

INFLUENCE OF ATTITUDE AND MOTIVATION TO STUDENTS' ACADEMIC SUCCESS IN SCIENCE EDUCATION AMONG JUNIOR HIGH SCHOOLS IN DAVAO ORIENTAL



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 50

Issue 4

Pages: 454-467

Document ID: 2025PEMJ4874

DOI: 10.70838/pemj.500408

Manuscript Accepted: 11-06-2025

Influence of Attitude and Motivation on Students' Academic Success in Science Education Among Junior High Schools in Davao Oriental

Mary Grace A. Nazareth,* Gina Fe G. Israel
For affiliations and correspondence, see the last page.

Abstract

This study focused on the influence of attitude towards science and science motivation on students' academic success in science education. The primary objective of the study was to determine whether Attitude Towards Science (ATS) and Science Motivation (SM) have a significant influence on students' academic success in science education. Additionally, it aimed to identify the relationship between ATS, SM, and AS and to characterize their levels in terms of their respective indications. A total of 352 students, selected through random sampling, participated in the study, which was conducted at Governor Generoso High School in the Davao Oriental Division. A descriptive survey was used to collect the data, and multiple regression analysis, mean, and Pearson's correlation coefficient (R) were used for analysis. Academic success, science motivation, and attitude toward science all have descriptively high levels. It was found that there was a positive correlation and a substantial association between the indicators of the variables. Academic success is strongly influenced by ATS factors related to scientific self-concept and practical work. Academic success is the only factor significantly influenced by achievement goals, which measure science motivation.

Keywords: *MAED-teaching science, attitude towards science, science motivation, academic success, science education, Philippines*

Introduction

Students' academic success in science education is influenced by their attitude towards learning, their drive to learn, and their career choices. Most students who are not performing well in school or have a poor or declining GPA tend to lack a positive attitude toward science and are not highly motivated (Seçgin & Sungur, 2020). This academic success highlights the development of critical thinking and problem-solving skills, alongside the acquisition of scientific knowledge and abilities, as well as a sustained interest in scientific research (Kim & Lee, 2024). Martinez & Ellis et al. (2023) noted that students with elevated scientific GPAs are regularly linked to enhanced preparedness and interest in advanced coursework, as well as improved performance in post-secondary science education. While academic success is crucial in science education, research suggests that student underachievement in science remains a widespread and persistent issue. Many students, especially those from poor and marginalized populations, routinely score below the competency level on science tests. This raises questions about how well and fairly contemporary science education systems work (OECD, 2019).

Recent studies have demonstrated that students encounter numerous challenges when attempting to succeed in science. Because eighth graders only attained competence at a minimal rate and performed below basic levels, the first digital administration of scientific tests in the United States resulted in a sharp decline in academic attainment. The twelfth graders' basic benchmark tests revealed a notable discrepancy between those who passed and those who failed, with 22% achieving competence and 41% scoring below basic (Sparks, 2021). According to Kang and Yoon's (2022) research, the academic performance of South Korean students has declined due to a decrease in their interest in science. Bursal (2012) found that as students advanced from one grade level to the next, their science achievement results decreased. Mullis et al. (2020) claim that students who meet the lower international benchmark have a limited understanding of scientific facts and principles. The proficiency of Filipino secondary school students in science has yielded erratic outcomes over time.

The Trends in International Mathematics and Science Study (TIMSS) examined eighth-grade Filipino students in the subject areas of life science, physics, chemistry, earth science, and environmental science in 2003, as well as in the cognitive domains of factual knowledge, conceptual understanding, and analytical reasoning. Out of 46 participating countries, the Philippines ranked 42nd. According to the findings, student performance improved from 78% at the low benchmark in 2007 to 85% in 2019, although it still fell short of the global average. Mullis et al.'s eighth-grade students scored 377 points, which was much less than the international average of 474 points (2020). According to the 2018 PISA results, the Philippines scored 357 on the scientific literacy scale, ranking second out of 79 participating countries (DepEd, 2022). According to a 2019 OECD assessment, 15-year-old Filipino students fell short of international norms in describing scientific phenomena, assessing investigations, and interpreting data. The 2023 National Achievement Test results showed that junior high school students continued to fall into the "Low Proficient" group for science (DepEd, 2022), indicating severe weaknesses in conceptual comprehension and scientific knowledge. Because higher grades indicate greater knowledge, academic performance remains a crucial predictor of students' preparedness for graduation and future opportunities, as noted by Areepattamannil et al. (2023).

Furthermore, attitudes toward science are a significant predictor of success in previous studies. Espejon (2022) discovered that students' performance is significantly impacted by their attitudes toward science courses. Similarly, good attitudes improve motivation,

engagement, and self-efficacy, according to Hands and Limniou (2023). According to Yalgin et al. (2023), children who hold more positive opinions about science tend to perform better academically.

Moreover, Teppo et al. (2021) concluded that students who enjoy and love science education are more engaged and motivated, both of which lead to improved academic performance. Wicaksono (2023) further emphasized that attitudes are a crucial affective component that supports the success of scientific learning. According to a correlational study by Mao et al. (2021), a moderate relationship was found between students' views about science and their academic achievement ($r = 0.248$), which aligns with the findings of Liou et al. (2021). The significance of affective components, including interest, attitude, and emotional engagement, in influencing students' success or failure was also emphasized by Wicaksono and Korom (2023).

These findings suggest that learning outcomes can be improved by encouraging favorable attitudes toward science. Academic success has also been found to be significantly predicted by motivation. According to Henriquez et al. (2019), a significant relationship exists between students' performance and motivation, suggesting that driven students are more likely to succeed. While Márquez et al. (2023) observed that motivated students are more engaged, actively participate, seek feedback, and join collaborative study activities, Membiela et al. (2023) defined science motivation as comprising persistence, effort, belief, and emotion in the learning process. According to Alamri and Alkhatani (2023), intrinsically motivated students, that is, those who find learning enjoyable and valuable for themselves, tend to perform better academically.

Despite its significance, there is ample evidence of a decline in motivation among secondary students (Wade, 2023; De Silva et al., 2018). Students' academic performance is adversely affected by this reduction, particularly in STEM disciplines (Areepattamannil et al., 2023). While Almalki (2019) found a substantial association between motivation and GPA ($r = 0.2296$, $p = 0.0019$), Dokme and Benzer (2020) reiterated that motivation is a primary element in determining accomplishment. Similarly, Gbollie and Keamu (2017) claimed that learning strategies and motivation are essential for raising student performance, with motivated students frequently aiming for higher outcomes (Babaylo, 2021). Although extrinsic motivation can also be beneficial, Liu et al. (2022) further demonstrated that intrinsic motivation has a significantly positive impact on academic success; students who are more deeply and internally motivated tend to perform better and employ more effective coping strategies.

Furthermore, similar trends were observed by Çetin (2015), who demonstrated that both intrinsic and extrinsic motivation promote deeper learning and are correlated with GPA. Additionally, Tanghal (2020) found that students' attitudes about science are influenced by their motivation, which in turn affects their performance. The need for more research in the Philippine context is indicated by the inconsistent results, though, as Mirabela-Constanța and Maria-Madela (2011) found an inverse relationship between motivational orientation and achievement, while Garcia and Garcia (2023) reported only a weak relationship.

The Theory of Reasoned Action, which holds that attitudes have a significant influence on action, serves as the foundation for this investigation (Bhojak, Momin, & Joshi, 2025). Even in the face of difficulties, a positive attitude toward learning encourages persistence (Liu et al., 2022). In a similar vein, Smith, Pasero, and McKenna (2014) proposed a connection between students' attitudes about science and their success in it.

