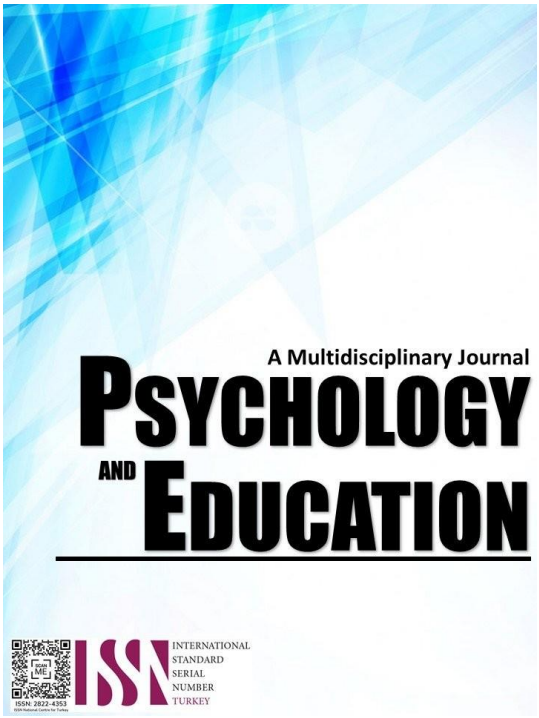
STUDENTS' MOTIVATION, ATTITUDE, SELF-EFFICACY, AND PROFICIENCY LEVEL IN SCIENCE



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Research Article

Students' Motivation, Attitude, Self-Efficacy, and Proficiency Level in Science

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Abstract

Students' motivation, attitude, and self-belief play a contributory role in shaping how well they understand and perform in science. This study examined the relationship between students' attitude, motivation, and self-efficacy, and their science proficiency at a Public Secondary School in the Division of South Cotabato during the 2024–2025 academic year. A total of 206 junior high school students from Grades 7 to 10 participated in the study. A descriptive-correlational research design was employed, utilizing a validated Likert-scale questionnaire to measure the affective variables and academic records to determine science proficiency. Descriptive statistics showed that students had a positive attitude (M = 3.77), a high level of motivation (M = 4.01), and a moderate level of self-efficacy (M = 3.45). More than half of the respondents (52.4%) were classified under the developing level of science proficiency. Spearman Rank Correlation revealed significant positive relationships among the three affective variables: attitude and motivation ($r = .597$, $p < .01$), motivation and self-efficacy ($r = .531$, $p < .01$), and attitude and self-efficacy ($r = .487$, $p < .01$). Furthermore, both motivation ($r = .531$, $p < .01$) and self-efficacy ($r = .487$, $p < .01$) showed significant correlations with students' science proficiency. Results indicated significant differences in affective traits based on sex and grade level. These findings affirm the integral role of affective factors in science learning and underscore the need for pedagogical strategies that enhance students' emotional engagement and confidence, particularly in public secondary school settings.

Keywords: *motivation, attitude, self-efficacy, proficiency level, science*

Introduction

The accelerating pace of technological advancement has significantly transformed education, particularly in the sciences. As global challenges increasingly demand scientifically literate citizens capable of critical thinking, innovation, and problem-solving, science education plays a pivotal role in shaping future-ready learners. The modern science curriculum, therefore, seeks not only to disseminate knowledge but also to develop learners who can apply scientific understanding in real-world contexts, communicate effectively, and engage with societal issues through informed reasoning (OECD, 2019).

However, being scientifically literate transcends the mere accumulation of facts; it encompasses emotional, motivational, and cognitive components that collectively influence student learning and engagement (Çetin-Dindar, 2016; Osborne et al., 2003). Affective factors such as attitude, motivation, and self-efficacy are now recognized as essential contributors to how students perceive and perform in science. These dimensions shape the learners' persistence, enjoyment, and belief in their capabilities, thus affecting their academic success and future interest in scientific careers (Bandura, 1997; Schunk & DiBenedetto, 2020).

In the Philippine context, recent international assessments have raised serious concerns about students' science proficiency. The Programme for International Student Assessment (PISA) results from 2018 and 2022 placed the Philippines near the bottom globally, with science scores reflecting low proficiency levels among 15-year-old learners (OECD, 2019; OECD, 2023). These findings underscore the urgent need for educational reforms that go beyond curricular content and address the psychosocial variables that influence student achievement (Bernardo et al., 2020; DepEd, 2021).

Recognizing that science achievement is intricately linked to learners' affective traits, this study focuses on three critical constructs: motivation, attitude, and self-efficacy. Despite the widespread emphasis on cognitive outcomes in schools, modern educational frameworks advocate for a holistic approach that also nurtures students' emotional and personal development. Motivated and confident learners who view science positively are more likely to overcome academic challenges and sustain their interest in the subject.

This study is timely and relevant, particularly in schools like Emiliano P. Baquial National High School, where learners face a myriad of challenges ranging from limited resources to low academic morale. Understanding how students' attitudes, motivational drives, and self-perceptions influence their science proficiency provides valuable insights for educators and policymakers. The goal is to inform pedagogical strategies that support the development of scientifically capable and emotionally resilient learners.

Hence, this research was conducted to examine the relationship between secondary school students' motivation, attitude, self-efficacy, and their proficiency in science. It aimed to bridge gaps in science education by focusing on how psychological and emotional factors impact academic performance, thereby supporting more effective and inclusive science teaching practices.

Research Questions

This study examined the effect of motivation, attitude, self-efficacy, and proficiency level of Emiliano P. Baquial National High School students in science subjects. Specifically, it sought to answer the following:

1. What is the demographic profile of the Junior High School students in terms of:
    1.1. age;
    1.2. sex; and
    1.3. grade level?
2. What is the extent of students' attitude towards the science subject in terms of:
    2.1. enjoyment; and
    2.2. interest?
3. What is the level of students' motivation towards science subjects in terms of:
    3.1. intrinsic motivation; and
    3.2. extrinsic motivation?
4. What is the level of students' self-efficacy towards science subjects in terms of:
    4.1. engagement; and
    4.2. confidence?
5. What is the extent of students' level of proficiency in science?
6. Is there a significant difference between students' attitudes, motivation, self-efficacy, and demographic profile?
7. Is there a significant relationship between the attitude, motivation, and self-efficacy levels of the students?
8. Is there a significant relationship between attitude, motivation, and self-efficacy in students' proficiency level in science?

Literature Review

Students' Motivation Towards Science

The learner's responses and reactions vary according to the influences that push and motivate him to do so, as they control the reactions of the internal or external influences and influence his behavior, learning, and thinking. Motivation is a critical factor in learning, driving students to invest effort, stay focused, and persist in overcoming academic challenges. It originates from internal desires and external influences, shaping how students approach their studies and interact with educational content (Krishan & Al-Rsa'i, 2023). Motivation is a determining factor in encouraging independent learners, so before offering many activities to promote independent language learning, teachers should ensure that their students have enough motivation to enable them to participate in all planned activities (Rustamovna & Obloberdiyevna, 2023). However, when teachers can develop the motivation of their students, especially their intrinsic motivation, it is easier to activate their ability for independent learning and achievement in social sciences, education, and humanities. According to Bernardo et al. (2020), students in urban public schools often report that science feels disconnected from their daily lives, contributing to low interest and motivation. Additionally, limited access to science labs and interactive learning tools in many public schools reduces opportunities for active learning, further affecting motivation levels. Intrinsic motivation pertains to students' enjoyment of engaging in science learning activities based on their responses to questions such as whether they have fun when learning science topics, like reading about science, enjoying learning new science topics, and acquiring new knowledge in science (Chai et al., 2021). Intrinsic motivation is influenced by perceived competence, which refers to the need of the individuals to experience opportunities and support for the activity and their ability to express their knowledge, skills, abilities, or talents (Ryan & Deci, 2017). Extrinsic research motives are external stimuli such as research rewards, income, or reputation for research that the lecturers/scientists can gain through research (Le et al., 2024). It is equally important to note that intrinsic and extrinsic motivations are not in an either-or relationship: one student can have both types of motivation, high or low (Derfler-Rozin & Pitesa, 2021).

