INTERNATIONAL JOURNAL OF ADVANCED MULTIDISCIPLINARY STUDIES
Volume VI, Issue 5 May 2026, eISSN: 2799-0664

Effect of Mindfulness Practices on The Correlation Between Self-Reflection and Science Motivation Among Stem Students: A Mediation Analysis

CRIS JOY D. LONGYAPON

Abstract — Low science motivation is alarming in educational systems. The Mediating Effect of Mindfulness Practices on the Correlation Between Self-Reflection and Science Motivation was verified. Using predictive research design, collecting data from 252 student samples in a school within Division of Davao City with the use of a simple random sampling technique, findings revealed that mindfulness practices partially but significantly mediate the relationship between self-reflection and science motivation. Supporting Self-Regulated Learning Theory, the finding reveals that mindfulness practices partially but significantly mediate the link between predictor and criterion variables. Future research may explore additional mediators beyond those studied, while school leaders may allocate funds to boost mindfulness practices towards strengthening the correlation of the variables mentioned.

Keywords: Effect of mindfulness practices, self-reflection, science motivation, science and technology engineering and mathematics, mediation analysis

I. INTRODUCTION

The Problem and Its Setting

Low science motivation remains a persistent issue in education, especially in physics and chemistry, despite curriculum reforms (Kim & Lee, 2022). **Globally**, Low science motivation declines from primary to secondary education (Sadera et al. 2020).

International studies highlight low science motivation across regions such as Asia, Australia, Europe, and the United States, with inconsistent student engagement (Lee & Strobel, 2024). In China, STEM learners struggle to stay motivated in science subjects (Tan et al., 2021). Australian students show low motivation in science beyond compulsory years (Baptiste & Maher, 2023), while European studies that low science motivation drops during the transition to secondary education (Jansen et al., 2022). In the United States, low science motivation persists despite access, raising concerns about STEM participation and innovation (Pamela et al., 2024).

In the Philippines, low science motivation among STEM students remains a persistent issue, especially in secondary and tertiary education (Sison, 2022). Despite STEM-focused policies, students show low science motivation in science careers (Mempin et al., 2024). Educators report ongoing low science motivation challenges and including shifting goals. (Landicho, 2020). Studies in regions like Northern Mindanao and Zamboanga reveal low science motivation despite interventions (Ordeniza & Ramber, 2024). Overall, findings indicate a widespread issue of low science motivation in the Philippines (Setiawan & Saputri, 2020)

Low science motivation is a global concern affecting educators and policymakers, as declining interest in science limits STEM engagement and innovation (Bazar et al., 2024). Enhancing motivation is crucial for both academic performance and sustained interest in science fields (Mauliya et al., 2020). However, most studies examine mindfulness and self-reflection separately or focus on general academic motivation, not specifically science motivation in STEM contexts (Maba et al., 2025). This gap highlights the need for this study, which explores the mediating effect of mindfulness practices on self-reflection and science motivation among senior high STEM students in Davao City, Philippines.

Significance of Study

This study is significant because it addresses science motivation as a critical driver for achieving SDG 4 (Quality Education) by fostering a resilient and engaged cohort of STEM learners. In the Philippine context, the findings support the Department of Education's goal of producing holistically developed, globally competitive students by highlighting how mindfulness

practices and self-reflection can enhance scientific literacy and interest. At the institutional level, the results provide Holy Cross of Davao College with evidence-based strategies to integrate well-being into the curriculum, nurturing a mission-driven student body committed to excellence and holistic formation, which ultimately ensures long-term educational sustainability and improved student achievement.

Statement of the Problem

It was aimed in this study to determine the mediating effect of mindfulness practices on the correlation between self-reflection and science motivation. Specifically following objectives were pursued:

1. To describe the levels of mindfulness practices in terms of Observing, Describing, Acting with awareness, non-judging of inner experience and non-reactivity to inner experience, self – reflection in terms of Self – reflection and Insights, and science motivation in terms of Intrinsic motivation, Self-efficacy, Self-determination, and Grade.

2. To determine the significance of the correlation between mindfulness practices, self – reflection, and the science motivation.

3. To determine the significance of the direct effect of the Self – reflection on science motivation.

4. To determine the significance of indirect effect of self – reflection on mindfulness practices through science motivation.

