The Mediating Role of Science Motivation between the Relationship of Self-Regulated Learning Strategies and Students' Achievement in General Science

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ABSTRACT

This study investigates the function of science motivation as a mediator in the link between self-regulated learning practices and general science success among junior high school students in the Cateel districts of the Philippines. The research examines the degrees of self-regulation learning strategies, motivation, and academic achievement to grasp the complex interplay between these variables in Science education. Data was collected via a survey to measure students' usage of learning techniques and motivation in Science learning. The findings show that students use highly self-regulated learning techniques, notably in cognitive, metacognitive, and resource management domains. Science motivation appears as an important moderator in the link between self-regulated learning practices and academic accomplishment. The study emphasizes the necessity of developing students' intrinsic drive to increase their engagement and performance in scientific education. Recommendations are provided for educators, policymakers, and future researchers to enhance self-regulated learning, intrinsic motivation, and academic achievement in scientific education. This study adds to the current body of evidence about successful teaching approaches and student outcomes in scientific education, highlighting the importance of motivation and self-regulated learning in improving students' academic performance and learning experiences.

Keywords: self-regulated learning strategies, motivation, academic achievement, academic performance, metacognition

INTRODUCTION

The global dilemma of poor student engagement and accomplishment in science education remains as a result of ineffective teaching practices, a lack of resources, and insufficient emphasis on nurturing scientific curiosity. The complex interplay between motivation, academic accomplishment, and self-regulated learning systems exacerbates this problem. These connections have yet to be completely understood and require more research. Addressing this serious dilemma requires a holistic strategy that incorporates new teaching methodologies, student-centered learning settings, and a culture of scientific inquiry.

The world is at a critical moment in scientific education. Science education, which is critical for driving future innovation and tackling difficult issues, is experiencing a worldwide crisis: poor student interest and success (UNESCO, 2015; OECD, 2019). This concerning tendency jeopardizes progress in critical areas such as sustainable development, healthcare, and technological advances, endangering the well-being of individuals and society (Aikenhead, 2006; Osborne, 2014). Inadequate teaching methodologies, a lack of resources, and a failure to promote scientific excitement are all significant factors. Furthermore, the need for a better understanding of how motivation, academic accomplishment, and self-regulated learning interact impedes the development of effective interventions. According to research, scientific motivation has an important mediating role, with students who have an inherent interest in science participating in more self-regulated learning processes and eventually obtaining greater academic achievements (Yang et al., 2021).

The Philippines has established high criteria for STEM education, yet a serious national issue persists. According to the 2022 Programme for International Student Assessment (PISA) results, on December 5, 2023, the Philippines scored third from the bottom in Science, with an average score of 356. Students' poor participation

and accomplishment limit the country's potential for economic growth and technological innovation in science fields, which must catch up with worldwide norms (Gonzales et al., 2018). Inadequate teaching materials, outdated teaching methodologies, and a lack of emphasis on nurturing scientific curiosity all contribute to this problem (Department of Education, 2019). Furthermore, our limited knowledge of how self-regulated learning, science motivation, and academic accomplishment interact impedes the development of effective treatments (Gonzales et al., 2013). A coordinated national effort that prioritizes creative teaching methods, supports student-centered learning environments, and cultivates a culture of scientific inquiry is needed to address this pressing issue (Philippine Academy of Sciences, 2020).

Cateel, Davao Oriental, like many other communities in the Philippines, is facing a significant issue in science education. Municipal students require assistance with poor engagement and accomplishment in Science, which is causing them to lag below national norms and limiting their future employment opportunities (Gonzales et al., 2018). The low availability of resources, such as science laboratories and competent instructors (Department of Education, 2019), as well as traditional teaching approaches that fail to captivate students' imaginations (National Research Council, 2000), contribute to this issue. Furthermore, the complex interplay between self-regulated learning strategies, science motivation, and academic achievement remains to be investigated in the local context, preventing the development of effective interventions tailored to the specific needs of students in Cateel (Philippine Academy of Sciences, 2020).

While there is a well-established link between self-regulated learning strategies (SRLS) and science accomplishment, the exact role that scientific motivation plays in this relationship is unknown. Previous research has generally focused on the individual components of this connection, ignoring the complex interactions between scientific desire, academic outcomes, and SRLS. This gap impedes a thorough understanding of the complex systems behind good scientific learning. More specifically, the study lacks (a) a thorough examination of the many motivating elements that influence students' engagement with science, such as intrinsic curiosity, extrinsic incentives, and self-efficacy beliefs. (b) an investigation of how certain SRLS, such as time management or goal planning, affect the formation and maintenance of scientific motivation. (c) longitudinal studies that examine the dynamic interaction between SRLS, scientific motivation, and academic accomplishment across time. (d) investigate how contextual factors such as socioeconomic background, classroom environment, and cultural influences impact the mediating function of scientific motivation. (d) Developing and validating evidence-based treatments that target particular motivating elements to improve SRLS and, eventually, science learning results.

Addressing these research gaps necessitates a multifaceted strategy that combines quantitative and qualitative approaches, employs multiple data sources, and encourages collaboration among academics, educators, and policymakers. By elucidating the mediating role of science motivation, we may better understand how students learn Science effectively, paving the way for developing more effective interventions and ultimately fostering a future generation of passionate and successful scientists.