Students' Attitude Towards Science

Attitude is an action, or an action based on the convictions and beliefs that a person has. Attitudes can reflect a person's or student's feelings towards something (Aprilisya et al., 2017; Putri & Rifai, 2019; Paños et al., 2020). Attitude has three main components: awareness, feeling, and behavior (Adya et al., 2021; Du et al., 2018; Narut & Nardi, 2019). Attitude, as a predisposition or tendency to action, will guide students' actions. Attitudes also affect students' skills, including science process skills (Luki & Kustijono, 2017; Rohmah, 2017; Alasim & Paul, 2019). Ayasrah et al. (2024) assert that attitudes toward specific learning environments and instructional approaches play a crucial role in learning. Moreover, in psychology, attitude refers to an individual's predisposition to respond favorably or unfavorably toward a particular object, person, or situation. In education, students' attitudes toward subjects like science influence how they engage with the material, their willingness to participate, and their overall academic performance. İnce (2023), the examination in his research asserted that numerous factors directly or indirectly impact an individual's learning journey within today's educational landscape. Attitude, self-efficacy, and motivation emerge as pivotal among these factors, with Attitude serving as the initial lens through which people perceive events, subjects, or objects. When science is enjoyable, students are more likely to engage deeply with the content, participate in classroom activities, and pursue related interests outside school. This positive emotional response supports higher motivation and improved academic performance (Galla et al., 2018), participation in extracurricular science activities, interest in science (Ainley & Hidi, 2014), science-related career aspirations, and academic achievement (Jeffries et al., 2020), and collaborative problem solving (Camacho-Morles et al., 2019). Grabau and Ma's (2017) analysis of PISA 2006 data found moderate effect sizes on science achievement for enjoyment of science and general interest in learning science, while science-related activities showed moderate effects on students' science performance and general interest in learning science. Furthermore, Jack and Lin (2018) investigation using PISA 2015 data found a high association between enjoyment and genuine interest in learning science, where the

latter construct involves triggering and then maintaining the crucial affective component of enjoyment that can harmonize with students' classroom cognition, and thus integrate and enhance the science learning experience. Interest is related to motivation because interest is an encouragement in a person or a factor that gives rise to selective attention, which causes the choice of an object or activity that is profitable, enjoyable, and, over time, will bring satisfaction (Harefa, 2020). Therefore, encouragement, attention, and pleasure in an activity are interrelated factors that generate interest. If the factors that generate interest in an activity are low, it can cause the person's interest to be low (Harefa, 2020). According to students who learn science is the most challenging subject to understand (Surur, 2020).

Students' Self-Efficacy Towards Science

Self-efficacy, or a student's belief in their capacity to succeed in specific academic tasks, has been widely recognized as a predictor of performance in science and other STEM disciplines. Students with higher self-efficacy are likelier to persevere through challenges, take initiative in their learning, and perform better academically (Kwon et al., 2023). Previous research has indicated that students' self-efficacy is highly correlated with their academic achievement, engagement, effort, motivation, course selection, and future career choice (Webb-Williams, 2018). In addition, findings have shown that students with high self-efficacy are more successful at developing and adhering to a work schedule, checking their progress, and setting academic goals than students with average or below-average self-efficacy. Findings have indicated that improved science self-efficacy may translate into higher levels of enjoyment when engaging in science, which could influence the commitment, motivation, and effort students invest in learning school science (Juan et al., 2018). Self-efficacy is one of the most influential subcomponents of effect in terms of its impact on students' science and mathematics success (Kesan & Kaya, 2018). Science self-efficacy significantly influences students' success in science courses and career trajectory. Self-confidence refers to how individuals perceive their abilities and characteristics, particularly in academic settings. In science education, confidence is often understood as a belief in one's skills (self-efficacy) and an overall academic self-concept. Students who view themselves as capable in science are likelier to participate actively in class and take on challenging tasks, contributing positively to their academic development (Jansen et al., 2015). Factors contributing to low confidence include abstract content, lack of hands-on experiences, and fear of making mistakes. Girls may report lower science confidence than boys despite performing at similar levels, due to social and cultural influences (OECD, 2019). These findings highlight the need for supportive learning environments that build skill and self-belief. In their study, Hadzigeorgiou and Schulz (2019) revealed that getting students interested in science and fostering comprehension of its concepts has remained a persistent struggle for science teachers and educators. Godec et al. (2018) pointed out that student engagement in science involves behavioral participation, emotional investment, and cognitive involvement in learning activities. It goes beyond mere interest, encompassing how students interact with science content inside and outside the classroom.

Proficiency Level in Science

Globally, students' proficiency in science remains a concern for many educational systems. According to the results of the Programme for International Student Assessment (PISA) 2018, only 22% of students in participating countries reached the proficiency level that demonstrated the ability to distinguish scientific questions from non-scientific ones and interpret data scientifically (OECD, 2019). The Proficiency Levels describe what individuals can do with language in terms of speaking, writing, listening, and reading in real-world situations in a spontaneous and non-rehearsed context. Proficiency refers to the degree of competency in a particular language/area. This includes understanding, speaking, reading, and writing skills. The Common European Framework of Reference (CEFR) provides a structure to identify these skill levels from beginner to mastery (Lerner, 2024). A study by Khine and Areepattamannil (2016) emphasized that science achievement in Southeast Asian countries remains below global averages, mainly due to systemic curriculum implementation and teacher training issues. These limitations reduce academic performance and affect students' long-term engagement with scientific fields. The Department of Education (DepEd) has acknowledged these gaps and attributed the low performance to insufficient teacher training, overloaded curriculum, and lack of access to hands-on science experiments (DepEd, 2021). These issues highlight the urgent need for reforms to improve science instruction and student engagement. In the Philippines, science proficiency among students is notably low. The Trends in International Mathematics and Science Study (TIMSS) 2019 results showed that Filipino Grade 8 students scored significantly below the international average in science, ranking near the bottom among participating countries (IEA, 2020).

Methodology

Research Design

This study used a descriptive-correlational research design. Descriptive studies clarify a situation, define and explain the problem in detail, and reveal the relationships between events (Karasar, 2017), while a correlational research design investigates relationships between variables without the researcher controlling or manipulating any of them (Creswell & Poth, 2017). The direction of a correlation can be either positive or negative (Bhandari, 2023).

This research design was used to reveal the effect of motivation, attitude, self-efficacy, and proficiency level in science among Grades 7 to 10 students of Emiliano P. Baquial National High School. At the same time, this study aimed to reveal whether the effect of students' motivation, attitude, and self-efficacy towards the science course on their level of proficiency differs in terms of age, sex, and grade level.

