Factors Influence Students' Learning and Interest in Science Education.

Pushpa Pradhan

Tshering Tobgay

Rinzin Wangdi

Singye Namgay

Sonam Yangzom(G)

Tendel Tshering

Jangchub Pemo

Science Department

Abstract

This study explores factors influencing Class VI students' learning and interest in science. Using a quantitative approach, data were collected from 83 students at Lamgong Higher Secondary School through a survey. The findings highlight the importance of enjoyment, engagement, teaching clarity, and confidence in science learning. However, weak participation and study habits were identified as key challenges. Recommendations for improving study habits, confidence, and real-life application of science are provided.

Keywords: Science education, student engagement, participation, study habits, confidence.

1.Introduction

Science is fundamental in understanding the nature around us both in terms of living and non-living things. Students' knowledge about science contributes towards health & hygiene, sanitation, and lifestyle that enhances intellectual ability, problem solving and creativity among others. Science is introduced in Class IV as single subject in the early years of education to inculcate basic scientific concepts, scientific skills, and values. Science teaching must address students' learning ability to learn and perform well in science subjects. Teachers must excel in teaching to enhance student learning experience and performance in science.

Action research is a tool used by teachers to enhance teaching and improve student academic performance in their teaching cycles. This collaborative action research is undertaken to study the ways to improve Class VI science students' academic performance.

1.2 Reconnaissance

According to Mills (2000), "reconnaissance is preliminary information gathering" (p. 27), which refers to the initial stage of inquiry aimed at exploring concerns within a given context. In essence, it is an investigative process that seeks to better understand the issues at hand. McNiff, Whitehead, and Lomax (2003, as cited in Dillon, 2008) describe this phase as an opportunity to clarify "where I was starting from in my real-world situation." The reconnaissance phase generally includes situational analysis, evaluation of teacher competence, and a review of existing literature.

This action research emerged from observed discrepancies between student engagement and academic performance in Class VI science at Lamgong Higher Secondary School. Although students displayed considerable enthusiasm during interactive science lessons and showed positive attitudes towards practical activities, their performance in formal assessments and the completion of independent assignments pointed to underlying challenges. It was observed that a significant number of students had difficulty completing homework regularly, suggesting potential issues with self-regulation and time management. Furthermore, while students expressed interest in science, their achievement in summative assessments varied significantly, indicating inconsistent conceptual understanding. Their active involvement in practical demonstrations was not mirrored in classroom discussions and inquiry-based questioning, suggesting a lack of confidence or difficulty engaging with abstract scientific ideas. Informal observations during study periods further revealed a tendency among students to rely on rote memorization rather than employing systematic study strategies, which may hinder deep learning and long-term retention. Reflective teaching practices also highlighted a possible imbalance between the use of engaging pedagogies and the explicit teaching of study skills and the application of scientific concepts to real-world contexts. These findings guided the direction of the research and informed the subsequent phases of inquiry.

These observations precipitated an investigation into the factors influencing student learning and interest in science. A preliminary review of relevant literature highlighted the significant roles of student engagement, self-efficacy, instructional clarity, and study habits in shaping academic outcomes in science education. Consequently, this reconnaissance phase aimed to systematically explore these variables to identify potential interventions and enhance the efficacy of instructional practices within the classroom environment.

1.3 Research objectives

To see how confident Class VI students feel about science.

To understand how clear Class VI students find their science lessons.

To explore how well Class VI students can use science to solve problems.

To find out how often Class VI students join in science activities and how they study science.

1.4 Background of the study

Building on the idea that student success in Class VI science is influenced by more than just textbooks, this research aims to look at the human side of learning. We believe that how students *feel* about science – their self-belief and how well they grasp the lessons – is deeply connected to how well they *do* in science. Furthermore, simply knowing facts isn't enough; being able to *use* that knowledge to figure things out is a key skill. Finally, how much students *engage* in the learning process, both in and out of the classroom, likely plays a significant role. By understanding these personal and interactive aspects of learning, we hope to find ways to make science education more supportive and effective for young students.