Rationale of the Study

Self-regulated learning (SRL) strategies are essential for students to succeed in science education and develop greater comprehension, resilience, and achievement. Science motivation significantly impacts students' academic performance by influencing their involvement, persistence, and effort in science studies. However, researchers are still actively exploring the relationship between SRL strategies and academic accomplishment in Science.

Previous studies have prioritized examining the direct link between accomplishment and SRL, overlooking the potential mediating role of science motivation. This study examines how science motivation mediates the relationship between students' achievement in general Science and self-regulated learning practices. It will investigate how different scientific motivations (intrinsic, extrinsic, curiosity) interact and influence various SRL methods (goal-setting, planning, monitoring, seeking help). The research will then explore the long-term impact of these interactions on student achievement.

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This study will help us understand the complex relationship between SRL, scientific motivation, and academic accomplishment in Science. Additionally, this research addressed a need in the field by understanding the connection between motivation, self-regulated learning strategies, and students' achievement. It benefited organizations like the Department of Education, curriculum makers, teachers, students, and future researchers.

Department of Education Officials. The findings can help shape scientific education policies and programs to improve SRL skills and science motivation. It could involve implementing teacher professional development programs on SRL strategies, allocating resources for curriculum development that fosters intrinsic motivation, or creating assessment frameworks incorporating evidence of both SRL and motivational constructs.

Curriculum Makers. The study's findings can inform the development of scientific curricula that explicitly include techniques for developing SRL skills and science interests. It might entail including metacognitive cues, self-assessment exercises, and chances for student choice and autonomy in the curriculum.

Science Teachers. This study will offer insight into the complex interplay between students' self-regulated learning (SRL) and their desire for science. This understanding will enable teachers to personalize their instruction and assistance to specific students' requirements, assisting those who struggle with motivation or SRL methods. Understanding the characteristics that contribute to student success in Science allows instructors to create a more interesting and effective learning environment, resulting in increased levels of student engagement, involvement, and, ultimately, accomplishment in the classroom.

Students. This study can help students identify their strengths and weaknesses in both SRL and scientific motivation. This self-awareness allows them to take responsibility for their learning and design ways to improve their academic success in Science. Understanding the factors that contribute to success in science will help them develop a more positive and confident attitude toward the subject. It can help students overcome obstacles and eventually reach their full potential in scientific education.

Future Researchers. Future researchers in scientific education will greatly benefit from the outcomes of this study. Researchers can improve student performance in scientific education by improving their understanding of the link between self-regulated learning techniques, science motivation, and academic accomplishment. Additionally, future studies could delve deeper into the specific mechanisms through which motivation influences self-regulated learning and academic outcomes, providing a more nuanced understanding of these complex relationships.

Statement of the Problem

This study investigates the mediating effect of science motivation in the relationship between self-regulated learning strategies and students' achievement in the 2nd Quarter of the School Year 2023-2024.

Specifically, it seeks to address the following questions:

1. What is the level of self-regulated learning strategies of Junior High students in learning General Science in terms of:

1.1 cognitive

1.2 metacognitive

1.3 resource management

2. What is the level of Junior High School students' motivation in learning Science in terms of:

2.1 intrinsic motivation

2.2 self-efficacy

2.3 self-determination

2.4 career motivation

2.5 grade motivation

3. What is the level of students' achievement in learning Science in the Second Quarter Period?

4. Is there a significant relationship between self-regulated learning strategies and the achievement of Junior High School students in General Science?

5. Is there a significant relationship between self-regulated learning strategies and the science motivation of Junior High School students?

6. Is there a significant relationship between science motivation and the achievement of Junior High School students in General Science?

7. Is there a mediating effect of Science Motivation between the Relationship of Self-Regulated Strategies and Achievement in General Science of Junior High School students?

Hypotheses

The researcher tested the hypotheses by setting a significance threshold of 0.05.

□□**1:** There was no significant relationship between self-regulated learning strategies and students' achievement.

□□**2:** There was no significant relationship between self-regulated learning strategies and science motivation.

□□**3:** There was no significant relationship between science motivation and students' achievement.

□□**4:** There was no mediating effect of Science Motivation between the Relationship of Self-Regulated Strategies and Achievement in General Science of Junior High School students.

REVIEW OF RELATED LITERATURE

This section discusses the pertinent literature and studies. The author presented the background information to highlight this study's importance and ensure readers understand the variables under investigation. The presentation and subsequent discussion of variables and indicators followed. It also highlighted the synthesis to understand the study better.