5. To determine the significance of the total effect of self – reflection on science motivation.

Hypotheses

The research hypotheses were tested at a 0.05 level of significance.

Ho1: Self - reflection does not significantly correlate with mindfulness practices

Ho2: Self - reflection does not significantly correlate with science motivation

Ho3: Mindfulness practices do not significantly correlate with science motivation

Ho4: Direct effect of self – reflection on science motivation while controlling for mindfulness practices is not significant

Ho5: Indirect effect of self – reflection on mindfulness practices and science motivation is not significant

Ho6: Total effect of self - reflection on science motivation is not significant

Theoretical and Conceptual Framework

This study is anchored on Self-Regulated Learning (SRL) 2000's by american educational psychologist and distinguished professor Barry Zimmerman, which propose the three cyclical phases: forethought, performance, and self-reflection. These phases help learners become independent and strategic. Forethought involves planning and goal setting, linked to science motivation. Performance occurs during learning, where strategies and mindfulness practices are applied. Self-reflection happens after the task, where learners evaluate and improve their learning. Together, these phases support mindful, reflective, and motivated learning (Zimmerman, 2000).

In this study, self – reflection indicated by reflection and insights is associated with self-reflection phase element mentioned in the theory. Moreover, mindfulness practices characterized by observing, describing, acting with awareness, non-judging of inner experience and non-reactivity to inner experience are linked with performance phase element in the theory. In addition, science motivation as evident by intrinsic motivation, self -efficacy, self – determination, grade

motivation, and career motivation are associated with forethought phase element mentioned in the theory. Hence, this study is fully anchored in Self-Regulated Learning Theory.