Respondents

The respondents of this study were junior high school students from Grades 7 to 10 enrolled at Emiliano P. Baquial National High School, located in Tupi, South Cotabato, during the School Year 2024–2025. A total of 206 students participated in the study. The participants were selected using stratified random sampling to ensure equal representation across all grade levels and to account for variations in demographic factors such as age and sex (Creswell & Poth, 2017).

The respondents ranged in age from 12 to 16 years old, which is typical for students in junior high school within the Philippine education system (DepEd, 2020). This stage of education is developmentally critical, as early adolescence is a period when students begin to form lasting academic identities and attitudes toward learning, particularly in subjects like science (Eccles & Roeser, 2011). It is also during this phase that affective variables such as motivation, attitude, and self-efficacy become increasingly influential in shaping learning outcomes (Schunk & DiBenedetto, 2020).

The principle of inclusivity guided the selection of respondents. Students from each grade level were proportionally represented, and both male and female students were included. Informed consent was obtained from all participants, and ethical protocols, such as ensuring anonymity, voluntary participation, and confidentiality of responses, were strictly observed throughout the study following standard research ethics guidelines (BERA, 2018).

This respondent group was purposefully chosen due to the crucial role that junior high school plays in influencing long-term interest and performance in science. According to Osborne et al. (2003), students' attitudes toward science formed during early adolescence often determine whether they continue pursuing science-related fields. Furthermore, research has shown that differences in academic engagement, motivation, and self-belief during these years can significantly impact proficiency in science (Bandura, 1997; Glynn et al., 2009).

By involving students with diverse academic standings, this study was able to examine how affective factors influence science proficiency across a realistic range of learner profiles, thereby offering insights for more targeted and effective instructional strategies in science education.

The population of EPBNHS (Emiliano P. Baquial National High School) students in Tupi North District, Tupi, South Cotabato, in the S.Y. 2024-2025, was 443 students. The total sample population of this study is (n = 206), who are officially enrolled in the school, consisting of Grade 7 to 10 students.

Instrument

To gather the necessary data for this study, the researcher utilized a structured questionnaire composed of both adopted and modified items. The instrument was designed to measure junior high school students' levels of motivation, attitude, and self-efficacy toward science, as well as to assess their corresponding science proficiency levels.

The questionnaire was divided into five key sections. The first section captured the demographic profile of the respondents, including age, sex, and grade level. The second section measured attitude toward science, with sub-components focusing on enjoyment and interest. The third section assessed motivation, specifically distinguishing between intrinsic and extrinsic motivators. The fourth section evaluated self-efficacy through indicators such as engagement and confidence in science learning. The final section collected data on the students' proficiency levels, which were validated using their most recent academic performance records in science.

The items related to motivation were adapted from Glynn et al.'s (2009) Science Motivation Questionnaire, while the sections on self-efficacy and attitude were based on scales developed by Bandura (1997) and Osborne et al. (2003), respectively. These tools were contextualized and modified to suit the Philippine junior high school setting, ensuring both linguistic clarity and cultural relevance.

Prior to the actual data collection, a pilot test was conducted among 30 students from the same public school, not included in the final sampling. The results of the pilot test were used to refine item wording and ensure internal consistency. The final version of the questionnaire yielded a Cronbach's alpha of 0.84, indicating high reliability.

The administration of the questionnaire was carried out in person during regular class hours in September 2024, with the assistance and approval of the school principal and the science department head. Respondents were informed about the purpose of the study, assured of their confidentiality and anonymity, and given their voluntary consent prior to participation.

Procedure

The data collection for this study was conducted during the First and Second Quarters of the 2024–2025 academic year, specifically from August to November 2024, at Emiliano P. Baquial National High School in Tupi, South Cotabato. Prior to the administration of the research instruments, the researchers obtained approval from the school principal and the Department of Education Division Office. A formal letter of request was submitted to ensure that all ethical and administrative protocols were strictly followed.

Upon approval, the researchers coordinated with the science department head and classroom advisers to schedule the appropriate time slots for data collection to administer the survey using the questionnaire "Level of Attitude, Motivation, and Self-Efficacy of the Students". The purpose of the study was explained to the students, and informed consent was obtained from all participants. To ensure

voluntary participation, students were assured that their responses would be kept strictly confidential and would be used solely for research purposes. Anonymity was maintained by excluding any identifying information from the survey forms.

The validated and pilot-tested questionnaire was administered in paper format during regular class hours under the supervision of the researcher. It designated science teachers—a total of 206 junior high school students from Grades 7 to 10 completed the questionnaire. The administration process took approximately 30 to 45 minutes per class section; the data collection lasted for 3 days.

To ensure the reliability of the responses, the researchers guided the students in understanding the instructions and clarified any ambiguities in the items. After data collection, all completed questionnaires were carefully sorted, encoded, and subjected to statistical analysis using appropriate quantitative techniques to answer the research questions and test the hypotheses.

The data gathering phase was completed smoothly, with a 100% retrieval rate, and no major issues were encountered throughout the process. The cooperation of the school administration, teachers, and students greatly contributed to the efficiency and success of the data collection.

Data Analysis

The raw data were classified, encoded, and computed using a statistical treatment appropriate to the needed data.

To determine the demographic profile of the students in terms of age, sex, and grade level, the researchers used frequency counts and percentages to describe categorical data. This provided a demographic overview of the respondents, which served as a contextual foundation for subsequent analyses.

To identify the students' extent of attitude toward science in terms of enjoyment and interest, the mean and standard deviation were computed. A five-point Likert scale was used to assess their responses, and interpretation was based on predefined scale intervals indicating whether the attitude was low, moderate, or high.

To assess the students' level of motivation in terms of intrinsic and extrinsic motivation, descriptive statistics (mean and standard deviation) were again employed. This allowed for the identification of which type of motivation was more dominant among the respondents and how motivation levels varied across the sample.

To measure students' self-efficacy in terms of engagement and confidence, the same descriptive statistics were used. These results indicated how confident and engaged students felt about science learning tasks, both of which are crucial predictors of academic performance.

To determine the extent of students' proficiency level in science, data from students' latest science grades were categorized and described using frequency, percentage, and mean scores. These grades were aligned with DepEd's grading scale to interpret proficiency levels.

To test for significant differences in students' attitude, motivation, and self-efficacy when grouped according to demographic profile, the Mann-Whitney U test and Kruskal-Wallis test were utilized. This nonparametric statistical test compares two samples or groups. It assesses whether two sampled groups are likely to derive from the same population. In other words, we want evidence as to whether the groups are drawn from populations with different levels of a variable of interest (McClenaghan, 2022). The Kruskal-Wallis test is used when the assumptions for a one-way analysis of variance are not met. Since the Kruskal-Wallis test is nonparametric, the data used do not have to be normally distributed.

To identify the relationship among students' attitude, motivation, and self-efficacy, Spearman Rank Correlation (rs) was used. This analysis assessed the strength and direction of linear relationships among the three affective constructs. The Spearman correlation between two variables is the correlation between the rank values of those two variables (Lehman, 2005).

To determine the relationship between students' attitude, motivation, and self-efficacy and their science proficiency, Spearman Rank Correlation (rs) was employed.

Ethical Considerations

Any research study must consider ethics to prevent unnecessary violations. This study employs demographic profiling, in which we must safeguard the respondents' identities.