Self-Regulated Learning Strategies

Self-regulated learning strategies refer to the cognitive, metacognitive, and resource management processes that learners use to regulate and control their learning. According to Zimmerman, self-regulated learning involves the ability of students to participate in their learning process, making changes and adjustments as needed to achieve their learning goals (Noviani et al., 2023). A study conducted a systematic review of literature from 2012 to 2020 on the self-regulated learning process in intelligent learning environments by Gambo and Shakir in 2021 found that self-regulated learning is a critical factor influencing the learning process in intelligent learning environments. Self-regulated learning boosts scientific literacy by enhancing students' self-efficacy, motivation, active learning behaviors, and engagement (Rahmawati et al., 2023). Additionally, self-regulated learning is correlated with academic achievement in mathematics, with factors such as self-efficacy, motivation, and goals playing a significant role (Herlina et al., 2022)

Self-Regulated Learning Strategies as to cognitive. Self-regulated learning strategies in the literature have focused on various aspects, including cognitive strategies. Different contexts highlight the importance of cognitive strategies for self-regulated learning. For instance, intelligent learning environments actively support

cognitive components like goal setting and knowledge internalization (Gambo & Shakir, 2021). Similarly, in integrated learning settings, cognitive strategies have been recognized as one of four types of self-regulation methods, alongside metacognitive, motivational, and managerial strategies (Eggers et al., 2021). Additionally, cognitive techniques have been shown in the context of second language acquisition to aid in knowledge internalization and language growth (Zhang & Zou, 2022). Furthermore, in the context of massive open online courses (MOOCs), cognitive regulation mechanisms have been highlighted as an important component of self-regulated learning, notably in goal formulation (Lee et al., 2019).

Self-Regulated Learning Strategies as to metacognition. Self-regulated learning practices, notably metacognition, have received substantial attention in the field of second language teaching. Metacognitive methods have been shown to increase academic achievement as well as affective dimensions such as self-efficacy and motivation (Zhang & Zou, 2022). Metacognition also helps to reduce ambiguity and anticipate outcomes in many learning contexts (Vaughan, 2022). In computer education, there is a rising interest in understanding how metacognitive and self-regulation abilities influence student success in programming courses. Several theories from psychology and education have been used to investigate metacognition and self-regulation in programming education, with promise for future use (Rodriguez et al., 2022). Furthermore, research shows that metacognitive education improves problem-solving skills, reading comprehension, critical thinking, and self-regulated learning (Loksa et al., 2022).

Self-Regulated Learning Strategies as to resource management. According to Pintrich, learners employ planning techniques to decide how to divide their time and resources among various learning activities. Regulation techniques are resource management strategies that focus on learners' abilities to regulate their actions and emotions while learning (Shabani et al., 2020). The gradual integration of resources from the academic setting is critical for developing self-regulation in learning. This approach demands students' time and effort (Miná et al., 2021). Resource management strategies, particularly learning environment, help-seeking, and peer learning, were positively correlated with the student's learning outcomes (Duong, 2020).

Students' motivation in learning Science

Students' motivation to learn Science has been a topic of interest in various studies. It significantly impacts students' learning experiences, particularly in scientific education. Several studies have examined the aspects that impact students' motivation to learn Science (Nishimura et al., 2020). Research shows that positive attitudes and behaviors significantly improve students' academic achievement (Kurbanoğlu, 2013). Moreover, Azhary et al. (2020) highlight the importance of intrinsic motivation, extrinsic motivation, and learning behavior in impacting student achievement.

Students' motivation in learning Science as to intrinsic motivation. Intrinsic motivation is essential to students' academic performance and learning outcomes (Thu et al., 2022). Learners with intrinsic motivation demonstrate a genuine interest in the subject matter and a desire to learn for learning's sake. Students with higher levels of intrinsic motivation tend to have better academic performance (Suárez-Mesa & Gomez, 2021). Technology-enhanced learning is an excellent way to stimulate students' learning motivation (Darmawati, 2022). Understanding the impact of socioemotional factors, such as intrinsic motivation, on students' learning and achievement is essential for educational practitioners, researchers, and policymakers.

Students' motivation in learning Science as to self-efficacy. Students' motivation is closely related to self-efficacy, which is the belief in one's ability to succeed in academic tasks. One study discovered that self-efficacy effectively minimizes academic procrastination when finishing a thesis (Mardiana, 2023). Another study found that academic self-efficacy moderated the connection between academic motivation and accomplishment (Shofia et al., 2023). Self-efficacy has a significant effect on academic outcomes such as task performance and effort expenditure (Hibatullah et al., 2022). Furthermore, self-efficacy has been established as an important component in predicting students' physical activity behavior (Reide et al., 2023).

Students' motivation in learning Science as to self-determination. Self-determination theory (SDT) was applied by researchers better to understand student motivation in various school topics (Bodrova et al., 2023). According to SDT, students' self-determined motivation, motivated by interest, curiosity, and personal values, is related to

greater academic well-being, persistence, and accomplishment (Guay, 2021). A cross-sectional research of senior high school students discovered a substantial positive association between self-determination and academic motivation, highlighting the multifaceted character of self-determination and its impact on academic achievement (Bureau et al., 2021). The study also validated self-determination as a multidimensional construct (Hasniza et al., 2023). Additionally, the review of SDT highlights the continuum of motivation, ranging from motivation to extrinsic to intrinsic motivation, with intrinsic motivation being the highest form of motivation that satisfies the innate psychological needs for competence, autonomy, and relatedness (Luria, 2022).