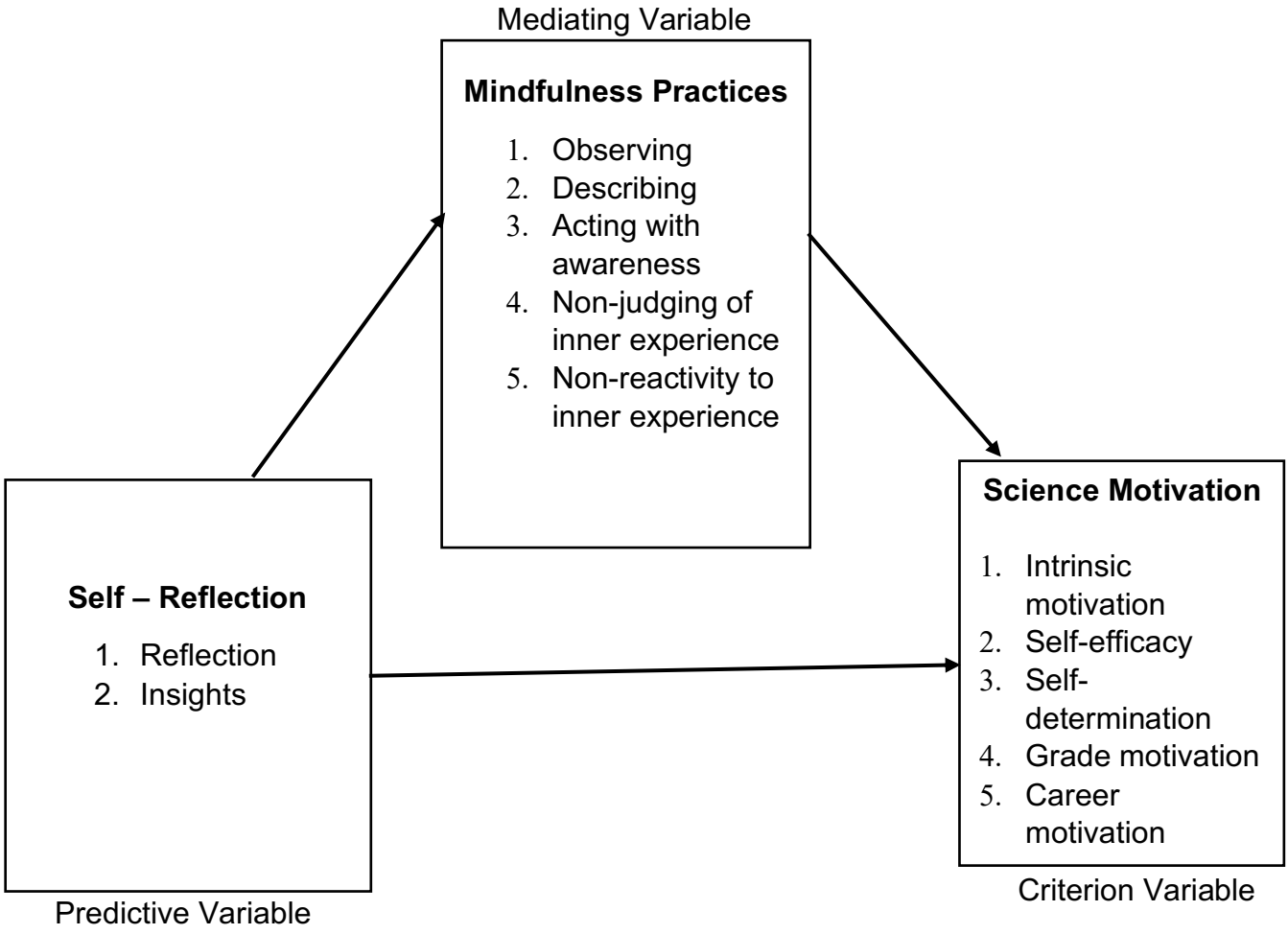

Figure 1. Conceptual Framework of the Study

II. METHODOLOGY

Included in this chapter are the research design, locale of the study, sample and sampling technique, data gathering technique, and data analysis and ethical considerations.

Research Design

This study employed predictive research design. It focuses on forecasting future outcomes by analyzing patterns in existing or historical data, complementing traditional research that explains past events and using statistical models to generate predictions (Sghir et al., 2022). It is suitable for this study as it allows researchers to anticipate trends, support evidence-based decisions, and implement early interventions, particularly in education and social sciences (Khalil & Ebner, 2023). Its advantages include revealing hidden patterns in large datasets, providing forward-looking insights, enhancing strategic planning, and improving decision accuracy by emphasizing prediction over description (Shmueli et al., 2023).

Locale of the Study

The study was conducted in a Cluster one public secondary school within the Schools Division of Davao City. This school was a good choice because it offered the STEM strand and had a sufficient number of Grade 11 and 12 STEM students to participate. It also featured a large student population, which provided an appropriate sample for descriptive-correlational and mediation analysis design. Furthermore, the school's emphasis on inquiry-based and performance-driven science education supported the study's goal.

Sample and Sampling Technique

The respondents of the study were the 252 Grade 11 and Grade 12 STEM students enrolled in School Year 2025–2026. This group involved both male and female students within the age

brackets of below and above 18 years old. All participants were regular students at a selected public secondary school with a total population of 725 students. The sample size was determined using the Raosoft online sample size calculator, based on a population of 725, a 95% confidence level, a 5% margin of error, and a 50% response distribution.

The study used simple random sampling, where each member had an equal and independent chance of being selected (Creswell, 2018). The process involved obtaining the official list of STEM students from the school registrar and using a random number generator to select the total number of respondents without replacement. This method was chosen to reduce bias and ensure that the sample accurately represented the population (Etikan & Bala, 2017). If a selected student declined or was unavailable, another student was randomly chosen from the remaining pool.

Data Gathering Technique

The survey technique was used in gathering data. This technique is a systematic method of collecting information from a sample using structured questionnaires to describe the characteristics, opinions, or behaviors of a larger population and is applied in research to efficiently assess, test, or generalize findings across a defined group (Sheikh et al., 2024). This offers advantages such as reaching large and diverse populations, producing quantifiable data for pattern analysis, enabling generalization, allowing faster data collection, and supporting replicability through standardized procedures (Oranga & Matere, 2025).

In this study, three adapted and modified survey questionnaires were used. The first instrument, the five-facet mindfulness questionnaire, was adapted from the study of Baer et al. (2012). It consists 36 items designed to asses the level of mindfulness practices among respondents, including observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience. The adapted Likert-scale questionnaire was pilot-tested for reliability, yielding a Cronbach's alpha of 0.861.

The second instrument measured self-reflection questionnaire adapted from Silvia (2021). This tool includes 20 items that evaluate the extent to which respondents engage in reflection and develop personal insight. A four-point Likert scale questionnaire was pilot-tested for reliability, yielding a Cronbach's alpha of 0.702.