Ethical issues may arise at any stage or phase of the research process in this study. Participants share their experiences, profiles, and opinions regarding a specific topic. Therefore, we ethically require permission from the participants to conduct the research and gather specific data. The consent form explains the study's purpose and potential risks and ensures anonymity. Participants can withdraw from the study at any time without penalty or prejudice.

The researcher explicitly told the participants that this study would not evaluate their performance or involve discriminatory assessments. The focus of this study is to allow participants to discuss their engagement in science courses. Following the survey, we collected and analyzed the data.

This paper has undergone Ethical Review from the Institutional Ethics Review Committee of Mindanao State University with the Approval Number 353-2024-MSUGSC-IERC and the Study Protocol Code 2024-358-SR, which was accepted on October 31, 2024. This approval is given based on the following provisions: (1) the study involves non-sensitive information, and (2) the identities involved are kept anonymous.

Results and Discussion

This section presents the findings according to the study's research questions. To compare the means and find out the significance between variables.

Demographic Profile

Table 1 shows the demographic profile of the junior high students of Emiliano P. Baquial National High School according to their age, sex and year level. The range of the age falls between 12 and 16 years old. Sex is categorized as male and female, and most students are from Grades 7 to 10.

Table 1. *Demographic Profile*

Variable	*Frequency (n=206)*	*Percentage*
Age		
16 years old and above	18	8.7
15 years old	40	19.4
14 years old	51	24.8
13 years old	62	30.1
12 years old	35	17.0
Sex		
Male	98	47.6
Female	108	52.4
Year Level		
Grade 10	48	23.3
Grade 9	52	25.2
Grade 8	52	25.2
Grade 7	54	26.2

Source: Processed data by Kruskal-Wallis Test

Regarding age, 30.1% of the students are 13, and 24.8% are 14. Others are 15 years old with 19.4%, 12 years old with 17.0%, and 16 years old and above with 8.7%. The average age of respondents is approximately 13.79 years, with a standard deviation of 1.37, suggesting that most students fall within the expected age range for junior high school. Female students slightly outnumber males by around 4%, indicating a relatively balanced gender distribution with a modest female majority (Noori, 2024). For sex, 52.4% of the students are female, and the remaining 47.6% are male. This indicates that while most students are around this age, there is some variation, reflecting the natural age differences across grade levels. The near-balanced sex distribution, with a slight majority of female respondents, is consistent with enrollment trends observed in various Philippine educational institutions. According to the Philippine Statistics Authority (2020), females slightly outnumber males in secondary education, particularly in urban school settings. The distribution of respondents across grade levels—where Grade 7 students represent the largest group—is aligned with findings by Bakar et al. (2010), who observed that younger students are more likely to participate in school-based activities and assessments, possibly due to interest or teacher encouragement at the entry level. Similarly, Tinio (2014) notes that lower grade levels often have higher response rates in school-based research due to structured class schedules and more frequent teacher-guided activities.

The Level of Students' Attitude Towards Science

Table 2 presents the descriptive analysis of students' attitudes toward the science subject, focusing on two key indicators: enjoyment and interest. These components were assessed through a Likert-scale questionnaire designed to capture students' affective responses to science learning. The computed mean and standard deviation values reflect the extent to which students find science enjoyable and engaging, which are crucial factors influencing classroom participation, curiosity, and long-term academic engagement. The findings in this table provide a snapshot of how students emotionally and cognitively respond to science, offering valuable context for interpreting their motivation, self-efficacy, and academic performance in the subject.

Relative to enjoyment, the students agree that they enjoy science classes (M=4.01) and reading books about science (M=3.91). However, they feel bored when they attend a science class with a means of (M=2.74) described as neither agree nor disagree. The mean of 3.64 is described as positive. This means that the students demonstrate positive attitudes in terms of enjoyment towards the science subject. A positive enjoyment toward science suggests that the students perceive the subject as engaging, exciting, and rewarding. Enjoyment in learning is closely associated with intrinsic motivation, which has been shown to significantly influence academic engagement and achievement (Ryan & Deci, 2000). Additionally, Osborne et al. (2003) expressed that students who enjoy science are more likely to develop a sustained interest in scientific concepts and pursue science-related careers in the future. On interest in science subjects, the students agree that they would like to learn more about science subjects (M=4.21) and they would like to learn more about

everyday facts or events that are relevant to science topics (M=4.02). Also, they agree that they would like to allocate more class hours to science lessons (M=3.59) The mean of 3.89 is described as positive. This means that the students display positive interest in the science subject. They are highly engaged in scientific concepts and ideas. In recent years, several key developments have supported a notable increase in interest in science among junior high school students. The shift toward inquiry-based and hands-on learning approaches has made science more engaging and accessible (Osborne & Dillon, 2016). Students are also increasingly aware of how scientific knowledge connects to real-world issues such as health, environmental sustainability, and technology, further enhancing their motivation to learn (Holbrook & Rannikmäe, 2017).

Table 2. *The Level of Students' Attitude Towards Science*

Indicator	*WM*	*Description*
Enjoyment		
1. I enjoy reading books about science.	3.91	Positive
2. I enjoy solving problems related to science.	3.77	Positive
3. I feel bored when I attend a science class.	2.74	Moderate
4. I enjoy science classes.	4.01	Positive
5. I enjoy listening to science trivia.	3.79	Positive
Mean	3.64	Positive
Interest		
1. Science is a field that I like very much.	3.67	Positive
2. I would like to learn more about science subjects.	4.21	Positive
3. Science is essential for a better understanding of the natural phenomena around us.	3.95	Positive
4. I would like to allocate more class hours to science lessons.	3.59	Positive
5. I would like to learn more about everyday facts/events that are relevant to science topics.	4.02	Positive
Mean	3.89	Positive
Over-all Mean	3.77	Positive

Source: Processed data by Weighted Mean

The Level of Students' Motivation Towards Science

Table 3 displays the descriptive statistics summarizing the level of students' motivation toward the science subject, assessed through two primary components: intrinsic motivation and extrinsic motivation. These dimensions reflect the internal and external drivers that influence students' willingness to engage with science learning. Responses were measured using a standardized Likert-scale questionnaire, and results are presented in terms of mean scores and standard deviations. This table offers critical insight into how motivated the students are to learn science, whether driven by personal interest and enjoyment (intrinsic) or by rewards and recognition (extrinsic). Understanding these motivational patterns is vital for designing instructional strategies that sustain interest and enhance science achievement.