Students' motivation in learning Science as to career motivation. Motivation is a crucial factor in students' academic and career success. Numerous studies have explored the factors influencing students' motivation, including their career aspirations. One study by Lounsbury, Hutchins, and Loveland found that students' career motivation positively correlated with academic performance. (2021, Lounsbury et al.) Another study by Wigfield and Eccles examined the relationship between students' career motivation and academic outcomes. They found that students who were highly motivated toward their career goals demonstrated higher levels of academic achievement.

Furthermore, various factors have been shown by research to influence students' motivation towards their career goals. (Wardhany et al., 2018). These factors include gender, academic achievement, and perceived social support (Brannan, 2017).

Students' motivation in learning Science as to grade motivation. Motivating students to perform well academically is a crucial aspect of education. Numerous studies have explored the relationship between students' motivation and academic performance, specifically focusing on their grade motivation (Tsai et al., 2022). Individuals are more motivated to learn when they understand how a subject is relevant to their potential career (A Matter of Perspective in the First Accounting Courses, 2022). Furthermore, academic motivation, which includes intrinsic and extrinsic motives, positively correlates with students' grades. Another study conducted in Indonesia found that learning motivation significantly impacts academic achievement in subjects such as the Indonesian language (Werang et al., 2022). Additionally, Yudiono suggests that educators should identify effective learning models to increase student motivation (Yudiono, 2020).

Student's Achievement in Science

A systematic literature review found that there are theoretical frameworks, construct operationalization, and quantitative results related to student motivation and science achievement (Zhang & Bae, 2020). Lee (2000) highlights the importance of science content and process in achieving success, while Kartimi (2021) emphasizes the role of self-efficacy in both students and teachers. Researchers have studied efforts to improve students' creative thinking abilities in science learning, and the application of Project-Based Learning (PjBL) and Problem-Based Learning (PBL) models are practical (Kiraga, 2023). Moreover, school and district science leaders are crucial in planning, implementing, and supporting teacher change in professional development models, improving student achievement in science education (Whitworth et al., 2015).

Relationship between self-regulated learning strategies and students' achievement

Research has revealed a positive relationship between self-regulated learning strategies and students' academic achievement. A study conducted in South Korea with 6th-grade students found that metacognition and effort regulation positively predicted literacy and math achievement within and across schools (Ha et al., 2023). Another South Korean study investigated the connection between self-regulated learning strategies and science achievement. They discovered that emotional control had a substantial impact on modulating this association, influencing the intensity of the link between SRL methods and accomplishment. (Ha, 2023). Furthermore, research on online and mixed-learning settings has demonstrated that self-regulated learning is critical for increasing students' academic performance, particularly in STEM fields (Xu et al., 2023). Furthermore, studies with college students revealed a strong link between self-regulated learning methods and academic achievement (Elesio, 2023).

Relationship between self-regulated learning strategies and science motivation

Self-regulated learning strategies have been shown to improve scientific motivation (Paz-Baruch & Hazema, 2023). Students who employ self-regulated learning techniques such as goal-setting, planning, note-taking, monitoring, and self-evaluation have better levels of science motivation (Ramadhani et al., 2022). Furthermore, self-regulated learning practices strongly predict academic success in science (Saputri et al., 2022). Using self-regulated learning methodologies has improved students' perceived academic self-efficacy, science motivation, and academic success (Cengiz-Istanbullu & Sakiz, 2022).

Relationship between science motivation and students' achievement

Several studies have examined the relationship between science motivation and student accomplishment. Zhang (2020) developed the Expectancy-Value Theory as a crucial framework, while Leong (2018) discovered that intrinsic drive improves scientific success. Libao (2016) found a favorable association between extrinsic motivation and academic success in science. Lee (2016) expanded on this by emphasizing the role of intrinsic desire in predicting science performance, with engagement serving as a mediator.

Mediating Effect of Motivation on Students' Achievement and Self-regulated Learning Strategies

Academic self-efficacy has been shown to govern the link between academic motivation and student academic accomplishment (Shofia et al., 2023). Students who are intrinsically driven and have a growth attitude do better academically (Guo et al., 2023). Students with learning or mastery of objectives have better levels of self-regulated learning and task engagement. Grit, self-efficacy, and intrinsic drive are all important determinants of self-directed learning practices.

According to Özen's (2017) meta-analysis, motivation has a small but favorable impact on student success. Havidz (2023) agrees, highlighting the importance of the learning environment on student motivation and accomplishment. Finally, Zhang (2020) conducted a thorough analysis of motivational variables impacting scientific accomplishment and identified the Expectancy-Value Theory as a significant framework.

Synthesis

Self-regulated learning strategies are the cognitive, metacognitive, and resource management processes that students employ to govern and control their learning. On the other side, scientific motivation refers to the various motivating variables that influence students' engagement with science, such as intrinsic curiosity, extrinsic rewards, and self-efficacy beliefs.

More research is needed on the intricate relationships between scientific motivation, academic results, and self-regulated learning mechanisms. It entails investigating how certain self-regulated learning techniques, such as time management or goal planning, impact the formation and maintenance of scientific motivation. Furthermore, longitudinal studies that follow the dynamic interaction of self-regulated learning techniques, science motivation, and academic accomplishment across time are critical.