Bandura's Social-Cognitive Theory (2001, 2005, 2006), which describes learning as an interplay between behavioral, contextual, and personal factors, lends more credence to the link between motivation and academic success. Students who can self-regulate their learning by controlling their motivation, behavior, and thought processes typically learn more efficiently (Lerkkanen et al., 2023). This study examines how motivation and attitudes about science interact to affect academic success, drawing on these frameworks. According to these views, motivated students are more attentive, collaborate, ask questions, and participate fully in class (Márquez et al., 2023).

The first independent variable, Attitude Toward Science (ATS) (Kind et al., 2007), comprises six components: Science in the Classroom, Science Outside of the Classroom, Science Self-Concept, Science Practical Work, Science Future Participation, and Science Importance. These examples illustrate how students perceive and engage with science. For instance, Science Outside School encompasses informal learning experiences (Rennie, 2014); Future Participation focuses on career aspirations (Kind, 2007); Self-Concept in Science refers to students' confidence in their scientific competence (Purkey, 1988; Jansen et al., 2015); Practical Work involves experimentation (Shana & Abulibdeh, 2020); and Learning Science in School emphasizes critical thinking and problem-solving (Sabanal et al., 2023). Self-efficacy, Active Learning Strategies, Science Learning Value, Performance Goal, Achievement Goal, and Learning Environment Stimulation comprise the second independent variable, Science Motivation, which was taken from Tuan et al. (2005). These illustrate how learners' motivation and engagement are influenced by their beliefs, objectives, and learning environment (Lawson et al., 2007; Newman, 2024; Tuan et al., 2005).

The dependent variable, academic success, is operationalized through students' performance in accordance with DepEd Order No. 31, s. 2020. According to earlier research (Rojas, 2015; Steinberg et al., 2019; Bayat & Salehiniya, 2019; Sabanal et al., 2023), self-reported grades accurately reflect learning outcomes and nearly match real records.

Despite the implementation of several changes aimed at enhancing educational results, Filipino junior high school students still face difficulties in national scientific exams, indicating enduring deficiencies in understanding and application. Few studies have examined how attitudes and motivation interact to predict academic success in the Philippine context, despite numerous investigations into the

factors that influence science achievement.

Thus, this study aims to investigate how motivation and attitudes toward science influence students' academic success, providing theoretical and practical insights that can help teachers develop more effective plans to meet the affective and motivational needs of their students. Ultimately, by providing localized perspectives on how these variables interact to shape science learning outcomes, the researchers hope to contribute to the body of knowledge.

Methodology

Research Design

The study employed descriptive, correlational, and causal-comparative research designs using a quantitative approach. Quantitative research, as noted by Barroga et al. (2023) and Rauteda (2025), provides a structured and controlled analysis of measurable phenomena, allowing for the drawing of precise conclusions.

The descriptive design was used to profile the respondents' demographic characteristics through frequency counts and percentages. The correlational design examined the relationships between attitude toward science, science motivation, and academic success. Finally, multiple regression analysis was applied to determine whether the independent variables (attitude and motivation) significantly predict students' academic success in science education.

According to Brambila-Tapia et al. (2024) correlational analysis is most appropriate when the goal is to explore the extent to which two (or more) variables co-vary without implying causation, while regression analysis is applied when one aims to model or predict a dependent variable from one or more predictors, potentially identifying causal influences (Tuncer, Kazu & Kuvvetli, 2024; UpGrad, 2025).

Respondents

The participants in this study were junior high school students enrolled in selected high schools within Davao Oriental during the 2023–2024 school year. Out of 2,911 students, a total of 352 were chosen as respondents through a random number generator to ensure impartial selection. Among these, 108 students came from Sigaboy Agricultural Vocational High School (66 females and 44 males), 187 were from Tibanban National High School (102 females and 85 males), and 57 were from Maryknoll School of Sigaboy, Inc. (27 females and 30 males).

The respondents were considered capable of comprehending scientific concepts, accurately following procedures, and demonstrating proficiency, flexibility in reasoning, and constructive learning attitudes under the new educational setup. Only officially enrolled students were included, while those not enrolled were excluded from participation.

Instrument

Three validated survey instruments were utilized in this study to measure the variables: Attitude Toward Science, Science Motivation, and Academic Success in Science Education. The instruments underwent both internal and external validation, guided by the researcher's thesis adviser and a panel of experts. Reliability was determined using Cronbach's Alpha, which assessed the internal consistency of each scale. A pilot test was conducted with respondents from a different school prior to final data collection to ensure clarity and reliability.

The first part of the questionnaire assessed the students' attitude towards science, adapted from Kind et al. (2007), with an internal consistency of 0.898. Participants were asked to choose the best response based on their attitudes about science from 35 seven-point Likert items in the survey. On a scale of 1 (strongly disagree) to 5 (strongly agree), respondents indicated their level of agreement with each of the six components assessed by each item: learning science in school, self-concept in science, practical work in science, science outside of school, future participation in science, and importance of science.

To determine the level of science motivation, the researcher adapts the Students' Motivation towards Science Learning (SMTSL) questionnaire of Tuan et al. (2005) to assess students' motivation in terms of the following factors: self-efficacy, active learning techniques, science learning value, performance goal, achievement goal, and learning environment stimulation. The SMTSL questionnaire consists of 32 Likert-type items, to which respondents indicate their level of agreement on a scale from 1 ('strongly disagree') to 5 ('strongly agree'). The reported Cronbach alpha reliability coefficient for the whole instrument is 0.923 (Tuan et al., 2005).

To determine student academic success, the researcher utilized the academic grades of students in science for the 2023-2024 school year, as stipulated in DepEd Order No. 31, s. 2020, entitled "Interim Policy Guideline for Assessment and Grading in Light of the Basic Education Learning Continuity Plan." The respondents indicated their grade from 'below 75' which means did not meet expectations to '95-100' which means outstanding.

Procedure

The researcher received official clearance from the Graduate School's Program Coordinator throughout the data collection phase,

certifying that UM Tagum College has recognized the project. After obtaining approval from the Davao Oriental Division Office and the Campus Directors, the Schools Division Superintendent granted permission to conduct the study in a select group of schools. After receiving approval, the researcher distributed a survey questionnaire to each responder in person. To ensure that participants understand the guidelines and goals of the study, an orientation session was conducted prior to the study. High retrieval rates and seamless administration were made possible by cooperation with program leaders, instructors, and class advisers. After completing the survey, each respondent was given a ballpoint pen as a thank-you gift. The duration of the data collection period was roughly one month. Only the researcher had access to completed questionnaires, which were kept private. While responses were encoded in Microsoft Excel and then reviewed by a qualified statistician, all hard copies were securely stored.

Data Analysis

All data were analyzed using statistical techniques at a p -value of 0.05. Descriptive statistics, specifically mean and standard deviation, were used to determine the levels of attitude toward science, science motivation, and academic success. The Pearson Product-Moment Correlation Coefficient (Pearson- r) was applied to measure the strength and direction of relationships between the variables. Furthermore, Multiple Regression Analysis was conducted to assess the predictive capability of attitude toward science and science motivation on students' academic success in science.

Finally, to ensure compliance with ethical standards, the study underwent review and approval by the University of Mindanao Ethics Review Committee (UMERC), which issued a Certificate of Approval with UMERC No. UMERC-2024-489 was issued, confirming that all ethical principles, including integrity, accountability, fairness, and respect for participants, were adhered to throughout the research process.

Results and Discussion

The researcher discusses the key outcomes and findings of the research, based on the data gathered. The null hypotheses formulated in this study were also tested.