The third instrument, the science motivation questionnaire II, was adapted from the study of adapted from Glynn et al. (2011). It consists of 23 items designed to assess learners' motivation to study science across several dimensions, including intrinsic motivation, self-determination, self-efficacy, career motivation, and grade motivation. A four-point Likert scale was pilot-tested for reliability, yielding a Cronbach's alpha of 0.800.

Data Analysis Technique

In this study, the data analysis techniques used were descriptive, correlation and mediation analysis. Descriptive analysis help organize and summarize large amounts of data, making it easier for researchers to understand real-world patterns while saving time, no matter the situation or field of study (Costa, 2024). In this study, the mean and standard deviation statistical tools were used. Moreover, the correlation analysis examines the strength and direction of the relationship between two continuous variables (Rizk, 2023). The Pearson Product- moment correlation statistical tool was used. Lastly, mediation analysis separates the overall effect of the treatment into two parts: the indirect effect, which happens through one or more middle factors called mediators, and the direct effect, which explains the remaining part of the outcome that is not caused by those mediators (Celli, 2022). The beta estimate statistical tool for the direct, indirect, and total effect of the determinant was utilized.

The matrix presenting the scale, descriptive level, and corresponding interpretation for each study variable is provided.

Scale	*Level*	*Self-Reflection & Mindfulness Practices*	*Science Motivation*
1.00 – 1.74	Very Low	Very Poor	Very weak
1.75 – 2.49	Low	Poor	Weak
2.50 – 3.74	High	Good	Strong
3.75 – 4.00	Very High	Ver Good	Very Strong

Standard Deviation (SD) Interpretation:

SD Range	*Description*	*Interpretation for Responses*
≤ 0.50	Highly Consistent Responses	Strong and uniform perceptions
0.51 – 1.00	Moderately Consistent Responses	Acceptable consistency
1.01 – 1.50	Low Consistency Responses	Varied perceptions
> 1.50	Very Low Consistency Responses	High variability indicating a lack of consensus in perceptions

The following scheme is used to measure the strength of the correlation (r-value).

Computed r	*Descriptive Interpretation*
+/- 1.00	Perfect correlation
Between +/- 0.75 – +/- 0.99	High correlation
Between +/- 0.51 – +/- 0.74	Moderately high correlation
Between +/- 0.31 – +/- 0.50	Moderately low correlation
Between +/- 0.01 – +/- 0.30	Low correlation
0.00	No correlation

The standard measure for the interpretation of the strength of the mediation is as follows:

Proportion Mediated	*Interpretation*
< 0.20	Weak Mediation
0.20 – 0.50	Moderate Mediation
> 0.50	Strong Mediation

Ethical Considerations

Ethical considerations were prioritized in this study. The researcher followed ethical protocols established by the Holy Cross of Davao College – Society for Moral Integrity and Legal Ethics (HCDC-SMILE), which reviewed the study and instruments. Participation was voluntary, with students aged 18 and above fully informed about the study's purpose, procedures, and minimal risks through signed consent forms. For participants under 18 years old, a letter of assent

was obtained from parents and guardians before their participation. Privacy was protected in accordance with the Data Privacy Act of 2012, and all data were securely stored and properly disposed of. Risks were minimized through clear communication, support resources, and collaboration with school authorities. Respondents were fairly selected. The researcher is a licensed teacher.

III. RESULTS

In this chapter, the results of the study are presented, specifically the descriptive analysis, correlation analysis, mediation analysis. Likewise, the summary of findings is also presented.

Descriptive Results

Table 1 is descriptive table. It contains the variables of the study which are mindfulness practices, self-reflection and science motivation. Moreover, it contains the number of respondents, Standard Deviation (SD), Mean, and descriptive Level.

TABLE 1
DESCRIPTIVE TABLE (N=252)

Variables	N	SD	Mean	Descriptive Level
Mindfulness Practices (MV)	***252***	***0.33***	***3.02***	***High***
Observing		0.36	3.32	Very High
Describing		0.49	2.90	High
Acting with Awareness		0.43	2.89	High
Non-judging of Inner Experience		0.45	3.01	High
Non-reactivity to Inner Experience		0.48	2.98	High
Self-Reflection (IV)	***252***	***0.38***	***3.11***	***High***
Reflection		0.44	3.16	High
Insight		0.46	3.06	High