Furthermore, contextual factors such as socioeconomic background, classroom setting, and cultural influences must be investigated to determine how scientific motivation plays a mediating function. Finally, creating and verifying evidence-based treatments that target particular motivating components is extremely important for improving self-regulated learning techniques and, ultimately, science learning outcomes.

Theoretical/Conceptual Framework

This study's framework is based on self-determination theory. This idea emphasizes the importance of intrinsic motivation and self-concept in inspiring student participation and achievement in science (C. Ha, 2023). According to Areepattamannil et al. (2023), pupils who have a positive self-concept in science and are organically driven to study are more likely to reach greater science accomplishment levels. Additionally, the theory emphasizes the mediating function of intrinsic motivation in the link between self-concept and scientific accomplishment (Siew & Bally, 2022). It indicates that encouraging pupils to have a good self-concept and

intrinsic drive might help them obtain better results in science. Furthermore, the idea proposes that treatments that promote positive self-concept and intrinsic motivation might be especially helpful in enhancing science achievement.

This study can also be anchored in Albert Bandura's Social Cognitive Theory (SCT). SCT stresses the importance of cognitive processes in determining human behavior and learning. It claims that humans learn by seeing and mimicking the actions of others. This study applies Social Cognitive Theory (SCT) to investigate how students' views about their science learning capacity, attitudes toward science, and expectations of scientific achievement impact their self-regulated learning techniques and motivation. SCT may also investigate how social factors like peer influence and instructor expectations affect students' learning and motivation in science. By focusing on SCT, researchers can gain a better understanding of the complex interaction of cognitive, social, and motivational elements that influence students' academic performance in Science.

Figure 1 displays the conceptual framework for the investigation. This graphic presentation depicts the study's basis, including the independent variable of self-regulated learning processes and three indicators: cognitive, metacognitive, and resource management. It also illustrates the dependent variable of students' achievement, assessed by the second quarter grade in Science. Additionally, the diagram depicts how self-regulated learning strategies indirectly influence students' achievement in General Science, with science motivation as the mediator.

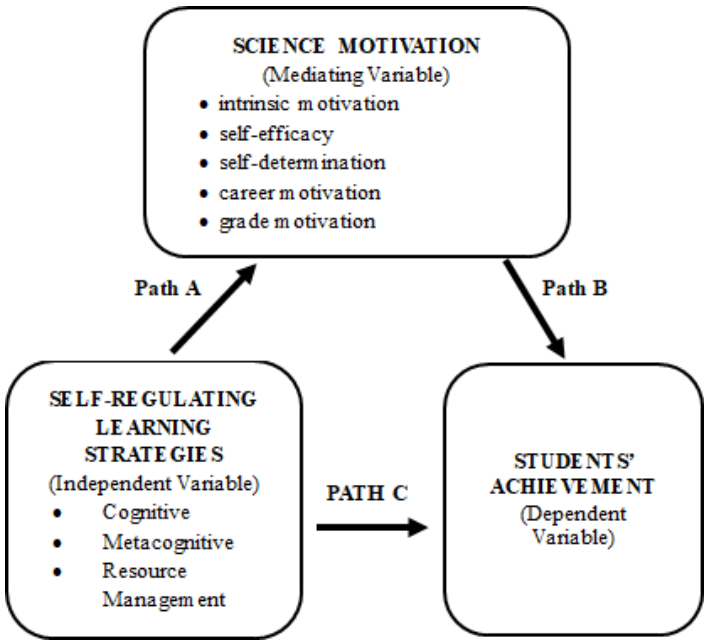

Fig 1. Conceptual Framework of the Study

METHOD

This chapter explained the methods employed in this study, such as research design, locale, respondents, instruments, ethical considerations, data gathering procedures, and data analysis.

Research Design

The quantitative research design aimed to recognize generalities, not particulars, by analyzing data from a wide selection of samples. To identify general trends, the researcher opted for a quantitative approach.

The research design for this study is a longitudinal quantitative correlational design. This methodology will enable a long-term study of the link between self-regulated learning practices, scientific motivation, and academic achievement in science. Collecting data at several periods enables the research to follow changes in these factors and investigate their interactions. The longitudinal character of the methodology provides insights into the temporal dimensions of the links being investigated.

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Research Locale

The study was carried out among junior high school students from public schools in the Cateel 1 and 2 districts of the Division of Davao Oriental, Philippines. Cateel, like many other places in the Philippines, is facing substantial issues in scientific education, including poor student interest and success in science fields. The scarcity of resources, such as science laboratories and qualified teachers, along with traditional teaching techniques that may fail to pique students' attention, contribute to Cateel's educational challenges. By concentrating on this specific location, the study hopes to shed light on the distinct contextual elements that impact student learning and motivation in science, giving useful insights for educators and policymakers looking to enhance scientific education results in comparable contexts.

Research Respondents

This study used a random sample approach to collect one hundred (100) responses from Junior High School students in Cateel 1 and 2 districts. The researcher estimated the sampling size using Slovin's Formula, taking into account the 95% confidence level and 5% margin of error.