Level of Attitude towards Science of Students

Table 1 shows the level of attitude towards science of the learners. The overall mean is 3.509 with a descriptive equivalence of high. Among the six indicators, the Importance of Science has the highest mean of 3.743 with high descriptive equivalence. This is followed by Learning Science in school, which has a score of 3.715 with a descriptive equivalence of high. Next is Science Outside, a school with a mean of 3.477 and high descriptive equivalence. After this is Practical work in Science, which has a mean of 3.477 with high descriptive equivalence. Next is Future Participation in Science, which has a mean of 3.291 with moderate descriptive equivalence. Lastly, the Self-concept in Science has the lowest mean of 3.262 with a descriptive equivalence of moderate.

Table 1. *Level of Attitude towards Science of Students*

<i>Indicator</i>	<i>Mean</i>	<i>SD</i>	<i>Descriptive Equivalent</i>
Learning Science in School	3.715	0.646	High
Self-concept in Science	3.262	0.669	Moderate
Practical Work in Science	3.477	0.62	High
Science Outside School	3.562	0.726	High
Future Participation in Science	3.291	0.825	Moderate
Importance of Science	3.743	0.724	High
Overall	3.509	0.519	High

According to the findings, most respondents had a favorable attitude toward science, particularly when it came to learning science in school, conducting real-world scientific research, appreciating the value of science in society, and recognizing the relevance of science outside the classroom. Regarding their scientific self-concept and their intention to continue participating in scientific endeavors, they likewise indicated a modest level of agreement. The statement "I can tell that science and technology are helping the less fortunate individuals" had the most excellent mean and standard deviation among the indicators of the value of science, which is considered high. This implies that students have a profound understanding of how science and technology can help underprivileged populations lead better lives.

The item "I believe science and technology are equally important in society," on the other hand, had the lowest mean and standard deviation but achieved a high descriptive equivalent, suggesting that society consistently recognizes the importance of science and technology. All things considered, these findings suggest that junior high school students have a very noticeable, favorable attitude toward science. They have a moderate view of themselves and their future involvement in scientific endeavors. However, they place a high value on learning and applying science both inside and outside the classroom. Their high degree of motivation for science is a reflection of their confidence in their academic success in scientific classes.

These results are consistent with the research of Lerkkanen et al. (2023), who highlighted that increased motivation, interest, and performance are influenced by a variety of factors, including exposure to science outside of the classroom, hands-on experimentation, learning science in school, acknowledging the importance of science to society, having a positive self-concept, and hoping to become



involved in science in the future. All of these interrelated elements work together to foster a favorable view of science, which in turn promotes both academic achievement and long-term interest in the field.

In a similar vein, Osborne et al. (2020) found that students' interest, confidence, and motivation increase when they are exposed to real-world and practical science situations. This immediately enhances their performance and attitudes toward learning science. According to Almasri et al. (2021), students who exhibit greater curiosity and confidence in science tend to perform better academically than those with less favorable views of science. All things considered, these results underscore the importance of creating a welcoming and stimulating learning environment in science classes that promotes both positive attitudes and academic achievement.

Level of Science Motivation of Students

Table 2 presents the level of science motivation among students, with an overall mean of 3.65 and high descriptive equivalence. The high level was reflected in the respondents' high ratings for all indicators of the science motivation, in which among the indicators, science learning value has the highest mean of 3.827 and standard deviation of 0.708, followed by active learning strategies with 3.729 mean and 0.671 standard deviation, the learning environment simulation got 3.681 mean and 0.783 standard deviation, achievement goal got 3.662 mean and 0.803 standard deviation, and self-efficacy has 3.611 mean and 0.607 standard deviation. The lowest mean represents the performance goal, with a mean of 3.38, a moderate descriptive equivalent, and a standard deviation of 0.8.

Table 2. *Level of Science Motivation of Students*

<i>Indicator</i>	<i>Mean</i>	<i>SD</i>	<i>Descriptive Equivalent</i>
Self-efficacy	3.611	0.607	High
Active Learning Strategies	3.729	0.671	High
Science Learning Value	3.827	0.708	High
Performance Goal	3.38	0.8	Moderate
Achievement Goal	3.662	0.803	High
Learning Environment Simulation	3.681	0.783	High
Overall	3.65	0.538	High

The statement "I think that learning science is important because I can use it in my daily life" had the highest mean and a descriptive level of high within the scientific learning value domain. This shows that students have an excellent understanding of the value of learning science and can readily see how science is applicable in real-world situations. It also implies that students are aware of the practical applications of scientific knowledge, especially in areas such as creativity, problem-solving, and career advancement, which connects their academic learning to observable, real-world success.

On the other hand, although having a high descriptive equivalent, the statement "I think it is important to have the opportunity to satisfy my own curiosity when learning science" had the lowest mean and standard deviation. This suggests that by investigating subjects that pique their interest, students regularly show that they are capable of taking charge of their education. Their answers demonstrate a sincere desire to learn about science, solve issues, and apply what they have learned in real-world contexts. This will boost their motivation, foster good attitudes, and help them do better in science-related tasks. Guido (2018) supports these findings by emphasizing that learners' motivation is a critical factor in determining their learning success and pace. This result is corroborated with Liu et al. (2022) who found that students with higher levels of internalized motivation tend to perform better on academic assignments, adopt more effective coping mechanisms, and achieve better learning outcomes.

Additionally, Schunk and DiBenedetto (2020) support these findings, which suggest that students who have faith in their capacity to understand and interact with scientific content are more driven, tenacious, and likely to succeed in science. Similarly, Zhang and Bae (2020) noted that highly motivated students participate more actively in class, employ effective study techniques, and achieve higher levels of success. Furthermore, students who are highly motivated to learn science not only have a richer conceptual grasp but are also more likely to pursue science-related courses and occupations in the future, according to Schumm and Bogner (2021).

Level of Academic Success of Students

Table 3 presents the level of academic success of students, with an overall mean of 86.673, a very satisfactory descriptive equivalent, and a standard deviation of 5.479. This revealed that students had a very satisfactory academic success in science. This indicates that students achieved high scores in various grade components, including written works, performance tasks, and quarterly assessments, for the entire 2023-2024 school year. This aligns with DepEd's (2015) statement that a very satisfactory grade means students in science have learned the essential knowledge and understanding, and demonstrate the necessary skills required according to their respective grade levels.

Table 3. *Level of Academic Success of Students*

<i>Indicator</i>	<i>Mean</i>	<i>SD</i>	<i>Descriptive Equivalent</i>
Science Grade	86.673	5.479	Very Satisfactory

This result appears to be positive since it reflects the effectiveness of science instruction and the students' ability to meet the learning competencies set by the curriculum. Furthermore, the result supports the idea that well-aligned instructional strategies and active student



engagement contribute to meaningful learning experiences, as also observed in recent educational studies. Overall, this outcome underscores the effectiveness of the teaching and learning process in promoting both academic achievement and scientific competence among students.

Significance on the Relationship between Attitude towards Science and Science Motivation to Academic Success

Presented in Table 4 is the significance of the relationship between attitude towards science and science motivation to academic success. The table reveals a moderate positive correlation between attitude towards Science and science motivation, and students' academic success, as indicated by the r-value and a p-value less than 0.05, which supports the rejection of the null hypothesis. This indicates a significant relationship exists between Attitude towards Science, science motivation, and academic success.