Science Motivation (DV)	***252***	***0.41***	***3.17***	***High***
Intrinsic Motivation		0.47	3.31	Very High
Self-Efficacy		0.53	2.97	High
Self-Determination		0.50	3.06	High
Grade Motivation		0.52	3.28	Very High
Career Motivation		0.56	3.24	High

Very High - (3.26 – 4.00); High - (2.50 – 3.25); Low – (1.75 – 2.49); Very Low – (1.00 – 1.74)

The descriptive analysis shows that the mean for mindfulness practices variable is 3.02, described as high level. It signifies that the respondents have good mindfulness practices. Four of its indicators are described as high while one as very high. The corresponding standard deviation of 0.33, described as highly consistent indicating strong and uniform perceptions. Moreover, the mean for self-reflection variable is 3.11, described as high level. It implies that the respondents have good self-reflection. All its indicators are described as high. The corresponding standard deviation of 0.38, described as highly consistent indicating strong and uniform perceptions. In addition, the mean for science motivation variable is 3.17, described as high level. It denotes that the respondents have a strong motivation in science. The respective standard deviation of 0.41, described as highly consistent indicating strong and uniform perceptions.

All three variables are at a high level, with science motivation being the highest, followed by self-reflection and mindfulness practices. This indicates that students are strongest in science motivation while still demonstrating strong levels in the other areas.

Correlation Results

Table 2 is the correlation table. It explicitly contains the r-value, p-value, decision on the null hypothesis and its interpretation.

Specifically, the table shows that the correlation between self -reflection and mindfulness practices obtained a p -value of 0.000, which lower than 0.05 level of significance; hence the null hypothesis was rejected indicating that the correlation is statistically significant.

TABLE 2
CORRELATION ANALYSIS (N=252)

Variables			N	r	p-value	Decision on Ho	Interpretation
Self-Reflection (IV)	-	*Mindfulness Practices (MV)*	252	0.746	0.000	Reject Ho	Significant Positive Strong Correlation
Self-Reflection (IV)	-	*Science Motivation (DV)*	252	0.537	0.000	Reject Ho	Significant Positive Moderate Correlation
Mindfulness Practices (MV)	-	*Science Motivation (DV)*	252	0.534	0.000	Reject Ho	Significant Positive Moderate Correlation

Level of Significance: 0.05, Decision Rule: Reject H_0 if $p < 0.05$

The r-value of 0.746 reflects a high correlation between self-reflection and mindfulness practices. This implies that as self-reflection changes, mindfulness practices also tend to change among students. Likewise, the correlation between self- reflection and science motivation yielded a p -value of 0.000, which also lower than 0.05 level of significance; hence, the null hypothesis was rejected indicating that the correlation is statistically significant. The r-value of 0.537 shows a moderately high correlation between self- reflection and science motivation. This implies that the higher levels of self-reflection are associated with higher levels of science motivation among students. Lastly, the correlation between mindfulness practices and science motivation attained a p-value of 0.000, which still lower than 0.05 level of significance; hence, the null hypothesis was rejected indicating that the correlation is statistically significant. The r-value of 0.534 shows a moderately high correlation between mindfulness practices and science motivation. This implies

that the higher levels of mindfulness practices are associated with higher levels of science motivation among students.

Both self-reflection and mindfulness practices show significant positive relationships with science motivation, meaning that higher self-reflection or mindfulness is associated with higher science motivation. Among the variables, self-reflection has the strongest correlation with mindfulness practices, indicating that self-reflection may play a greater role in enhancing students' mindfulness, which in turn supports their science motivation.

Mediation Results

The Table 3 is a mediation table. The table includes several columns for Beta Estimate, Standard Error, z-value, p-value, and its interpretation.

TABLE 3
MEDIATION ANALYSIS (N=252)

Total effects

Variables			Estimate	Std. error	z-value	p-Value	Interpretation
Self-Reflection (IV)	→	*Science Motivation (DV)*	0.567	0.056	10.10	0.000	Significant

Indirect effects

Variables				Estimate	Std. error	z-value	p-Value	Interpretation
Self-Reflection (IV)	→	*Mindfulness Practices (MV)*	→ *Science Motivation (DV)*	0.237	0.063	3.785	0.000	Significant

Direct effects

Variables			Estimate	Std. error	z-value	p-Value	Interpretation
Self-Reflection (IV)	→	*Science Motivation (DV)*	0.330	0.102	3.234	0.001	Significant