The researcher was aware that there may have been possible survey respondents who satisfied the inclusion criteria yet held qualities that could have harmed the research's success or raised the likelihood of a negative outcome. As a result, the researcher developed the following exclusion criteria: students who responded outside of the study period, respondents who submitted incorrect data, and those who refused to offer informed consent/informed assent. This ensured that the researcher could obtain dependable and verifiable data, reduce the risk of harm to the target respondents, and protect them from being taken advantage of as vulnerable people.

Research Instrument

This study employed an adapted and modified survey questionnaire as the primary research tool. The questionnaire included quantitative questions to gather specific responses from respondents about students' use of learning strategies and motivation in learning General Science.

The researcher designed a 57-item survey with separate sections to assess students' use of learning strategies in their Science class (33 items) and their motivation in learning Science (24 items). This study developed the scales by selecting items from the college version of the MSLQ (Garcia et al., 2005; Pintrich et al., 1991), with modifications (described subsequently) for the present study.

Ethical Considerations

It is critical to follow ethical guidelines when conducting this study to preserve and promote the dignity of research subjects/respondents. This study will carefully follow the guidelines the Department of Science and Technology (DOST) and the Philippine Health Research Ethics Board (PHREB) set forth to uphold the highest ethical standards.

The research will ensure that the study holds social value and contributes to the advancement of scientific knowledge, benefiting the broader community and the field of science education. Respondents or legal guardians will be fully informed about the study's purpose, procedures, and potential risks and benefits. The study will obtain informed consent from all participants, who will also retain the right to withdraw at any time. For respondents who are minors, informed assent will also be obtained in addition to parental consent. Respondents will be made aware of any potential risks associated with their involvement in the study. This study will clearly explain the advantages of participation to all respondents. Furthermore, the research will prioritize respondents' safety and well-being by taking necessary safeguards during the study.

Furthermore, all data obtained from responders will be kept personal and safe. Measures to protect respondents' privacy will be taken, such as using anonymous identifiers and storing data securely. The researcher will only utilize the provided data for study purposes. To protect participant privacy, the data collected will be kept secret. Only with participants' clear and informed agreement will their data be shared with third parties. The study will

guarantee that respondents are selected and treated fairly and equitably, with no prejudice or bias. The research process will be transparent, with respondents receiving clear and accurate information about the study's goal, methodology, and potential ramifications.

Finally, the researcher performing the study will have the necessary credentials and experience to conduct the research ethically and professionally. The study will ensure that the facilities and resources employed for data collection and respondent engagement are adequate and relevant to the research goals. The research will actively endeavor to involve the community in the process, encouraging collaboration and ensuring that the study is consistent with the group's beliefs and practices.

By adhering to these ethical guidelines, the study will help to maintain the research's integrity and credibility while also protecting the respondents' rights and well-being.

Data Gathering Procedure

The researcher used survey questionnaires to gather information about students' self-regulated learning practices, scientific motivation, and academic accomplishment in science. The questions were administered online using Google Forms. Survey questionnaires allow for the collection of quantitative data that may be evaluated to determine the correlations between variables of interest.

Data Analysis

The researcher examined the data, computing means, the Pearson Product Moment Correlation Coefficient, and doing mediation analysis. These methodologies will allow the researcher to investigate the links between self-regulated learning strategies, scientific motivation, and academic achievement in science. Mediation analysis will shed light on how science motivation mediates the association between self-regulated learning practices and academic accomplishment.

RESULTS AND DISCUSSIONS

This chapter presents a thorough analysis of the data obtained, shedding light on the correlations between these key variables and offering significant insights regarding student engagement and performance in science education. This chapter provides a complete review of the elements impacting students' academic performance and general scientific learning experiences by assessing the degrees of self-regulated learning techniques, motivation, and accomplishment. The discussions in this chapter seek to understand the findings, investigate their ramifications, and add to the current body of research on successful teaching strategies and student outcomes in science education.

Summary of the Level of Self-Regulated Learning Strategies of Junior High Students in Learning General Science

The first objective of this study was to measure Junior High students' level of self-regulated learning strategies when learning General Science. Table 1 shows the mean scores for various indices of self-regulated learning techniques, including cognitive, metacognitive, and resource management.

Table 1. Level of Self-Regulated Learning Strategies of Junior High Students in Learning General Science

Indicators	Mean	Descriptive Level
1. Cognitive	4.04	High
2. Metacognitive	3.99	High
3. Resource Management	3.98	High
Overall	**4.00**	**High**

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The cognitive indicator in Table 1 shows students' capacity to participate in cognitive processes such as information processing, understanding, and knowledge application when learning general science. A high mean score of 4.04 indicates that students have strong cognitive skills in their approach to learning science. Previous studies have shown that cognitive methods such as summarizing information, organizing content, and relating new knowledge to existing knowledge can improve academic performance and understanding of science subjects. Lindahl (1964) proved that cognitive processes are essential for learning and problem-solving.

With a high mean score of 3.99, students show a strong metacognitive ability to govern their scientific learning. According to the literature, metacognitive methods such as goal formulation, self-assessment, and feedback-driven learning strategy adjustment are critical for developing deep comprehension and academic achievement in scientific education. Metacognitive methods can increase both academic performance and emotional dimensions, such as self-efficacy and motivation (Zhang & Zou, 2022).