Table 4. Significance on the Relationship between Attitude towards Science and Science Motivation to Academic Success

Independent Variable	Dependent Variable	r-value	r-squared	p-value	Decision
Attitude towards Science	Academic Success	0.324*	0.104976	< .001	Reject Ho
Student Motivation		0.321*	0.103041	< .001	Reject Ho

*p<0.05

Additionally, the table displays data on the relationship between academic success and the variables science motivation and attitude toward science. As can be seen, the association between attitude toward science and academic accomplishment is highly significant, with the greatest r-value of 0.324 indicating a positive moderate correlation with a p-value < 0.001. There is a very significant association between academic achievement and science motivation, as indicated by the r-value of 0.321, which indicates a positive moderate correlation with a p-value < 0.001. The results of the study indicate that students with more positive attitudes toward science tend to demonstrate higher levels of motivation, which subsequently contributes to better academic performance. This pattern suggests that motivation serves as an important mechanism through which attitudes toward science influence learning outcomes. This result aligns with earlier studies, which have shown that students' motivation and academic performance are significantly influenced by their attitude (Seçgin & Sungur, 2020).

In a similar vein, the result confirmed the findings of Wang et al. (2020) who found that students' motivation and performance improve when they have confidence in their scientific aptitude. The findings also show that students who view science more positively are more inclined to consider science-related pathways in the future, highlighting the long-term impact of their perceptions. These results align with the observations of Kim and Lee (2024), who noted that motivation mediates the relationship between students' attitudes toward science and their academic success. They are further supported by Seçgin and Sungur (2020), who emphasized that students' perceptions of science significantly shape their future career choices. In the context of the increasing global demand for science, technology, and engineering careers, fostering favorable science attitudes among students remains essential.

Significance on the Relationship between Attitude towards Science and Academic Success

Table 4.1 illustrates a significant relationship between academic success and attitude toward science. With an r-value and a p-value below 0.05, the table indicates a weak positive correlation between students' academic success and their general attitude toward science, so we reject the null hypothesis. This suggests that attitudes toward science and academic achievement are strongly correlated.

Additionally, the table displays information on the relationship between academic success and the markers of attitude toward science. As demonstrated, the association between academic achievement and self-concept in science is very significant, with the greatest r-value of 0.297 indicating a modest positive correlation with a p-value < 0.001. With a p-value < 0.001 and an r-value of 0.291, practical work in science follows, indicating a low positive correlation. This suggests a strong correlation between academic performance and practical work in science. With a p-value of less than 0.001 and an r-value of 0.269, which indicates a modest positive correlation, learning science in school comes next. This indicates a very significant association with academic success.

Table 4.1. Significance on the Relationship between Attitude towards Science and Academic Success

Indicators	Dependent Variable	r-value	r-squared	p-value	Decision
Learning Science in School	Academic Success	0.269*	0.072361	< .001	Reject Ho
Self-concept in Science		0.297*	0.088209	< .001	Reject Ho
Practical Work in Science		0.291*	0.084681	< .001	Reject Ho
Science Outside School		0.262*	0.068644	< .001	Reject Ho
Future Participation in Science		0.124*	0.015376	0.02	Reject Ho
Importance of Science		0.227*	0.051529	< .001	Reject Ho

*p<0.05

Science Outside School received an r-value of 0.262, indicating a low positive correlation, and a p-value of less than 0.001, suggesting a highly significant relationship between academic success and participation in science outside of school. The importance of science received an r-value of 0.227, indicating a low positive correlation, and a p-value of less than 0.001, indicating a highly significant relationship between academic success and the importance of science. Lastly, there is an influential, significant association between future scientific activity and academic success, as indicated by the 0.124 r-value, which suggests a weak correlation, and the 0.02 p-value. Liou et al.'s (2021) analysis documented a statistically significant overall weighted mean correlation of r = 0.248 (p < 0.001),



which aligns with the results of this investigation.

This finding suggests that students' views about science and their academic success in the subject are positively and moderately correlated. The notion that encouraging positive attitudes regarding science can improve students' learning outcomes was supported by similar findings in Li et al.'s earlier work (2020). Furthermore, supporting the favorable influence of attitude on academic success, Bairagya et al. (2021) found that students with more positive attitudes toward science scored significantly higher in science.

Significance on the Relationship between Science Motivation and Academic Success

Presented in Table 4.2 is the significance of the relationship between science motivation and academic success. As shown in the table, the relationship between Science Motivation and students' Academic Success exhibits a positive, low correlation, with an r-value and p-value less than 0.05, indicating rejection of the null hypothesis. This means a significant relationship exists between Science, Motivation, and Academic Success.

Table 4.2. Significance on the Relationship between Science Motivation and Academic Success

Indicators	Dependent Variable	r-value	r-squared	p-value	Decision
Self-efficacy	Academic Success	0.265*	0.070225	< .001	Reject Ho
Active Learning Strategies		0.274*	0.075076	< .001	Reject Ho
Science Learning Value		0.222*	0.049284	< .001	Reject Ho
Performance Goal		0.107*	0.011449	0.045	Reject Ho
Achievement Goal		0.296*	0.087616	< .001	Reject Ho
Learning Environment Simulation		0.283*	0.080089	< .001	Reject Ho

*p<0.05

The statistics on the relationship between academic success and markers of science motivation are also presented in the table. A modest positive connection with a p-value < 0.001 is shown by the attainment aim, which has the highest r-value (0.296). This suggests that academic success and accomplishment goals are significantly correlated. With a p-value < 0.001 and an r-value of 0.283, the learning environment simulation follows, showing a weak positive connection. This indicates that these two factors and academic success are highly significantly correlated. Next are active learning strategies, which show a positive weak connection with a p-value of less than 0.001 and an r-value of 0.274. This suggests that active learning techniques and academic success are highly significantly correlated.

Academic success and self-efficacy were found to be highly significantly correlated, with a p-value of less than 0.001 and an r-value of 0.265 for self-efficacy, indicating a positive, weak correlation. This is followed by a scientific learning value, showing a highly significant link between academic success and the value of science, with a 0.222 r-value of p < 0.001. Lastly, a p-value of 0.045 and an r-value of 0.107 for the performance target indicate a weak positive connection. This suggests that academic success and performance goals are significantly correlated.

The results of this study are consistent with previous research by Mahama et al. (2023), who highlighted that students' low competence levels are caused by several factors, including their lack of passion for the subject. Given the substantial predictive impact of motivation on high school students' success in science, this study suggests that even while students generally demonstrate a high degree of drive, further development to an even higher level could yield even greater academic performance. This finding is supported by Baierl et al. (2021), who found that students who are more motivated to study science are more likely to have a firmer conceptual grasp and to follow science-related courses of study or occupations in the future. This finding is also parallel to that of Peguero and Shaffer (2019), where students' motivation, curiosity, and general academic success are all strongly correlated with their belief in their capacity to control their learning processes and master challenging content.

Regression Analysis on the Influence of Attitude towards Science and Science Motivation on Academic Success

Presented in Table 5 is the regression analysis on the Influence of the Domain of Attitude towards Science and Student Motivation on Academic Success. The R2 value is 0.127; this means that the indicators of Attitude towards Science and Science Motivation explain 12.7% of the variance in students' Academic Success.

Table 5. Regression Analysis on the Influence of Attitude towards Science and Science Motivation on Academic Success

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	Decision
	B	SE	Beta			
(constant)	72.100	2.065				
Attitude Towards Science	2.115	0.691	0.200*	3.063	0.002	Reject Ho
Science Motivation	1.959	0.666	0.192*	2.941	0.003	Reject Ho

Dependent Variable: Academic Success

p < 0.05, R = 0.356, F-value = 25.344, R² = 0.127, p-value < 0.001

The p-value for the independent variables, science motivation and attitude toward science, is less than 0.05, indicating that they had a significant impact on academic success. Science motivation received a beta value of 0.192, while attitude toward science had the highest



beta value of 0.200. Based on this finding, it can be said that students' academic success increases in proportion to each unit rise in their attitude toward and motivation for science.