The mediation analysis table shows that the total effect of self-reflection on science motivation yielded a Beta estimate of 0.567 with a corresponding p-value of 0.000, which is lower than the 0.05 level of significance. This indicates that the total effect of self- reflection on science motivation is significant. Similarly, the indirect of self-reflection through mindfulness practices on science motivation obtained a Beta estimate of 0.237 with a p-value of 0.000 which also lower than the 0.05 level of significance. This signifies that the indirect effect of self-reflection on science motivation through the mediator, is significant. Lastly, the direct effect of self-reflection on science motivation acquired a Beta estimate of 0.330 with a corresponding p-value of 0.001, which still

lower than the 0.05 level of significance. This indicates that the direct effect of self-reflection on science motivation is significant.

The table further presents that the mediated proportion is 0.42 (42%), indicating that mindfulness practices account for a moderate portion of the relationship between self-reflection and science motivation. This implies that mediation of mindfulness practices explains 42% in the variance of the correlation between self- reflection and science motivation.

Summary of Findings

1. Self- reflection and mindfulness practices significantly correlate with science motivation.
2. The direct effect of self-reflection on science motivation while controlling for mindfulness practices, is significant.
3. The indirect effect of self-reflection through mindfulness practices on science motivation, is significant.
4. The total effect of self-reflection on science motivation is significant.

IV. DISCUSSIONS

Discussed in this chapter are the findings of the study. Also, the conclusion and recommendations are presented accordingly.

Self-reflection and Mindfulness Practices Correlation

The finding that self-reflection has a strong positive correlation with mindfulness practices, affirms prior study stating that mindfulness acts as a cognitive gateway by providing the mental clarity necessary for deep, insightful reflection (Vázquez-Cano et al. 2024). Likewise, this current

finding affirms Zhou et al. (2023) who highlighted that engaging in mindfulness-based therapeutic practices enhances individuals' capacity for self-reflection. In particular, studies of mindfulness-based study reported that participants demonstrated heightened self-reflection, including greater ability to observe and introspect on thoughts and emotions in a non-judgmental, mindful way, after mindfulness interventions compared with controls. This supports a positive relationship between mindfulness practice and self-reflective awareness.

Self-reflection and Science Motivation Correlation

The finding of the correlation between self-reflection and science motivation affirms the prior study stating that self-reflection allows students to identify their own strengths and weaknesses, which in turn improves their self-efficacy and overall engagement in the science curriculum (Panadero et al., 2024). Likewise, this current finding affirms Broadbent et al. (2024) who highlighted that the assess phase of learning is synonymous with self-reflection and it indicates that students who are encouraged to reflect on their goals and adapt their strategies are more likely to sustain long-term engagement and persistence in complex academic tasks, particularly within scientific and technical disciplines.

Mindfulness Practices and Science Motivation Correlation

The finding of this study demonstrates that integrating mindfulness exercises directly into the elementary science curriculum leads to significantly higher levels of science motivation. The study asserts that students who engaged in mindfulness activities, including meditation and introspective inquiry focused on science content, showed sustained improvements in their motivation and academic achievement compared to a control group, with these effects remaining evident six months after the intervention (Alomari 2025). Likewise, recent studies indicate that mindfulness has a significant and positive influence on academic motivation, contributing to as much as 89.6% of the variance in some cases. This research asserts that mindfulness practices foster a state of awareness and direct their attention more deeply toward tasks, thereby increasing

internal (intrinsic) motivation while decreasing reliance on external pressures (Aldbyani et al. 2025). However, this current finding contradicts Simpson et al. 2024, who found that when mindfulness is used as an instrumental tool to boost grades or motivation, it can actually increase student stress by adding another task to their busy curriculum. While simpson et al. had 197 samples, but this current finding was established using 252 samples.