Table 3. *Level of Students' Motivation Towards Science*

Indicator	*WM*	*Description*
Intrinsic Motivation		
1. I would like to learn about new ideas in science.	4.26	High
2. I enjoy searching for answers to science problems.	3.92	High
3. I like to help my classmates in science lessons.	3.77	High
4. I enjoy doing group work with my friends in science lessons.	4.13	High
5. I like homework because it helps me learn more helpful information.	3.87	High
Mean	3.99	High
Extrinsic Motivation		
1. I would like to get the highest grade on my science exams.	4.12	High
2. I would like to be the first to finish the activities or problems we solve in class.	3.73	High
3. I would like my efforts in science class to be appreciated by my teacher.	4.17	High
4. I try very hard not to miss important information that our teacher gives us.	4.00	High
5. I would like my teacher to check whether homework assignments have been done.	4.16	High
Mean	4.04	High
Over-all Mean	4.01	High

Source: Processed data by Weighted Mean

On intrinsic motivation, the students agree that they would like to learn about new ideas in science (M=4.26) and enjoy doing group work with their friends in science lessons (M=4.13). They also like to help their classmates in science lessons (M=3.77) The mean of 3.99 is described as agree. This means that the students have a high level of intrinsic motivation. These findings align with Deci and Ryan's (2017) study, which emphasized that when learners perceive activities as enjoyable and self-driven, they are more likely to

engage deeply with the content (Keser, 2015) and perform better. Similarly, Potvin and Hasni (2019) found that students who value learning science for its own sake demonstrate greater persistence and curiosity, highlighting the importance of fostering intrinsic motivation in educational settings. Moreover, on extrinsic motivation, the students agree that they would like their efforts in science class to be appreciated by their teachers (M=4.17) and they would like their teachers to check whether homework assignments have been done (M=4.16). They would like to be the first to finish the activities or problems they solve in class (M=3.73). The mean of 4.04 is described as agree. This suggests that the students have a high level of extrinsic motivation. These results are consistent with the findings of Glynn et al. (2017), who stated that teacher feedback and external reinforcement contribute significantly to maintaining students' motivation in science. Moreover, Salta and Koulougliotis (2020) emphasized that external recognition, such as praise or competition, enhances students' classroom participation and interest, particularly in science subjects.

The Level of Students' Self-Efficacy Towards Science

Table 4 presents the descriptive analysis of students' self-efficacy toward the science subject, focusing on two key indicators: engagement and confidence. These components were measured using a structured Likert-scale questionnaire designed to capture students' beliefs in their ability to succeed in science-related tasks. The computed mean scores and standard deviations provide insight into the overall level of self-efficacy among junior high school students. Understanding how students perceive their competence and involvement in science learning is crucial, as self-efficacy significantly influences academic effort, persistence, and achievement. This table serves as a foundation for assessing how students' self-beliefs correlate with their performance and affective traits in science.

Table 4. *The Level of Students' Self-Efficacy Towards Science*

Indicator	*WM*	*Description*
High Confidence and Engagement		
1.I can help my friends who are struggling to understand science topics.	3.88	High
2.I can complete science projects successfully.	3.54	High
3.Whether the science subjects are difficult or easy, I am confident that I can understand them.	3.72	High
4.I am sure I will do well in the science exams.	3.56	High
5.I believe I will get high grades in science.	3.37	Moderate
Mean	3.61	High
Low Confidence and Engagement		
1.I have difficulty in solving science problems.	3.51	High
2.I do not want to take a research assignment in science class.	2.94	Moderate
3.I cannot do my science homework on my own.	2.90	Moderate
4.I am always afraid of not reaching the result of science experiments.	3.58	High
5.I am afraid of not being able to answer the questions asked by my science teacher.	3.49	Moderate
Mean	3.28	Moderate
Over-all Mean	3.45	Moderate

Source: Processed data by Weighted Mean

On high confidence and engagement, the students agree that they can help their friends who are struggling to understand science topics (M=3.88) and whether the science subjects are difficult or easy, they are confident that they can understand them (M=3.72). However, they neither agree nor disagree that they believe they would get high grades in science (M=3.37). The mean of 3.61 is described as agree. This implies that the students have a high level of self-efficacy in science, in terms of confidence and engagement. On the other hand, on low confidence and engagement, the students agree that they are always afraid of not reaching the desired results of science experiments (M=3.58) and they have difficulty in solving science problems (M=3.51). Nevertheless, they neither agree nor disagree that they cannot do their science homework on their own (M=2.90). The mean of 3.28 is described as neither agree nor disagree. This indicates that the students have a moderate level of low confidence and engagement. The mean of 3.61 is described as neither agree nor disagree. This suggests that the students have a moderate level of self-efficacy regarding science subjects in terms of low confidence and engagement. Overall, the mean of 3.45 is described as neither agree nor disagree. This means the student has moderate self-efficacy and is unsure or inconsistent in their belief about their science abilities. This finding aligns with the study of Jamil and Mahmud (2019), who reported an average self-efficacy score of 3.39 among secondary school students, indicating moderate confidence in academic abilities. Similarly, Jumadi et al. (2023) found a mean self-efficacy score of 3.66 among science learners, reinforcing that many students hover between confidence and uncertainty in their science learning. These results underscore the need for targeted interventions to strengthen students' confidence and engagement in science-related tasks, as self-efficacy plays a vital role in academic performance and persistence in learning.

The Extent of Students' Level of Proficiency in Science

Table 5 illustrates the extent of students' proficiency levels in science based on their academic performance during the current school year. The data were derived from students' final grades in science and categorized according to the DepEd grading scale to determine overall proficiency. Descriptive statistics, including frequency, percentage, and mean scores, were used to summarize the distribution of students across different proficiency levels, ranging from beginning to advanced. This table provides an overview of how well the respondents are performing in science, offering a basis for interpreting their academic standing and relating it to their levels of motivation, attitude, and self-efficacy. This report was taken from their grades in the first quarter of the school year 2024-2025.

Table 5. *The Extent of Students' Level of Proficiency in Science*

Grade	*f*	*%*	*Description*	*Level of Proficiency*
90-100	49	23.8	Advanced	Very High
85-89	55	26.7	Proficient	High
80-84	43	20.9	Approaching Proficiency	Moderate
75-79	58	28.2	Developing	Low
74 and below	1	0.5	Beginning	Very Low
Mean	83.95		Approaching Proficiency	Moderate

Table 6 shows the extent of students' level of proficiency in science. Results reveal that 28.2% of the students have a developing level of proficiency in science, 26.7% have a proficient level, and 23.8% have an advanced level of proficiency in science. It is also noted that 20.9% of the students have an approaching proficiency level in science. The highest level of proficiency is 97, and the lowest is 70. The mean of 83.95 is described as approaching the proficiency level. This means that the students have a moderate level of proficiency in science. This result is supported by Mempin (2024), who states that students have a poor achievement level in science. This has been documented for several years now.

Difference Between Students' Attitudes, Motivation, Self-Efficacy, and Demographic Profile

Table 6 presents the results of the statistical analysis examining whether there are significant differences in students' attitudes, motivation, and self-efficacy toward science when grouped according to their demographic profiles, specifically in terms of age, sex, and grade level. These findings are essential in determining whether specific segments of the student population require targeted support or differentiated instructional strategies to enhance their engagement and performance in science.

Table 6. *Difference Between Students' Attitudes, Motivation, Self-Efficacy, and Demographic Profile*

Indicator		*Age*	
	Chi Square	*p-value*	*Remark*
Attitude	5.748	.219	Not Significant
Motivation	12.611	.013	Significant
Self-Efficacy	10.002	.040	Significant
		Sex	
	Mann-Whitney Test	*p-value*	*Remark*
Attitude	5062.00	.590	Not Significant
Motivation	4236.50	.013	Significant
Self-Efficacy	4646.00	.130	Not Significant
		Grade Level	
	Chi Square	*p-value*	*Remark*
Attitude	1.902	.593	Not Significant
Motivation	6.864	.076	Not Significant
Self-Efficacy	5.624	.131	Not Significant

Source: Processed data by Kruskal-Wallis, Spearman Rank Correlation, and Mann Whitney U test

Table 6 presents the difference in students' attitudes, motivation, and self-efficacy when grouped according to demographic profile. The students' attitudes are not significantly different when they are grouped concerning age as supported by a Chi Square of 5.748 with a p-value of .219 which is greater than .05. Similarly, students' attitudes are not also significantly different when they are grouped according to grade level as supported by a Chi Square of 1.902 with a p-value of .593.