Therefore, the results presented here strongly support the research of Sahin (2020), who suggests that attitude and motivation are important predictors of students' performance in science. The importance of cultivating positive perceptions of science education is also highlighted by the meta-analysis by Mao et al. (2021), which found a moderately positive correlation ($r = 0.248$) between students' attitudes toward science and their academic achievement. Positive attitudes and higher learning satisfaction were linked to better academic outcomes.

These results reinforce those of Areepattamannil et al. (2023), indicating that among Emirati early adolescents, science self-concept has a positive influence on both scientific achievement and intrinsic motivation. Therefore, attitudes and ideas that affect how students interact with scientific material, persevere through difficulties, and value science education in both academic and practical settings are implied by science motivation and attitude toward science.

Regression Analysis on the Influence of Attitude towards Science on Academic Success

Presented in Table 5.1 is the regression analysis on the Influence of Attitude towards Science on Academic Success. The R2 value is 0.140; this means that the indicators of Science Motivation explain 14.0% of the variation in students' academic success.

Table 5.1. Regression Analysis on the Influence of Attitude towards Science on Academic Success

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	Decision
	B	SE	Beta			
(constant)	73.156	1.971				
Learning Science in School	0.654	0.570	0.077	1.148	0.252	Do not Reject Ho
Self-concept in Science	1.333	0.544	0.163*	2.451	0.015	Reject Ho
Practical Work in Science	1.311	0.552	0.148*	2.374	0.018	Reject Ho
Science outside School	0.704	0.545	0.093	1.292	0.197	Do not Reject Ho
Future Participation in Science	-0.805	0.419	-0.121	-1.921	0.056	Do not Reject Ho
Importance of Science	0.620	0.450	0.082	1.379	0.169	Do not Reject Ho

Dependent Variable: Academic Success

$p < 0.05, R = 0.375, F\text{-value} = 9.381, R^2 = 0.140, p\text{-value} < 0.001$

Only two of the specified domains, self-concept in science and practical work in science, had a p-value below 0.05, indicating that they have a significant impact on academic achievement. Self-concept in science had the most excellent beta value of 0.163 among these categories, followed by practical work in science, which had a beta value of 0.148. Based on this finding, it can be said that students' academic achievement increases in proportion to their level of self-concept and practical science work.

However, four of the Attitude towards Science domains have a p-value greater than 0.05: learning science in school had the lowest beta value (0.077), science outside of school had a beta value of 0.093, the importance of science had a beta value of 0.082, and future participation in science had the highest beta value (0.12). Given that the p-value is higher than the 0.05 significance level, it can be concluded that these domains had no discernible impact on students' motivation for science.

The strongest predictor was the science self-concept ($\beta = 0.163, p = 0.015$), indicating that students who believe they are skilled in science are more likely to perform well academically. This finding is consistent with Bandura's (1997) self-efficacy theory and is corroborated by Wang, Degol, and Ye (2020), who discovered that self-concept is a reliable indicator of STEM success. It may also be inferred that, when all other factors are held equal, there is a 1.333 unit increase in students' academic success for every unit rise in their science self-concept. Likewise, scientific practical work ($\beta = 0.148, p = 0.018$) was positively correlated with academic success, indicating that experiential learning improves comprehension and engagement, which is consistent with findings from Kolb's experiential learning model. Additionally, when all other factors are held constant, it can be said that for every unit increase in science practical work, students' academic success increases by 1.311 units.

This result aligns with other research that has demonstrated the importance of assessing the efficacy of specific teaching tactics in light of students' attitudes (Almasri, Hewapathirana, Ghaddar, Lee, & Ibrahim, 2021). Similarly, Tanti et al. (2021) found that students who reported enjoying scientific lessons more and showing a greater interest in extracurricular science-related activities performed better academically in science courses. These findings suggest that fostering favorable attitudes toward science is crucial for enhancing students' academic success in this subject.

Regression Analysis on the Influence of Science Motivation on Academic Success

Presented in Table 5.2 is the regression analysis on the Influence of Science Motivation on Academic Success. The R2 value is 0.125; this means that the indicators of Science Motivation explain only 12.5% of the variation in students' academic success.

The result below shows that only one domain of Science Motivation, namely achievement goal, has a p-value less than 0.05, which means this domain significantly influences academic success. It has the highest beta value of 0.166, which suggests that for every one-

unit increase in achievement goal, there is a 1.133-unit increase in students' academic success when other indicators are held constant. It is also the only indicator that has an effect among all indicators. Most domains of Science Motivation have a p-value greater than 0.05, namely self-efficacy, which has a beta value of 0.155, learning environment simulation has a beta value of 0.102, active learning strategies have a beta value of 0.099, performance goal has a beta value of -0.036, and science learning value has a beta value of -0.031. This means that these domains did not significantly influence student science motivation, as the p-value is more significant than 0.05.

Table 5.2. Regression Analysis on the Influence of Science Motivation on Academic Success

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	Decision
	B	SE	Beta			
(constant)	74.880	1.982				
Self-efficacy	1.038	0.582	0.115	1.784	0.075	Do not Reject Ho
Active Learning Strategies	0.808	0.642	0.099	1.258	0.209	Do not Reject Ho
Science Learning Value	-0.238	0.573	-0.031	-0.416	0.677	Do not Reject Ho
Performance Goal	-0.246	0.386	-0.036	-0.638	0.524	Do not Reject Ho
Achievement Goal	1.133	0.470	0.166*	2.407	0.017	Reject Ho
Learning Environment Simulation	0.714	0.506	0.102	1.410	0.159	Do not Reject Ho

Dependent Variable: Academic Success

$p < 0.05$, $R = 0.353$, $F\text{-value} = 8.207$, $R^2 = 0.125$, $p\text{-value} < 0.001$

The result indicates that motivation, specifically achievement goals, acts as a precondition for the efficient application of learning strategies, which in turn has a more direct impact on academic success. The study's findings align with recent research by Sabanal et al. (2023), which found that highly motivated students feel satisfied when they understand the course material, receive good grades, work through challenging problems, and have their opinions accepted by their teachers or peers. In a similar vein, it is coherent with Li et al. (2021) who found that among Chinese medical students, self-determined motivation was a significant predictor of academic success, particularly through the use of learning strategies.

Since academic success and accomplishment goals have consistently demonstrated a significant positive link, especially in the context of science education, this result aligns with the findings of earlier studies. According to Popa et al. (2023), accomplishment objectives have an indirect impact on academic success by increasing self-efficacy and learning engagement, which supports the notion that motivation is a crucial mediating factor in this relationship. Similarly, Hur et al. (2014) found that the mastery objective is the most potent predictor of motivation and learning approach, underscoring the importance of achievement goals for academic success. Accordingly, encouraging achievement goals remains a valuable teaching strategy for enhancing students' motivation and academic success in science classes (Umamoto & Inagaki, 2023).

Conclusion

Considering the results of this research, it infers that : (1) the level of the student's attitude towards science is high, which implies that the attitude towards science of the students is often manifested; (2) the level of the student's science motivation is high, which implies often science motivation of the learners is manifested; (3) the level of the students' academic success is very satisfactory which implies that the academic success among the students is most of the time manifested; (4) there is a significant relationship between attitude towards science of the students and their academic success in science which implies that when the level of attitude towards science of the students is high, their academic success can also be expected to be high and vice versa; (5) there is a significant relationship between science motivation and academic success of the students; therefore, when the level of the science motivation of the students is high, their academic success can also be expected to be high and vice versa; (6) there is a significant influence of attitude towards science and science motivation towards academic success in science of the students which implies that when there is an increase in the levels of attitude towards science and science motivation, the level of academic success in science of the students will also increase.