Self-Reflection and Science Motivation as Mediated by Mindfulness Practices

The finding of this study asserting that mindfulness practices partially mediate the correlation between self-reflection and science motivation, affirms the study of Kalkan and Kaya (2023) highlighting that mindfulness practices serve as a significant mediator between self-reflective cognitive styles and academic motivation. Kalkan and Kaya also assert that mindfulness acts as a bridge that allows individuals to translate their self-reflections into meaningful motivational energy. They found that while self-reflection provides the raw data for personal growth, mindfulness practices provide the focus and non-judgmental awareness necessary to sustain motivation in challenging subjects like science. Moreover, the current finding supports the claim that students who engage in high levels of self-reflection are more likely to adopt mindfulness practices, which in turn significantly reduces academic anxiety and boosts motivation, and the direct path remains significant, but the indirect path through mindfulness provides a crucial additional layer of influence on the student's drive Xie et al. (2024). On the contrary, this current finding contradicts Kuyken et al. (2022), who found that mindfulness was actually less effective than typical school support, and in some cases, students with existing mental health challenges even showed worse outcomes. While Kuyken et al. study show limited success for the general population, but this current finding was specifically focused on STEM students, where the high-pressure and analytical nature of the subjects may make the 'mediating' effect of mindfulness more visible or necessary.

V. CONCLUSIONS

Based on the findings, Mindfulness Practices partially but significantly mediate the relationship between Self-Reflection and Science Motivation. This result provides robust empirical evidence for Self – Regulated Learning Theory positing the three cyclical phases, which are forethought phase, performance phase and self-refection phase.

VI. RECOMMENDATIONS

Based on the study's conclusions, several recommendations are proposed:

1. Future research may explore other variables not cover in this study to be utilized as potential mediators on the correlation between self-reflection and science motivation.

2. School leaders may exert optimum efforts and allocate resources for mindfulness practices to students to strengthen the connection between self-reflection and science motivation. The provision of efforts and resources may be directed and allocated for mindfulness practices.

REFERENCES

[1.] Akkaya, G. (2024). Investigation of the relationship between science motivation and the 21st century skill levels of secondary school students. Pegem Journal of Education and Instruction. https://doi.org/10.47750/pegegog.14.03.01

[2.] Arifin et al., (2024). Unraveling the decline of science interest among middle school students: A case study. AISTEEL Conference Proceedings.

[3.] Barroga, E. (2022). A practical guide to writing quantitative and qualitative... (overview of quantitative methods). PubMed Central.

[4.] Bhandari, P. (2021). Correlational research — When & how to use. Scribbr.

[5.] Cavadore, M., et al. (2022). Mindfulness-based interventions in schools: A systematic review of individual and environmental outcomes. Journal of Educational Psychology, 114(4), 780–802. https://doi.org/10.1037/edu0000720

[6.] Fortus & Touitou (2021). Changes to students' motivation to learn science. Disciplinary and Interdisciplinary Science Education Research, 3(1). https://doi.org/10.1186/s43031-021-00034-8

[7.] Gay et al., (2012). Educational research: Competencies for analysis and applications (10th ed.). Pearson Higher Ed.

[8.] González-Martín, A. M., et al. (2023). Mindfulness to improve the mental health of university students: A systematic review and meta-analysis. Frontiers in Public Health, 11, 1284632. https://doi.org/10.3389/fpubh.2023.1284632

[9.] Gunsilius, C. Z., Price, M. M., Rogers, S. L., et al. (2024). Paying attention to attention: A program evaluation of faculty-delivered mindfulness-based attention training to optimize wellness and professionalism in medical students. BMC Medical Education, 24, 182. https://doi.org/10.1186/s12909-024-05119-5

[10.] Hassan, M., et al. (2025). Impact of students' self-regulation and mindfulness on academic self-efficacy: The mediating effect of mental well-being. Cogent Education, 12(1). https://doi.org/10.1080/2331186X.2025.2498183

[11.] Hayes (2020). Introduction to mediation, moderation, and conditional process analysis and related PROCESS literature; and Rockwood & Hayes (2020) chapter on regression-based approaches to mediation. Andrew F. Hayes, Ph.D.

[12.] Hayes, A. F. (2022). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (3rd ed.). Guilford Press.

[13.] Kosie et al., (2022). Open science considerations for descriptive research... (descriptive research role). PubMed Central.

[14.] Landicho (2020). Research attitudes, motivations, and challenges of STEM education researchers. International Journal of Technology in Education, 3(1), 45–58. https://files.eric.ed.gov/fulltext/EJ1264083.pdf

[15.] Magulod (2019). Learning styles, study habits and academic performance of Filipino university students in applied science courses: Implications for instruction. Journal of Technology and Science Education, 9(2), 184–198. https://doi.org/10.3926/jotse.504

[16.] Martínez-Pérez et al., (2020). Motivation and learning strategies in physics education: A study in rural Mexican schools. International Journal of Science Education, 42(3), 345–364. https://doi.org/10.1080/09500693.2019.1709801

[17.] Mauliya et al., (2020). Senior high school students' motivation toward science learning and science academic performance. International Conference on Contemporary Education (ICCE), Philippines.