Furthermore, students' attitudes are not significantly different when grouped according to sex, as evidenced by a Mann-Whitney U Test of 5062.00 with a p-value of .590. This means that attitudes are not significantly different according to age, sex, and grade level. On the other hand, students' motivation is significantly different when they are grouped according to age as supported by a Chi Square of 12.611 with a p-value of .013 which is less than .05.

However, their motivation is not significantly different when they are grouped according to grade level as supported by a Chi Square of 6.864 with a p-value of .076. Moreover, students' motivations are not significantly different when grouped according to sex, as evidenced by a Mann-Whitney U Test of 4236.50 with a p-value of .013. This means the students' motivation level significantly differs according to age and sex, but not with grade level. This research focused on students' self-efficacy in science learning based on gender. The study revealed differences in self-efficacy levels between male and female students, indicating that gender may affect students' confidence in science subjects (Jumadi et al., 2023). The findings indicated no significant relationship between demographics (such as sex) and self-efficacy in learning.

However, a significant relationship was found between family income and track with self-efficacy, suggesting socioeconomic factors may influence students' confidence in their learning abilities (Coros & Madrigal, 2021). The level of self-efficacy of the students is significantly different when they are grouped according to age, as evidenced by a Chi Square of 10.002 with a p-value of 0.040 Nevertheless, their self-efficacy is not significantly different when they are grouped according to grade level as supported by a Chi Square of 5.624 with a p-value of .131. Students' self-efficacy is not significantly different when grouped according to sex, as evidenced

by a Mann-Whitney U Test of 4646.00 with a p-value of .130. This means the students' self-efficacy level significantly differs according to age, but not by sex or grade level.

A study by Sawari and Mansor (2013) investigated self-efficacy among secondary students. They found that self-efficacy levels can vary with age, suggesting that developmental stages influence students' confidence in their academic abilities. Pajares and Valiante (2001) indicated that students' self-efficacy beliefs can fluctuate across grade levels, with transitions between educational stages potentially impacting their self-confidence in academic tasks. Jamil (2016) revealed that male students exhibited higher self-efficacy levels than female students in specific academic contexts, highlighting the influence of gender on self-perceived academic capabilities.

Relationship between the Attitude, Motivation, and Self-Efficacy Levels of the Students

Table 7 presents the results of the correlation analysis examining the relationships among students' levels of attitude, motivation, and self-efficacy toward the science subject. These variables are interrelated psychological factors that influence how students engage with science learning. Understanding their interconnections is essential in identifying how shifts in one factor may correspond to changes in the others. The results in this table offer valuable insights into the extent to which students' enjoyment, interest, confidence, and motivation support or reinforce one another in shaping their science learning experiences.

Table 7. *Relationship Between the Attitude, Motivation, and Self-Efficacy Levels of the Students*

Variables Correlated	*r*	*r2*	*p-value*	*Extent of Relationship*	*Remark*
Level of Attitudes and Students' Motivation	.597	.356	.000	Moderate	Significant
Level of Attitudes and Students' Self-Efficacy	.531	.282	.000	Moderate	Significant
Level of Motivation and Students' Self-Efficacy	.487	.237	.000	Moderate	Significant

Source: Processed data by Spearman Rank Correlation

A Spearman Rank Correlation (rs) was conducted to examine the relationship between the level of attitudes and students' motivation in science, the level of attitude and students' self-efficacy, and the level of motivation and students' self-efficacy. The analysis on the relationship between the level of attitudes and level of motivation of students in science yielded a correlation coefficient f r (206) =97, with a p-value of .000, significantly less than the alpha level of 0.05.

This result indicates a statistically significant relationship between the level of attitudes and the level of motivation of the students in science. This explains 35.6% of the variations in students' motivation level. The other 64.4% of the variations are due to other variables. These results further imply that the level of attitudes of the students in science significantly influences their level of motivation. These findings also suggest that the increase in the level of attitudes of the students implies an increase in their motivation for science.

Similarly, the analysis of the relationship between the level of attitudes and the level of self-efficacy of students in science, r(206)31 with a p = .000, explaining 28.2% of the variations of self-efficacy. This result indicates a statistically significant relationship between the level of attitudes and the level of self-efficacy of the students in science.

The other 71.8% of the variations are due to other variables. These results imply that the level of attitudes of the students in science significantly influences their level of self-efficacy. These findings further suggest that the increase in the level of attitudes of the students implies an increase in their self-efficacy in science. Moreover, the analysis of the relationship between the level of motivation and the level of self-efficacy of students in science, r(206)= .487 with a p = .000, explaining 23.7% of the self-efficacy variations of the science students. This result indicates a statistically significant relationship between the level of motivation and self-efficacy of the students in science.

The other 76.3% of the variations are due to other variables. These results imply that the students' motivation level in science significantly influences their self-efficacy. These findings further suggest that the increase in the students' motivation level implies an increase in their self-efficacy in science. The study concluded that secondary school students' attitudes towards the science course were above the middle level. This result supports the finding of Uyanık (2017) that fourth-grade students' attitudes towards the science course were slightly above the middle level.

However, Kaya and Böyük (2011) found that second-level primary school students were ambivalent about science courses. In their study, Kahyaoˇglu and Pesen (2013) revealed that students' attitudes towards science courses were positive and high. Students need to have attitudes, values, understanding, and knowledge about science that are necessary to maintain their curiosity about their environment.

Relationship Between Attitude, Motivation, and Self-Efficacy in Students' Proficiency Level in Science

Table 8 shows the results of the correlation analysis conducted to determine the relationship between students' attitude, motivation, and self-efficacy and their proficiency level in science. Attitude, motivation, and self-efficacy are widely recognized as predictors of learning outcomes and establishing their connection to science proficiency helps provide evidence-based insights for targeted educational interventions. The values presented in this table reveal how each of these psychological constructs is associated with students' achievement, highlighting which variables may have the strongest influence on their success in science.

Table 8. *Relationship Between Attitude, Motivation, and Self-Efficacy in Students' Proficiency Level in Science*

Variables Correlated	*r*	*r2*	*p-value*	*Extent of Relationship*	*Remark*
Attitude and Motivation in Students' Proficiency Level in Science	.597	.356	.000	Moderate	Significant
Attitude and Self-Efficacy in Students' Proficiency Level in Science	.531	.282	.000	Moderate	Significant
Motivation and Self-Efficacy in Students' Proficiency Level in Science	.487	.237	.000	Moderate	Significant

Source: Processed data by Spearman Rank Correlation

A Spearman Rank Correlation (rs) was conducted to examine the relationship between the level of attitudes and students' proficiency level, motivation, and self-efficacy in science. The analysis on the relationship between the level of attitudes and students' proficiency level in science yielded a correlation coefficient of r (206) = .004, with a p-value of .952, greater than the alpha level of 0.05. This result indicates no statistically significant relationship between the level of attitudes and students' proficiency level in science. This explains 0.0% of the variations in the students' proficiency level in science. These results further imply that the level of attitudes of the students in science does not significantly influence their proficiency level in science. Results also reveal that the students' motivation levels do not significantly affect their proficiency levels in science. Nonetheless, self-efficacy significantly correlates negatively with students' proficiency levels in science. It was also concluded that students' motivation indirectly affects their academic achievement. It was concluded that students' self-efficacy in a science course directly affects students' motivation. Britner (2002) found that laboratory skills self-efficacy did not affect laboratory grades in terms of the gender variable. Aurah (2017) found that self-efficacy in science courses correlated with academic achievement. Juan et al. (2018) found that self-efficacy in science courses positively affected students' achievement. Lilian (2012) found a positive relationship between attitude, self-efficacy, effort, and academic achievement.