According to the results, which are consistent with the Theory of Reasoned Action, students who have a favorable attitude toward science are more likely to have strong learning intentions, which in turn will enhance their academic achievement. The findings of this study, which show that motivated children are more engaged and perform better in school, are also supported by the Social-Cognitive Theory. According to these views, students' academic success in scientific classes is greatly influenced by their motivation and attitude.

The following suggestions are supported in light of the data and conclusions mentioned above:

It is advised that educators use strategies that boost students' confidence and encourage their engagement with science-oriented careers, particularly in their future contributions to the field as teachers or scientists, given the high level of students' attitude toward science and the moderate descriptive equivalent of their self-concept in science and future participation in science among indicators. High levels of science motivation were attained as a result, and the sole indication with a reasonable descriptive equivalent is the performance target. Therefore, teachers should encourage students to learn science in order to compete with their peers, achieve high grades, and attract their teachers' attention by setting performance goals.

High academic success demonstrates the effectiveness of the teaching-learning process, enabling educators to maintain and enhance

student-centered learning by employing inquiry-based, practical, and real-world application techniques that make science engaging and relevant. Regularly evaluating students' interest and attitude, in addition to their cognitive performance, adjusting instruction to meet their affective needs, and providing feedback that highlights effort, growth, and curiosity can all help students feel more motivated and confident in their capacity to succeed in science when they find the subject engaging and relevant. Since there is a moderately positive overall correlation between students' attitudes toward science and academic success, teachers can help students develop positive attitudes toward science by incorporating engaging, inquiry-based, and real-life learning experiences that boost students' confidence, curiosity, and sustained interest in the subject. To improve academic outcomes, teachers can employ strategies that enhance student motivation, such as providing meaningful feedback, incorporating hands-on and collaborative activities, acknowledging students' efforts and accomplishments, and linking lessons to real-life applications and future career opportunities.

Since attitudes toward science and motivation for learning science have a significant impact on students' academic success, it is recommended that parents and teachers consistently nurture children's interest in the subject. Engaging them in meaningful conversations about science and recognizing even small scientific accomplishments can help strengthen their motivation and cultivate a more positive attitude toward science. To address students' attitudes toward science and science motivation, the Department of Education should focus on strengthening curriculum and policy support for science education, training teachers in motivational techniques, and developing language teaching programs that foster the attitudes and motivation most essential for producing successful science education students. Ultimately, future researchers may conduct additional parallel studies to investigate the variables that influence students' academic success in scientific classes.

References

- Almalki, S. A. (2019). The Influence of Motivation on Academic Performance Among Dental College Students. *Open Access Macedonian Journal of Medical Sciences*, 7(8), 1374–1381. <https://doi.org/10.3889/oamjms.2019.319>
- Alamri, M. M., & Alkahtani, A. Y. (2023). A model of e-learning through achievement motivation and academic achievement among university students in Saudi Arabia. *Sustainability*, 15(3), Article 2264. <https://doi.org/10.3390/su15032264>
- Almasri, A., Alsubhi, N., Alzahrani, M., & Alghamdi, A. (2021). The Impact of Students' Attitudes toward Science on Their Academic Achievement in Saudi Arabia. *Education and Science*, 46(206), 213-225. <https://doi.org/10.15390/EB.2021.9767>
- Arepattamannil, S., Khurma, O. A., Ali, N., Hakmani, R. A., & Kadbey, H. (2023, July 6). Examining the relationship between science motivational beliefs and science achievement in Emirati early adolescents through the lens of self-determination theory. *Large-scale Assessments in Education*. <https://doi.org/10.1186/s40536-023-00175-7>
- Aydin, S., & Boz, Y. (2020). The relationship between high school students' attitudes toward science and their science achievement. *Research in Science Education*, 50(5), 1781–1796.
- Aydeniz, M. (2012, June 15). Factors Impacting Turkish Students' Attitudes towards Science and Their Academic Performance in Science. <https://www.tused.org/index.php/tused/article/view/428>
- Bal-Taştan, S., Davoudi, S. M. M., Masalimova, A. R., Bersanov, A. S., Kurbanov, R. A., Boiarchuk, A. V., & Pavlushin, A. A. (2018). The Impacts of Teacher's Efficacy and Motivation on Student's Academic Achievement in Science Education among Secondary and High School Students. *Eurasia Journal of Mathematics, Science and Technology Education*, 14(6). <https://doi.org/10.29333/ejmste/89579>
- Babaylo, A. (2021). Science-Related Attitudes and Academic Achievements of Students with Varied Learning Styles. Retrieved January 26, 2024, from <https://nosteonline.org/wp-content/uploads/2020/10/01-Babaylo-For-Final-Publication.pdf>
- Bagchi, M., Saha, S., & Bairagya, S. (2021). A study of achievement motivation and attitude towards science across gender for secondary students and their impact on achievement in science. *Visva-Bharati University*. Retrieved from https://www.researchgate.net/publication/353215832_A_STUDY_OF_ACHIEVEMENT_MOTIVATION_AND_ATTITUDE_TOWARDS_SCIENCE_ACROSS_GENDER_FOR_SECONDARY_STUDENTS_AND_THEIR_IMPACT_ON_ACHIEVEMENT_IN_SCIENCE
- Baierl, T. M., Bonine, K., Johnson, B., & Bogner, F. X. (2021). Biosphere 2 as an informal learning platform to assess motivation, fascination, and cognitive achievement for sustainability. *Studies in Educational Evaluation*, 70, Article 101061. <https://doi.org/10.1016/j.stueduc.2021.101061>
- Bayat, B., & Salehiniya, H. (2019). Assessing academic success rate and related factors among the students. *Journal of Education and Health Promotion*, 8. https://doi.org/10.4103/jehp.jehp_244_18
- Bhajak, S., Momin, M., & Joshi, H. (2025). Understanding students' learning behavior through the lens of theory of reasoned action. *Higher Education, Skills and Work-Based Learning*. Advance online publication. <https://doi.org/10.1108/HE-10-2024-0120>
- Broman, K. (2022). Relevant or Interesting According to Upper Secondary Students? Affective Aspects of Context-Based Chemistry Problems. Retrieved from <https://eric.ed.gov/?id=EJ1371599>