The indicator has a mean score of 3.98, indicating that students are proficient at managing resources for their science education. Research stresses the importance of resource management skills, such as time management, material organization, and asking for assistance when necessary, in encouraging independent and effective learning habits among students, which leads to improved academic achievements in science. The gradual integration of resources from the academic setting is critical for developing self-regulation in learning. This approach demands students' time and effort (Miná et al., 2021).

Overall, the high mean scores across cognitive, metacognitive, and resource management indicators in Table 1 indicate that junior high school students use good self-regulated learning techniques when learning general science. These findings emphasize the importance of developing students' cognitive, metacognitive, and resource management skills in order to improve their engagement, motivation, and academic achievement in science education, which is consistent with previous research on effective learning strategies and student success in science subjects.

Summary of the Level of Junior High School Students' Motivation in Learning Science

Table 2 presents junior high school students' motivation levels in learning science, including intrinsic motivation, self-efficacy, self-determination, career motivation, and grade motivation indicators.

Table 2. Level of Junior High School Students' Motivation in Learning Science

Indicators	Mean	Descriptive Level
1. Intrinsic Motivation	4.23	Very High
2. Self-Efficacy	3.93	High
3. Self-Determination	3.93	High
4. Career Motivation	3.89	High
5. Grade Motivation	4.19	High
Overall	**4.03**	**High**

The mean score of 4.23 suggests that students exhibit a very high level of intrinsic motivation towards science learning. It indicates that junior high school students in the study demonstrate an exceptionally high level of intrinsic motivation towards learning science. This means that pupils are motivated, interested, and like engaging with the material. Deci and Ryan (1985) found that intrinsic motivation is important for encouraging deep engagement, perseverance, and favorable learning outcomes in academic contexts, including science education.

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Students had a high mean score of 3.93, indicating a strong feeling of self-efficacy in their scientific learning efforts. It appears that the study's junior high school students had a strong feeling of self-efficacy in their scientific learning activities. This shows that students believe they can achieve in science activities and problems. Bandura (1997) emphasized the importance of self-efficacy beliefs in affecting students' motivation, effort, and academic success, especially in science-related subjects.

The indicator's high mean score of 3.93 indicates that students are self-determined in their approach to learning science. It suggests that they demonstrate a high level of self-direction and independence in their science-related learning activities. The high mean score indicates that students feel empowered to make decisions, endure in the face of adversity, and keep control over their scientific learning outcomes. Deci and Ryan (2000) developed the Self-Determination Theory, which emphasizes the role of autonomy, competence, and relatedness in generating intrinsic motivation and engagement in educational settings, including scientific education.

Career motivation has a high mean score of 3.89 and the lowest of the indicators, suggesting that students are moderately motivated to pursue science-related employment. Students who are highly motivated to pursue careers in science, technology, engineering, or mathematics are more likely to have specific aims, goals, or intents. The literature on career motivation in STEM areas emphasizes the importance of early exposure, role models, and educational experiences in molding students' career goals and perseverance in science disciplines.

Students have a high mean score of 4.19, indicating a strong drive to get excellent marks in science. This means that they are driven by the recognition, validation, or benefits that come with academic accomplishment, such as grades or performance assessments. Research on grade motivation has demonstrated that it has a substantial influence on learning results (Ibtidaiyah, 2019).

Overall, the levels of motivation indicators in Table 2 demonstrate the various motivating elements that influence students' engagement and success when learning science. These findings are consistent with theoretical frameworks and empirical research on motivation, self-efficacy, and career aspirations in science education, emphasizing the importance of cultivating intrinsic motivation, self-efficacy beliefs, and career goals to increase student motivation and success in science subjects.

Summary of the Level Students' Achievement in Learning Science in the Second Quarter Period

Table 3 shows the level of students' achievement in studying science during the second quarter period, using the grade as an indication.

Table 3. Level of Students' Achievement in Learning Science in the Second Quarter Period

Indicator	Mean	Descriptive Level
Grade	**3.67**	**High**

The mean grade achievement score of 3.67 indicates that students performed well in science during the second quarter. The high mean score indicates that students as a whole displayed an acceptable level of comprehension, application, and mastery of science ideas during the second quarter. Academic success in science is an important result that shows students' comprehension, mastery of concepts, and application of information in the discipline.

Relationship between Self-Regulated Learning Strategies and Students' Achievement in Learning Science in the Second Quarter Period of Junior High Students in Learning General Science

Table 4 presents the significance of the relationship between self-regulated learning strategies and students' achievement in learning science during the second quarter period for Junior High School students. The table includes the correlation coefficient (r), p-value, decision on the null hypothesis (H0), and interpretation of the relationship.

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Table 4. Significance on the Relationship between Self-Regulated Learning Strategies and Students' Achievement in Learning Science in the Second Quarter Period of Junior High Students in Learning General Science

	Students' Achievement in Learning Science in the Second Quarter Period			
Self-Regulated Learning Strategies	**r**	**p-value**	**Decision on H_o**	**Interpretation**
	.121	.229	Failed to Reject	Not Significant

The correlation coefficient (r) is 0.121, indicating a positive but weak relationship between self-regulated learning strategies and students' achievement in learning science during the second quarter period. The p-value is 0.229, which is greater than the significance threshold of 0.05, leading to the decision to fail to reject the null hypothesis (H_o) that there is no significant relationship between the two variables. In summary, Table 4 provides insights into the relationship between self-regulated learning strategies and students' achievement in learning science during the second quarter period, indicating a weak and non-significant correlation based on the data analysis. The interpretation of the results in the context of related literature underscores the importance of self-regulated learning strategies in academic achievement, highlighting the need for further investigation and potential interventions to enhance this relationship.

