employed a descriptive-correlational research design to determine the levels of science achievement, metacognition, and adversity quotient among junior high school students and to examine the relationships among these variables. Descriptive research is appropriate for describing the characteristics and conditions of a population, while correlational research is utilized to determine the degree and direction of relationships among variables without manipulating them (Creswell & Creswell, 2018). The participants of the study were 129 junior high school students enrolled at Fisheries Marine High School (ISCOF-Main Campus), consisting of 21 Grade 7 students, 42 Grade 8 students, 37 Grade 9 students, and 29 Grade 10 students. The respondents were selected using proportionate stratified random sampling to ensure adequate representation from each grade level.

Students' science achievement was measured using their final grades in Science obtained from school records. Metacognition was assessed using the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994), while adversity quotient was measured using the Adversity Quotient Profile (AQP) developed by Stoltz (2000). Prior to data collection, the instruments underwent face and content validation to ensure their suitability for the target respondents. Permission to conduct the study was secured from the school authorities,

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after which the questionnaires were personally administered by the researcher. The objectives of the study were explained to the respondents, and the local language was used whenever necessary to facilitate understanding. Completed questionnaires were collected, checked, and prepared for analysis. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. Mean and standard deviation were used to determine the levels of science achievement, metacognition, and adversity quotient, while Pearson Product-Moment Correlation Coefficient (Pearson's r) was employed to determine the relationships among the variables.

RESULTS AND DISCUSSIONS

Level of Science Achievement, Metacognition, and Adversity Quotient

As shown in Table 1, the students attained a proficient level of science achievement (M = 85.94, SD = 5.65). This finding indicates that the respondents generally demonstrated satisfactory mastery of science concepts and competencies. The result suggests that the students possess the knowledge and skills necessary to meet the expected learning standards in science. Academic achievement is widely recognized as an important indicator of educational success and learner development (Álvarez-Bueno et al., 2017). The finding may reflect students' engagement in learning activities, effective classroom instruction, and the development of learning behaviors that support academic performance. Higgins et al. (2023) emphasized that learners who actively engage in the learning process and develop effective learning strategies are more likely to achieve positive academic outcomes.

Table 1 further shows that the students demonstrated a satisfactorily developed level of metacognition (M = 3.13, SD = 1.10). This result indicates that the respondents possess a moderate level of awareness and regulation of their cognitive processes. According to Flavell (1979), metacognition refers to one's awareness and understanding of cognitive processes, while Schraw and Dennison (1994) emphasized that effective learning involves both knowledge and regulation of cognition. The finding suggests that students are generally capable of planning, monitoring, and evaluating their learning activities. This supports the work of Kuhn and Dean (2004), who described metacognitive development as a gradual progression toward more effective cognitive strategies. Similarly, Stanton et al. (2021) noted that students with developed metacognitive skills are better able to monitor their learning progress and make adjustments to improve performance. Recent studies by Bao et al. (2024), Antonio and Prudente (2022), and Meher et al. (2024) likewise reported that metacognition contributes positively to academic achievement through reflective thinking, self-monitoring, and strategic learning behaviors.

In terms of adversity quotient, Table 1 reveals that the students exhibited an average level (M = 3.28, SD = 1.13). This finding suggests that the respondents possess a moderate capacity to cope with challenges, setbacks, and difficulties encountered in academic and everyday situations. According to Stoltz (2000), individuals with an average adversity quotient are generally capable of managing difficulties under normal circumstances but may encounter challenges when confronted with more demanding situations. Nevertheless, they possess the potential to strengthen their resilience through appropriate experiences and support systems. The finding is consistent with the study of Safi'i et al. (2021), which demonstrated that adversity quotient significantly influences students' academic performance and learning behaviors. Similarly, Rahmadani et al. (2025) found that adversity quotient contributes to academic resilience, while Wang (2025) reported that students with higher adversity quotient exhibit stronger motivation and persistence in pursuing academic goals. These findings suggest that resilience and adaptability are important attributes associated with students' academic development and success.

Table 1 Level of Science Achievement, Metacognition, and Adversity Quotient among Junior High School Students

Variable	N	M	SD	Interpretation
Science Achievement	129	85.94	5.65	Proficient
Metacognition	129	3.13	1.10	Satisfactorily Developed
Adversity Quotient	129	3.28	1.13	Average

Note. Science Achievement: 74.99 and below = Beginning; 75.00–79.99 = Developing; 80.00–84.99 = Approaching Proficiency; 85.00–89.99 = Proficient; 90.00 and above = Advanced. Metacognition: 1.00–1.50 = Not Developed; 1.51–2.50 = Slightly Developed; 2.51–3.50 = Satisfactorily Developed; 3.51–4.50 = Strongly Developed; 4.51–5.00 = Excellently Developed. Adversity Quotient: 1.00–1.50 = Low; 1.51–2.50 = Below Average; 2.51–3.50 = Average; 3.51–4.50 = Above Average; 4.51–5.00 = High.