- Bursal, M. (2012). Longitudinal Investigation of Elementary Students' Science Academic Achievement in 4-8th Grades: Grade Level and Gender Differences. Retrieved from <https://eric.ed.gov/?id=EJ1017289>
- Castillo, J. C. D., Pinugu, J. N., Angel Lorraine, & Pasay, S. J. M. (2020). Achievement Goal Orientation, Self-Efficacy, and Classroom Climate as Predictors of Writing Performance of Filipino Senior High School students. In *Asian EFL Journal* (pp. 83–85) [Journal-article]. *Asian EFL Journal*. <https://www.researchgate.net/publication/343714827>
- Cetin, B. (2015). Predicting Academic Success From Academic Motivation And Learning Approaches In Classroom Teaching Students (Publication No. Contemporary Issues In Education Research – Third Quarter 2015 Volume 8, Number 3) [PHD, Canakkale 18 Mart University, Turkey]. https://www.researchgate.net/publication/298342604_Predicting_Academic_Success_From_Academic_Motivation_And_Learning_Approaches_In_Classroom_Teaching_Students
- Dede, Y., & Yaman, S. (2008). A Questionnaire for Motivation toward Science Learning: A Validity and Reliability Study. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, 2(1), 19-37
- Deiparine, J. P., Andrin, G. R., Groenewald, E. S., Zamora, M. B., Pansacala, N. R., & Kilag, O. K. T. (2023). Enhancing student engagement: An exploration of five high-impact teaching practices. *Journal of Education and Learning*, 12(1), 1-14.
- Department of Education. (2015). DepEd Order No. 8 s. 2015: Policy guidelines on classroom assessment for the K to 12 basic education program. https://www.deped.gov.ph/wpcontent/uploads/2015/04/DO_s2015_08.pdf
- Espejon, M. (2022, April 9). Learners' Attitude Towards Science on the Use of Modular Learning. <https://journalppw.com/index.php/jpsp/article/view/3519>
- Furtak, E. M., Seidel, T., Iverson, H., & Briggs, D. C. (2019). Experimental and quasi- experimental studies of inquiry-based science teaching: A meta-analysis. *Review of Educational Research*, 89(3), 415–458. <https://doi.org/10.3102/0034654318825436>
- Gbollie, C. and Keamu H. (2017). Students' Academic Performance: The Role of Motivation Strategies and Perceived factors Hindering Liberian junior High School and Senior High School Learning. *Education Research International*. DOI:10.1155/2017/1787084
- Guido, R. M. D. (2018, May 6). Attitude and Motivation towards Learning Physics. Retrieved from <https://arxiv.org/abs/1805.02293>
- Hands C, Limniou M. Diversity of Strategies for Motivation in Learning (DSML) A New Measure for Measuring Student Academic Motivation. *Behav Sci (Basel)*. 2023 Apr 1;13(4):301. doi: 10.3390/bs13040301. PMID: 37102815; PMCID: PMC10136107.
- Hajbaghery, M. A., Gandomani, H. S., & Aminolroayae Yamini, E. (2016). Assessing academic success and its predictors from the perspective of nursing students in Kashan University of Medical Sciences. *Iranian Journal of Medical Education*, 15, 510–520.
- Henschel, S. (2021). Antecedents of Science Anxiety in Elementary School. *The Journal of Educational Research*, 114(3), 263–277. <https://doi.org/10.1080/00220671.2021.1922989>.
- Henriquez, L. et al. (2019). Teaching Strategies and Middle School Science Motivation: An exploratory Study - ProQuest. (n.d.). <https://www.proquest.com/openview/cb86f2ed636b60bc5c7448c1c1888b90/1?pq-origsite=gscholar&cbl=18750&diss=y>
- Ince, M. (2023, July 27). Examining the Role of Motivation, Attitude, and Self-Efficacy Beliefs in Shaping Secondary School Students' Academic Achievement in Science Course. <https://doi.org/10.3390/su151511612>
- Kang, N., & Yoon, H. (2022). Identifying Students at Risk in Learning Science: Diagnostic Assessment in Physical Science for Primary and Lower Secondary School Grades. *Asia-Pacific Science Education*, 8(2), 331–360. <https://doi.org/10.1163/23641177-bja10049>
- Hur, Y., Kim, S., & Park, J. H. (2014). The correlation between achievement goals, learning strategies, and motivation in medical students. *Korean Journal of Medical Education*, 26(1), 19–24. <https://doi.org/10.3946/kjme.2014.26.1.19>
- Kim, H., & Lee, J. (2024). Student attitudes and academic engagement in STEM: A longitudinal analysis. *International Journal of STEM Education*, 11(2), 110–125. <https://doi.org/10.1186/s40594-024-00312-6>
- Lee, G.-G., & Mun, S. (2023). From science motivation to science identity: The mediating effect of science achievement according to gender. *Eurasia Journal of Mathematics, Science and Technology Education*, 19(10), em2341. <https://doi.org/10.29333/ejmste/13633>
- Lerikkanen, M.-K., Kiuru, N., Niemi, P., & Poikkeus, A.-M. (2023). Stimulating elementary school students' self-regulated learning through high-quality interactions and relationships: A narrative review. *Educational Psychology Review*, 35, Article 71. <https://doi.org/10.1007/s10648-023-09795-5>
- Li, M., et al. (2021). Achievement goal orientations and academic performance: A cross-sectional study among Chinese medical students. *Frontiers in Psychology*. <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.694019/full>
- Liou, P.-Y., Wang, C.-L., Lin, J. J. H., & Areepattamannil, S. (2021). Assessing students' motivational beliefs about learning science across grade level and gender. *Journal of Experimental Education*, 89(4), 605–624. <https://doi.org/10.1080/00220973.2020.1721413>

- Liu, C., Shi, Y., & Wang, Y. (2022, January 1). Self-Determination Theory in Education: The Relationship between Motivation and Academic Performance of Primary School, High School, and College Students. <https://doi.org/10.2991/assehr.k.220704.167>
- Mahama, I., Danquah, S. O., Ammah, C., Amos, P. M., & Eshun, P. (2023). An examination of mindfulness and academic resilience among higher education students amidst the COVID-19 pandemic in Ghana. *Psychology*, 14, 974–999. <https://doi.org/10.4236/psych.2023.146052>
- Mao, P., Cai, Z., He, J., Chen, X., and Fan, X. (2021). The relationship between Attitude Towards Science and Academic Achievements in Science. *Frontiers in Psychology*. DOI:10.3389/fpsyg.2021784068
- Martinez, M., Ellis, J., Kang, H., & Blankenstein, A. (2023). How high school GPA predicts STEM success: Examining science interest, readiness, and persistence. *Educational Researcher*, 52(4), 213–224. <https://doi.org/10.3102/0013189X231193309>
- Márquez, R., Lazcano, M., Bada, J., & Arroyo-Barrigüete, J. (2023). The Impact of Student Engagement on Academic Performance: Attendance, Participation, and Feedback. *SAGE Open*, 13(2), 1–15. <https://doi.org/10.1177/21582440231177298>
- Membiola, P., Vidal, M., Fragueiro, S., Lorenzo, M., García-Rodeja, I., Aznar, V., Bugallo, A., & González, A. (2022). Motivation for science learning as an antecedent of emotions and engagement in preservice elementary teachers. *Science Education*, 106, 119–141. <https://doi.org/10.1002/sce.21686>
- Membiola, P., Acosta, K., Yebra, M. A., & González, A. (2023). Motivation to learn science, emotions in science classes, and engagement towards science studies in Chilean and Spanish compulsory secondary education students. *Science Education*, 107(4), 939–963. <https://doi.org/10.1002/sce.21793>
- Mirabela-Constanța, M., & Maria-Madela, A. (2011). Intrinsic and extrinsic motivation - An investigation of performance correlation on students. *Annals of Faculty of Economics, University of Oradea, Faculty of Economics*, 1(1), 671–677.
- Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). TIMSS 2019 International Results in Mathematics and Science. TIMSS & PIRLS International Study Center. Retrieved from <https://timssandpirls.bc.edu/timss2019/international-results/>
- Murat İnce, (2023). Examining the Role of Motivation, Attitude, and Self-Efficacy Beliefs in Shaping Secondary School Students' Academic Achievement in Science Course, *Sustainability*, 10.3390/su151511612, 15, 15, (11612)
- Nacaroglu, O., et al. (2023). Investigating Lifelong Learning Tendencies and Scientific Creativity Levels of Prospective Science Teachers. *Acta Educationis Generalis*, 13(1), 74–95. <https://doi.org/10.2478/atd-2023-0004>
- Nieuwoudt, J. E. (2017, December 1). Time management and attitude towards science as predictors of academic success in an enabling science.. *ResearchGate*. https://www.researchgate.net/publication/322530642_Time_management_and_attitude_towards_science_as_predictors_of_academic_success_in_an_enabling_science_subject_A_preliminary_exploratory_study
- Organisation for Economic Co-operation and Development. (2019a). PISA 2018 results (volume I): What students know and can do. PISA, OECD Publishing. <https://doi.org/10.1787/5f07c754-en>
- Organisation for Economic Co-operation and Development. (2019b), PISA 2018 assessment and analytical framework. PISA, OECD Publishing. <https://doi.org/10.1787/b25efab8-en>.
- Osborne, J., Rafanelli, S., & Kind, P. (2020). Attitudes towards science: A review of the field and its findings through a psychological perspective. *International Journal of Science Education*, 42(9), 1417–1438. <https://doi.org/10.1080/09500693.2020.1751625>
- Papadogiannis, I., Pouloupoulos, V., Platis, N., Vassilakis, C., Lepouras, G., & Wallace, M. (2023, September 19). First Grade GPA as a Predictor of Later Academic Performance in High School. <https://doi.org/10.3390/knowledge3030033>
- Popa, D., et al. (2023). The Influence of Achievement Goal Orientation on Academic Performance through Motivational Components. *Frontiers in Psychology*. <https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1296346/full>
- Radunzel, J., Mattern, K., & Westrick, P. (2017). The role of academic preparation and interest on STEM success. ACT Research Report. https://www.researchgate.net/publication/322137197_The_Role_of_Academic_Preparation_and_Interest_on_STEM_Success
- Rojas, Joanne P., "THE RELATIONSHIPS AMONG CREATIVITY, GRIT, ACADEMIC MOTIVATION, AND ACADEMIC SUCCESS IN COLLEGE STUDENTS" (2015). Theses and Dissertations--Educational, School, and Counseling Psychology. Paper 39. http://uknowledge.uky.edu/edp_etds/39
- Sabanal, G., Reputanan, K., Palwa, S., Labandero C., & Alimbon, J. (2023). Motivation and Academic Performance of Secondary Students in Science: A Correlational Study [Review of Motivation and Academic Performance of Secondary Students in Science: A Correlational Study]. *Asian Journal of Science Education*, Vol. 5. No. 2, 20–29(e-ISSN 2715-564). Vol. 5. No. 2, October (2023) 20–29. <https://doi.org/10.24815/ajse.v5i2.31668>
- Sahin, E. (2020). The Role of Motivation and Attitude in Predicting Science Achievement among Middle School Students. *Journal of Science Education and Technology*, 29(1), 56–65.