Conclusions

Based on the findings of the study, students are of the right age for junior high school, and females are fairly represented at all grade levels in junior high school. Also, students have a positive attitude towards science, both in enjoyment and interest. The students are motivated and generally show a positive attitude and willingness to participate in science activities. The students also have a high level of intrinsic and extrinsic motivation. Students have a moderate self-efficacy, unsure or inconsistent in their beliefs about their science abilities. The extent of students' level of proficiency in science is at the level of approaching. Students' level of motivation and self-efficacy is significantly different when grouped according to age. Only the level of motivation is significantly different when grouped according to sex. Attitudes significantly influence the motivation and self-efficacy of science students, and motivation significantly influences self-efficacy. Moreover, these results further imply that the students' attitudes in science do not significantly influence their proficiency level in science. Results also reveal that the students' motivation levels do not significantly affect their proficiency levels in science. Nonetheless, self-efficacy significantly correlates negatively with students' proficiency levels in science.

References

Adya Winata, K., Hasanah, A., & Sunan, U. (2021). Implementasi model pembelajaran interaksi sosial untuk meningkatkan karakter peserta didik. https://doi.org/10.36232/pendidikan.v9i1.639.

Ainley, M., & Hidi, S. (2014). Interest and enjoyment. International handbook of emotions in educationhttps://doi.org/10.4324/9780203148211.

Alasim, K., & Paul, P. V. (2019). Understanding factors that affect teachers' attitudes toward inclusion of students who are hard of hearing in Saudi Arabia. Deafness and Education International, 21(4), 210–226. https://doi.org/10.1080/14643154.2018.1489950.

Aprilisya, N., Kerti Yasa, N., & Giantari, I. (2017). Peran Sikap Memediasi Pengaruh Pemasaran Hijau Terhadap Niat Beli Produk Ramah Lingkungan. E-Jurnal Manajemen Unud, 6(4), 254624. https://ojs.unud.ac.id/index.php/Manajemen/article/download/27022/18218.

Aurah, C. (2017). Investigating the relationship between science self-efficacy beliefs, gender, and academic achievement among high school students in Kenya. Journal of Education and Practice, 8(8), 146–153.

Ayasrah, F. T. M., Alarabi, K., Al Mansouri, M., Fattah, H. A. A., & Al-Said, K. (2024). Enhancing secondary school students' attitudes toward physics by using computer simulations.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman

BERA (British Educational Research Association). (2018). Ethical guidelines for educational research (4th ed.).

Bernardo, A. B. I., Estrellado, A. F., & Tuazon, J. E. (2020). Socioeconomic status and academic performance: Findings from Philippine urban public schools. Asia Pacific Journal of Education, 40(3), 345–361.

Bhandari, P. (2023, June 22). Correlational Research | When & How to Use. Scribbr. Retrieved May 5, 2025, from https://www.scribbr.com/methodology/correlational-research/

Britner, S.L. (2002). Science Self-Efficacy of African American Middle School Students: Relationship to Motivation Self-Beliefs, Achievement, Gender, and Gender Orientation. Ph.D. Thesis, Division of Educational Studies, Georgia State University, Atlanta, GA, USA.

Camacho-Morles, J., Slemp, G. R., Oades, L. G., Morrish, L., & Scoular, C. (2019). The role of achievement emotions in the collaborative problem-solving performance of adolescents. Learning and Individual Differences, pp. 70, 169–181. https://doi.org/10.1016/j. lindif.2019.02.005.

Çetin-Dindar, A. (2016). Student motivation and learning in science. International Journal of Environmental and Science Education, 11(6), 1345–1360.

Chai CS, Lin P-Y, King RB, & Jong MS-Y (2021). Intrinsic Motivation and Sophisticated Epistemic Beliefs Are Promising Pathways to Science Achievement: Evidence from High Achieving Regions in the East and the West. Front. Psychol. 12:581193. doi: 10.3389/fpsyg.2021.581193

Coros, J. D., & Madrigal, D. V. (2021). Self-directed learning, self-efficacy in learning, and academic motivation of public senior high school students. Asian Journal of Education and Social Studies, 21(2), 19-34.

Creswell, J.W. & Poth, C.N (2017). Qualitative Inquiry and Research Design: Choosing among Five Approaches, 4th ed.; Sage Publications: Thousand Oaks, CA, USA.

Department of Education (DepEd). (2020). K to 12 Basic Education Curriculum Guide.

Department of Education (DepEd). (2021). Basic Education Report.

Derfler-Rozin, R., & Pitesa, M. (2021). Motivation purity bias: Expression of extrinsic motivation undermines perceived intrinsic motivation and engenders bias in selection decisions. Academy of Management Journal, 63(6), 1840–1864. https:// doi. org/ 10. 5465/ AMJ.2017.0617

Du, Y., Wang, X., Brombal, D., Moriggi, A., Sharpley, A., & Pang, S. (2018). Changes in environmental awareness and its connection to local environmental management in water conservation zones: The case of Beijing, https://doi.org/10.3390/su10062087.

Galla, B. M., Amemiya, J., & Wang, M.-T. (2018). Using expectancy-value theory to understand academic self-control. Learning and Instruction, 58, 22–33. https://doi.org/ 10.1016/j.learninstruc.2018.04.004.

Glynn, S. M., Brickman, P., Armstrong, N., & Taasoobshirazi, G. (2009). Science motivation questionnaire: Construct validation with nonscience majors. Journal of Research in Science Teaching, 46(2), 127–146.

Glynn, S. M., Taasoobshirazi, G., & Brickman, P. (2009). Science motivation questionnaire: Construct validation with nonscience majors. Journal of Research in Science Teaching, 46(2), 127–146.

Godec, S., King, H., Archer, L., Dawson, E., & Seakins, A. (2018). Examining student engagement with science through a Bourdieusian notion of field. Sci. Educ. 27, 501–521. doi: 10.1007/s11191-018-9988-5

Grabau, L., & Ma, X. (2017). Science engagement and science achievement in the context of science instruction: A multilevel analysis of U.S. students and schools. International Journal of Science Education, 39(8), 1045–1068. https://doi.org/10.1080/09500693.2017.1313468

Hadzigeorgiou, Y. & Schulz, R. (2019). Engaging Students in Science: The Potential Role of "Narrative Thinking" and "Romantic Understanding." Volume 4 - 2019 | https://doi.org/10.3389/feduc.2019.00038

Harefa, D. (2020). English Learning Model Theory in Science. Solok, West Sumatra: CV. Independent Scholar.

Holbrook, J., & Rannikmäe, M. (2017). The nature of science education for enhancing scientific literacy. International Journal of Science Education, 39(3), 253–265. https://doi.org/10.1080/09500693.2016.1262786

IEA. (2020). TIMSS 2019 International Results in Science and Mathematics. International Association for the Evaluation of Educational Achievement.