Relationship between Self-Regulated Learning Strategies and Students' Motivation in Learning Science

Table 5 presents the significance of the relationship between self-regulated learning strategies and students' motivation in learning science for Junior High School students during the second quarter period.

	Students' Motivation in Learning Science			
Self-Regulated Learning Strategies	**r**	**p-value**	**Decision on H_o**	**Interpretation**
	.609	.000	Reject	Significant

Table 5. Significance on the Relationship between Self-Regulated Learning Strategies and Students' Motivation in Learning Science

The correlation coefficient (r) is 0.609, indicating a strong positive relationship between self-regulated learning strategies and students' motivation in learning science during the second quarter period. The p-value is 0.000, which is less than the significance threshold of 0.05, leading to the decision to reject the null hypothesis (H0) and conclude that the relationship is statistically significant. The interpretation suggests that based on the data analysis, there is a significant and positive relationship between self-regulated learning strategies and students' motivation in learning science.

The finding substantiates the study of Paz-Baruch & Hazema (2023) that engaging in self-regulated learning practices has positively influenced scientific motivation. Students who use self-regulated learning strategies, such as goal-setting, planning, note-taking, monitoring, and self-evaluation, have shown higher levels of science motivation (Ramadhani et al., 2022).

Relationship between Students' Motivation and Students' Achievement in Learning Science in the Second Quarter Period of Junior High Students

Shown in Table 6 is the significance of the relationship between students' motivation in learning science and students' achievement in learning science during the second quarter period for Junior High School students. The correlation coefficient (r) is 0.051, indicating a very weak positive relationship between students' motivation in learning science and their achievement during the second quarter period. The p-value is 0.544, which is greater than the significance threshold of 0.05, leading to the decision to fail to reject the null hypothesis (H_o) that there is no significant relationship between these two variables. The interpretation suggests that based on the data

analysis, the relationship between students' motivation in learning science and their achievement is not statistically significant.

Table 6. Significance on the Relationship between Students' Motivation and Students' Achievement in Learning Science in the Second Quarter Period of Junior High Students

	Students' Achievement in Learning Science in the Second Quarter Period			
Students' Motivation in Learning Science	**r**	**p-value**	**Decision on H_o**	**Interpretation**
	.051	.544	Failed to Reject	Not Significant

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusions drawn from the study's findings regarding the mediating role of science motivation in the relationship between self-regulated learning strategies and students' achievement in general science among junior high school students. The study's implications are also used to provide suggestions to educators, policymakers, and future researchers.

Conclusions

The following findings were discovered after analyzing data obtained from junior high school students in the Cateel districts of the Philippines:

First, the data show that Junior High students have high levels of self-regulated learning techniques in cognitive, metacognitive, and resource management areas. This indicates that students are actively involved in managing their learning processes, which might improve their academic success in general science.

Second, scientific motivation is an important mediating factor in the association between self-regulated learning practices and academic accomplishment. This supports the idea of the Self-Determination Theory that intrinsic motivation and self-concept are important in inspiring student participation and achievement in science (C. Ha, 2023). The study emphasizes the necessity of developing students' intrinsic desire to increase their engagement, perseverance, and, eventually, success in learning about science.

Third, educators and policymakers may use these findings to develop interventions and teaching approaches that encourage self-regulated learning and increase students' interest in science. Educators may foster a culture of scientific inquiry and curiosity among students by designing student-centered learning settings that promote autonomy, mastery, and purpose.

Finally, the work paves the way for future research into the processes by which motivation promotes self-regulated learning and academic performance. Further research might look at longitudinal impacts, cultural differences, and the influence of specific teaching styles on student motivation and accomplishment in scientific education.

Recommendations

Based on the findings of this study, the following recommendations should be considered for educators, policymakers, and future researchers:

Educators should include explicit training on self-regulated learning techniques in scientific curricula to provide students with the tools they need to effectively monitor, regulate, and assess their learning processes.

Schools and educational institutions should prioritize intrinsic motivation in students by offering meaningful learning experiences, opportunities for autonomy, and recognition of personal accomplishments in science education.

Educators should be provided with ongoing professional development programs to improve their grasp of self-regulated learning and motivation theories, allowing them to employ evidence-based teaching techniques that promote student success in science.

Collaboration among researchers, educators, and policymakers is critical for advancing knowledge in scientific education. Future studies should take an interdisciplinary approach, examining the multidimensional nature of motivation, self-regulated learning, and academic accomplishment in a variety of educational contexts.

By following these recommendations and expanding on the study's findings, stakeholders in scientific education may collaborate to create an inclusive and engaging learning environment that fosters students' interest, motivation, and academic achievement in general science.

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