- Salmi, H., Thuneberg, H., & Vainikainen, M. P. (2022). The impact of informal and formal science learning experiences on students' science attitudes and academic achievement. *International Journal of Science Education*, 44(2), 277–296. <https://doi.org/10.1080/09500693.2021.2010004>
- Sanstad, E. A. (n.d.). *The Fear of Science: a Study of Science Anxiety and the Learning Capabilities of Adult College Students*. UWM Digital Commons. <https://dc.uwm.edu/etd/2>
- Seçgin, F., & Sungur, S. (2020). The role of motivation and self-efficacy in the relationship between metacognition and science achievement: A path analysis. *International Journal of Science and Mathematics Education*, 18(7), 1325–1343. <https://doi.org/10.1007/s10763-019-10015-6>
- Shao-Na Zhou, Hui Zeng, Shao-Rui Xu, Lu-Chang Chen, Hua Xiao, (2019). EXPLORING CHANGES IN PRIMARY STUDENTS' ATTITUDES TOWARDS SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) ACROSS GENDERS AND GRADE LEVELS, *Journal of Baltic Science Education*, 10.33225/jbse/19.18.466, 18, 3, (466-480)
- Schunk, D. H., & DiBenedetto, M. K. (2020). Motivation and social cognitive theory. *Contemporary Educational Psychology*, 60, Article 101832. <https://doi.org/10.1016/j.cedpsych.2019.101832>
- Smith, T. J., Pasero, S., & McKenna, C. M. (2014, February 1). Gender Effects on Student Attitude Toward Science. *Bulletin of Science, Technology & Society*. <https://doi.org/10.1177/0270467614542806>
- Steinmayr, R., Weidinger, A. F., Schwinger, M., & Spinath, B. (2019, July 31). The Importance of Students' Motivation for Their Academic Achievement – Replicating and Extending Previous Findings. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2019.01730>
- Stover, J. B., Hoffmann, A. F., Buenos Aires University, De La Iglesia, G., Liporace, M. F., & Buenos Aires University and National Research Council (CONICET). (2014). Predicting Academic Achievement: The role of motivation and learning Strategies. In *Problems of Psychology in the 21st Century: Vol. 8 (Issue No. 1, pp. 71–72)*. https://ri.conicet.gov.ar/bitstream/handle/11336/34453/CONICET_Digital_Nro.1783f7de-c428-4d5e-ad6d-183bd2f2ca64_A.pdf?sequence=2
- Tanti et al. (2021). Attitudes toward science based on analysis and correlation: Learning enjoyment & leisure interest on science. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 11 (1): 113-126. <http://dx.doi.org/10.30998/formatif.v11i1.5142>
- Teppo, M., Soobard, R., & Rannikmäe, M. (2021, January 1). A Study Comparing Intrinsic Motivation and Opinions on Learning Science (Grades 6) and Taking the International PISA Test (Grade 9). <https://doi.org/10.3390/educsci11010014>
- Tuan, H-L., Chin, C-C., & Shieh, S-H. (2005). The development of a questionnaire to measure students' motivation towards science learning. *International Journal of Science Education*, 27(6), 639–654. <https://doi.org/10.1080/0950069042000323737>
- Umemoto, T., & Inagaki, T. (2023). Relationships between achievement goals, motivation instability, and learning persistence in asynchronous distance learning classes. *SAGE Open*, 13(4). <https://doi.org/10.1177/21582440231219075>
- VanUitert, V. J., Kennedy, M. J., Peeples, K. N., Romig, J. E., Mathews, H. M., & Rodgers, W. J. (2022). Enhancing science performance of middle-school students with and without developmental and behavioral-based disabilities using the Content Acquisition Podcast Professional Development approach. *Journal of Research in Science Teaching*. <https://doi.org/10.1002/tea.21808>
- Wade, K. (2023). *A Narrative Inquiry of How Recent Trio Student Support Services (SSS) Graduates Overcame Barriers to Achieve Academic Success at a Rural Community College - ProQuest*. (n.d.). Retrieved from <https://www.proquest.com/openview/9cf1eb7568980cc833e7df546ce02960/1?pq-origsite=gscholar&cbl=18750&diss=y>
- Wang, M.-T., Degol, J. L., & Ye, F. (2020). Math and science motivation and achievement: A longitudinal examination of the reciprocal relations. *Child Development*, 91(5), 1474–1490. <https://doi.org/10.1111/cdev.13305>
- Wicaksono, A. G. C., & Korom, E. (2023, September 1). Attitudes towards science in higher education: Validation of questionnaire among science teacher candidates and engineering students in Indonesia. <https://doi.org/10.1016/j.heliyon.2023.e20023>
- Yalgin, S., Batman, K. A., & Bastas, M. (2023). Developing an attitude scale towards science and technology courses: A study of validity and reliability. *Journal of Baltic Science Education*, 22(4), 641-652. <https://doi.org/10.33225/jbse/23.22.641>
- Zhang, Y., Guan, X., Ahmed, M. Z., Jobe, M. C., & Ahmed, O. (2022). The Association between University Students' Achievement Goal Orientation and Academic Engagement: Examining the Mediating Role of Perceived School Climate and Academic Self-Efficacy. *Sustainability*, 14(10), 6304. <https://doi.org/10.3390/su14106304>
- Zheng, L., Bhagat, K. K., Zhen, Y., & Zhang, X. (2020). The Effectiveness of the Flipped Classroom on Students' Learning Achievement and Learning Motivation: A Meta-Analysis. *Educational Technology & Society*, 23 (1), 1–15. .



Affiliations and Corresponding Information

Mary Grace A. Nazareth

Sigaboy Agricultural Vocational High School

Department of Education – Philippines

Gina Fe G. Israel, EdD

University of Mindanao Tagum College – Philippines