[18.] Mempin et al., (2024). Senior high school students' motivation toward science learning and science academic performance. Bulacan Agricultural State College. ICCE Proceedings.

[19.] Pangan (2018). Students' motivation towards science learning (SMTSL) of STEM students of University of Batangas, Lipa City. PEOPLE: International Journal of Social Sciences, 3(3), 1262–1274. https://doi.org/10.20319/PIJSS.2018.33.12621274

[20.] Richardson et al., (2022). A systematic review of motivation in STEM education: Trends, gaps, and future directions. Educational Psychology Review, 34(2), 567–589. https://doi.org/10.1007/s10648-021-09603-4

[21.] Rijnhart et al., (2021). Mediation analysis methods used in observational research: A scoping review and recommendations. BMC Medical Research Methodology, 21(226). https://doi.org/10.1186/s12874-021-01426-3

[22.] Sadera et al., (2020). Challenges encountered by junior high school students in learning science: Basis for action plan. Universal Journal of Educational Research, 8(12A), 7405–7414.

[23.] Saro et al., (2023). Quantitative research methods: Applications and techniques in educational research. International Journal of Research and Innovation in Social Science, 7(1), 112–118. https://doi.org/10.47772/IJRISS.2023.70112

[24.] Shlyapnikov, V. N., & Shestova, M. A. (2026). Motivational and volitional predictors of academic performance among university students. Psychological Science and Education, 31(1), 158–174. https://doi.org/10.17759/pse.2026310107

[25.] Singh & Sharma (2025). Mindfulness in education: The way forward for achieving Sustainable Development Goals. In S. Kumar (Ed.), Sustainability and mindfulness in education (pp. 15–32). Taylor & Francis. https://doi.org/10.1201/9781003594055-2

[26.] Sison (2022). Philippine struggle to make the grade in STEM education. SciDev.Net. https://www.scidev.net/asia-pacific/scidev-net-investigates/philippine-struggle-to-make-the-grade-in-stem-education/

[27.] Soriano-Sánchez, J. G., Quijano-López, R., & Saavedra Regalado, M. S. (2025). Methodological strategies to enhance motivation and academic performance in natural sciences didactics: A systematic and meta-analytic review. Education Sciences, 15(10), 1289. https://doi.org/10.3390/educsci15101289

[28.] Toroba, J. R. (2025). The mediating role of science motivation between the relationship of self-regulated learning strategies and students' achievement in general science. International Journal of Research and Innovation in Social Science, 9(5), 126–141. https://dx.doi.org/10.47772/IJRISS.2025.90500013

[29.] Tus et al., (2020). The learners' study habits and its relation on their academic performance. St. Paul College of Bocaue. https://www.researchgate.net/publication/346580149

[30.] Vázquez-Cano, E., et al. (2024). The impact of mindfulness on the cognitive reflection of university students. Educational Psychology Review, 36(1), 12–29. https://doi.org/10.1007/s10648-024-09854-w

[31.] Vetter et al., (2021). Correlation and simple linear regression. Anesthesia & Analgesia, 132(3), 837–838. https://doi.org/10.1213/ANE.0000000000005380

[32.] Wang (2020). Cross-sectional studies: Strengths, weaknesses, and recommendations.

[33.] Wisniewski et al., (2024) Correlation (Coefficient, Partial, Pearson r, and Spearman Rank) and Regression Analysis.

[34.] Yang et al., (2025) A New Multiple Correlation Coefficient without Specifying the Dependent Variable

[35.] Zare, H., et al. (2024). The impact of mindfulness on academic achievement of students with the mediating role of adaptability: A structural equation modeling approach. BMC Medical Education, 24, 1167. https://doi.org/10.1186/s12909-024-06192-6

[36.] Zhu, Z., et al. (2025). Mindfulness-based art interventions for students: A meta-analysis review of the effect on anxiety. Behavioral Sciences, 15(8), 1078. https://doi.org/10.3390/bs15081078

[37.] Zimmerman (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation (pp. 13–39). Academic Press. https://doi.org/10.1016/B978-012109890-2/50031-7