Relationships among Science Achievement, Metacognition, and Adversity Quotient

As shown in Table 2, a significant and strong positive relationship was found between science achievement and metacognition ($r = .848$, $p = .001$). This finding indicates that students with higher levels of metacognitive awareness tend to demonstrate better performance in science. Learners who effectively plan, monitor, and evaluate their learning processes are more likely to understand scientific concepts and perform successfully in academic tasks. The result supports the theoretical perspective of Flavell (1979), who emphasized the importance of awareness and regulation of cognitive processes in learning. Likewise, Schraw and Dennison (1994) explained that metacognitive awareness enables learners to regulate their thinking and learning behaviors effectively. The finding is consistent with the studies of Young and Fry (2008) and Mwangi et al. (2024), which reported positive relationships between metacognition and academic achievement. Similarly, Bao et al. (2024) concluded that metacognition positively influences academic achievement by promoting reflective thinking, self-monitoring, and strategic learning behaviors. Antonio and Prudente (2022) further found that metacognitive instruction significantly improves students' science learning achievement, while Meher et al. (2024) reported that metacognitive interventions contribute positively to students' academic performance. These findings suggest that students who actively regulate their learning processes are more likely to achieve higher levels of science achievement.

The results further revealed a significant and strong positive relationship between science achievement and adversity quotient ($r = .884$, $p = .001$). This finding suggests that students who possess greater resilience and ability to cope with challenges tend to attain higher levels of science achievement. Students with higher adversity quotient are more likely to persevere despite difficulties, maintain motivation, and adapt effectively to demanding learning situations. According to Stoltz (2000), adversity quotient reflects an individual's capacity to withstand and overcome challenges, thereby influencing success in various life domains, including education. The finding supports the study of Safi'i et al. (2021), which demonstrated that adversity quotient significantly influences student performance, learning autonomy, and academic achievement. Likewise, Rahmadani et al. (2025) reported that adversity quotient contributes to academic resilience by enabling students to persist despite obstacles and setbacks. Wang (2025) further found that adversity quotient positively influences achievement motivation and learning behaviors, which contribute to improved academic performance. The result indicates that resilience and persistence are important factors associated with students' success in science learning.

Furthermore, a significant and strong positive relationship was found between metacognition and adversity quotient ($r = .821$, $p = .001$). This finding indicates that students who exhibit stronger metacognitive awareness also tend to possess greater resilience in dealing with academic challenges. Learners who can effectively monitor and regulate their cognitive processes are more likely to identify appropriate strategies when confronted with difficulties, thereby strengthening their ability to cope with adversity. Conversely, resilient learners are more likely to persist in evaluating and improving their learning strategies despite setbacks. This finding is supported by Safi'i et al. (2021), who reported that adversity quotient positively influences learning autonomy and students' academic behaviors. Similarly, Rahmawati et al. (2024) found that adaptive responses to challenges contribute to favorable academic outcomes, while Wang (2025) demonstrated that adversity quotient is associated with motivational and learning processes that support academic success. The finding also supports the perspectives of Zimmerman (2002), Panadero (2017), Dignath and Büttner (2008), and Theobald (2021), who emphasized the importance of self-regulation, strategic learning behaviors, and persistence in achieving academic success. The result suggests that metacognition and adversity quotient function as complementary attributes that enable students to effectively manage both the cognitive and emotional demands of learning.

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Table 2 Relationships among Science Achievement, Metacognition, and Adversity Quotient

Variables	r	p-value	Interpretation
Science Achievement and Metacognition	.848	.001	Significant
Science Achievement and Adversity Quotient	.884	.001	Significant
Metacognition and Adversity Quotient	.821	.001	Significant

Note. Correlation is significant at $p < .05$.

CONCLUSIONS

This study examined metacognition and adversity quotient as correlates of science achievement among junior high school students. The findings revealed that the students demonstrated a proficient level of science achievement, a satisfactorily developed level of metacognition, and an average level of adversity quotient. These results indicate that the respondents possess adequate academic competence in science, moderate awareness and regulation of their learning processes, and a reasonable capacity to cope with challenges and setbacks.

The study further established significant positive relationships among science achievement, metacognition, and adversity quotient. Students with higher levels of metacognitive awareness tended to achieve better performance in science, while those with greater adversity quotient demonstrated higher levels of science achievement. Likewise, students with stronger metacognitive awareness tended to exhibit greater resilience in dealing with academic challenges. These findings suggest that metacognition and adversity quotient are important correlates of science achievement and that both cognitive and non-cognitive factors contribute to students' academic success.

The findings indicate the importance of fostering metacognitive awareness and resilience among junior high school students. Educational programs and instructional practices that develop students' ability to regulate their learning and respond effectively to challenges may contribute to improved science achievement and enhanced learning outcomes.

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