İnce, M. (2023). Examining the role of motivation, attitude, and self-efficacy beliefs in shaping secondary school students' academic achievement in science courses. Sustainability, 15(15), 11612.

Jack, B. M., & Lin, H. S. (2018). Warning! Increases in interest without enjoyment may not be trend predictive of genuine interest in learning science. International Journal of Educational Development, 62, 136–147. https://doi.org/10.1016/j.ijedudev.2018.03.005

Jamil, H., & Mahmud, R. (2019). Relationship Between Self-Efficacy and Students' Academic Achievement. Creative Education, 10(13), 2947–2960. https://www.scirp.org/pdf/ce_2019112614300546.pdf

Jansen, M., Scherer, R., & Schroeders, U. (2015). Students' Self-Concept and Self-Efficacy in the Sciences: Differential Relations to

Antecedents and Educational Outcomes. Contemporary Educational Psychology, 41, 13–24. doi:http:// dx.doi.org/10.1016/j.cedpsych.2014.11.002

Juan, A.; Hannan, S.; Namome, C. (2018). I believe I can do science: Self-efficacy and science achievement of Grade 9 students in South Africa. S. Afr. J. Sci.,114, 48–54.

Jumadi, J., Diani, R., & Bakar, M. (2023). Students' Self-Efficacy in Science Learning Based on Gender. ResearchGate. https://www.researchgate.net/publication/371906024_Students%27_Self-Efficacy_in_Science_Learning_based_on_Gender

Kahyaoˇglu, M.; Pesen, A. (2013). Üstün Yetenekli Öˇgrencilerin Fen ve Teknolojiye Yönelik Tutumları, Öˇgrenme ve Motivasyon Stilleri Arasındaki ˙ Ili¸ski. Türk Üstün ZekâE ˇgitim Derg.,3, 38–49

Karasar, N. (2017). Bilimsel Ara¸stırma Yöntemi: Kavramlar ˙Ilkeler Teknikler; Nobel Akademik Yayıncılık: Ankara, Türkiye.

Kaya, H.; Böyük, U. (2011) ˙Ilköˇgretim II. kademe öˇgrencilerinin fen ve teknoloji dersine ve fen deneylerine kar¸sı tutumları. Türk Bilim Ara¸stırma Vakfı Bilim Derg.,4, 120–130.

Kesan, C., & Kaya, D. (2018). Mathematics and science self-efficacy resources as the predictor of academic success. International Online Journal of Educational Sciences, 10(2), 45-58.

Keser, T. (2015). Conditions Supporting the Development of Scientific Argumentation in High School Chemistry Classrooms: The Role of Question Prompts and an Interactive Simulation. https://doi.org/10.7275/6955327.0

Khine, M. S., & Areepattamannil, S. (2016). Science Education in East Asia: Pedagogical Innovations and Research-Informed Practices. Springer.

Krishan, I. Q., & Al-rsa'i, M. S. (2023). The Effect of Technology-Oriented Differentiated Instruction on Motivation to learn Science. International Journal of Instruction, 16(1).

Kwon, H., Vela, K., Williams, A. M., & Barroso, L. R. (2023). Mathematics and science self-efficacy and STEM careers: A path analysis. Journal of Mathematics Education, 12(1), 74-89.

Lehman, A. (2005). Jump for Basic Univariate and Multivariate Statistics: A Step-by-Step Guide. Cary, NC: SAS Press. p. 123. ISBN 978-1-59047-576-8.

Lerner, M. (2024). What is Your Level of Proficiency? The 6 Different Levels of Proficiency to Reach Conversational Fluency. Copyright © 2024 Sololingual, All Rights Reserved. https://www.sololingual.com/blog/level-of-proficiency

Lilian, K.Y. (2012). A Study of the Attitude, Self-efficacy, Effort and Academic Achievement of CityU Students towards Research Methods and Statistics. Discov.–SS Stud. E-J.,1, 154–183.

Luki, N., & Kustijono, R. (2017). Pengembangan Laboratorium Virtual Berbasis Algodoo Untuk Melatihkan Keterampilan Proses Sains Siswa Pada Pokok Bahasan Gerak Parabola. Jurnal Inovasi Pendidikan Fisika, 06(03), 27–35. fisika/article/view/19846/18158.

McClenaghan, E. (2022). Mann-Whitney U Test: Assumptions and Example. https://www.technologynetworks.com/informatics/articles/mann-whitney-u-test-assumptions-and-example-363425

Narut, Y. F., & Nardi, M. (2019). Analisis Sikap Peduli Lingkungan Pada Siswa Kelas VI Sekolah Dasar di Kota Scholaria: Jurnal Pendidikan https://doi.org/10.24246/j.js.2019.v9.i3.p259-266.

Noori, A. (2024). Originality in Question: Plagiarism and Afghan English Major Students. https://doi.org/10.62810/jssh.v1i1.26

OECD (2016). OECD Proposes Global Competence Assessment. International Educator, 25(4), 14.

OECD. (2019). PISA 2018 Results (Volume I): What Students Know and Can Do. OECD Publishing.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. International Journal of Science Education, 25(9), 1049–1079. https://doi.org/10.1080/0950069032000032199

Paños, E., Navarro, R. I., & Ruiz-Gallardo, J. R. (2020). Attitude and perception towards science. Comparing active vs traditional instruction in transition to adulthood students. European Journal of Special Needs Education, 35(3), 425–435. https://doi.org/10.1080/08856257.2019.1703552.

Philippine Statistics Authority (PSA). (2021). Philippine Education Indicators. https://psa.gov.ph/

Putri, Y. L., & Rifai, A. (2019). Pengaruh Sikap dan Minat Belajar terhadap Motivasi Belajar Peserta Didik Paket C. Journal of Nonformal Education and Community Empowerment, 3(2), 173–184. https://doi.org/10.15294/pls.v2i1.23448.

Rappler (2023). PH still among lowest in math, science, reading in global student assessment. https://www.rappler.com/nation/for-second-time-ph-ranks-among-lowest-pisa-2022/

Rohmah. (2017). Pengaruh Kecerdasan Emosi terhadap Perilaku Resistensi pada siswa-Siswi SMP Islam Al Hidayah Jember. Doctoral Dissertation, http://repository.unmuhjember.ac.id/8639/. Universitas Muhammadiyah

Rustamovna, R. B., & Obloberdiyevna, D. S. (2023). Motivation as a Determining Factor in Promoting Student Independence. Best Journal of Innovation in Science, Research and Development, 2(2), 140-144.

Ryan, R.M.; Deci, E.L. (2017). Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness; Guilford Press: New York, NY, USA; p. 756.

Surur, M. (2020). "Effect of Education Operational Cost On The Education Quality With The School Productivity As Moderating Variable, "Psychol. educ. J., vol. 57, no. 9, pp. 1196–1205.

Uyanık, G. (2017). ˙Ilkokul Ö˘grencilerinin Fen Bilimleri Dersine Yönelik Tutumları ile Akademik Ba¸sarıları Arasındaki ˙Ili¸ski. TÜBAV Bilim Derg.,10, 86–93

Webb-Williams, J. (2018). Science self-efficacy in the primary classroom: Using mixed methods to investigate sources of self-efficacy. Research in Science Education, 48(5), 939–961.

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