2. Literature review

The dynamics between enjoyment, engagement, confidence, self-perception, instructional clarity, application, problem-solving, participation, and study habits in science education have been the focus of a growing body of literature. Central to this discourse is the recurring emphasis on the role of **enjoyment and engagement** in enhancing students' academic experiences and performance. According to Mohamad (2024), students who reported higher levels of enjoyment during science lessons demonstrated increased engagement and held more favorable views of their learning environments. This finding is echoed by Iglesia et al. (2023), who emphasize that motivation and enjoyment are strongly associated with student engagement. Their study also identifies the alignment of learning content with personal goals as a key determinant of enjoyment and boredom, pointing to the significant role of psychological factors in science education.

Another essential construct influencing student outcomes is **self-efficacy**, which shapes both learners' confidence and their self-perception. Özdemir and Hastürk (2021) demonstrate that preschool teachers with elevated self-efficacy beliefs are more likely to implement student-centered teaching approaches in science classrooms. Similarly, Gagnier et al. (2024) argue that positive self-perceptions enhance academic participation and performance. Iglesia et al. (2021) further validate this by showing that motivational factors such as self-efficacy and enjoyment substantially impact engagement levels among pre-service science teachers. Collectively, these findings suggest that bolstering teacher self-efficacy may have a ripple effect, fostering greater confidence and involvement among students.

Instructional clarity also plays a pivotal role in student engagement and the development of problem-solving abilities. Haatainen et al. (2021) find a strong correlation between teachers' self-efficacy and their ability to deliver clear instruction, which, in turn, improves students' learning experiences. Well-structured and transparent teaching strategies support students' understanding and enhance their capacity to solve complex scientific problems.

Active participation, particularly through hands-on learning, further supports effective science instruction. Hudson-Smith et al. (2019) observe that students derive more enjoyment and display higher engagement levels when involved in hands-on activities compared to traditional lecture-based formats. This suggests that interactive approaches not only increase engagement but also improve learning outcomes.

Emerging educational trends also show a growing emphasis on computational thinking in science education. Ogegbo (2023) notes that training teachers in computational thinking techniques can increase their confidence and positively influence student engagement. This interdisciplinary approach reinforces the importance of integrating problem-solving and application-focused teaching strategies into the curriculum.

Finally, study habits and learning environments significantly influence student attitudes toward science. Gagnier et al. (2024) emphasize that students who perceive their classroom environments as supportive and stimulating are more likely to enjoy and actively participate in science lessons. Likewise, Ayasrah et al. (2024) and Ghanem (2019) report that students engaged in exploratory, interactive learning tasks experience heightened levels of motivation, interest, and enjoyment. These findings underscore the need for educational strategies that foster engaging and inclusive science learning environments to cultivate sustained student interest and success.

3. Research questions

What factors influence students' learning and interest in science education?

Sub questions

1. How does enjoying science lessons affect students' engagement in class?
2. How does students' confidence in science shape how they see themselves as learners?
3. How does clear teaching help students understand science better?
4. How do real-life applications and problem-solving tasks help students learn science?
5. How do active participation and good study habits affect students' performance in science?

3.2 Research Design

This study adopts **a** quantitative research design to investigate the factors influencing students' learning and interest in science education. The approach is appropriate as it allows for the collection and analysis of numerical data to identify patterns, relationships, and trends across different variables such as enjoyment, engagement, confidence, instructional clarity, application, participation, and study habits. A survey questionnaire will be used as the primary tool for data collection.

3.3 Sample

The study uses a convenience sampling technique. A total of **83** students from Lamgong Higher Secondary School participated in the study. The sample included students from different sections of Grades VI, selected based on their availability and willingness to participate. This approach was chosen due to the ease of access to the participants and time constraints.

3.4 Data collection

Permission was obtained from the school administration prior to data collection. The purpose of the study was explained to participants, and informed consent was obtained. The questionnaires were distributed and collected during regular school hours under the supervision of the researcher. Students were assured that their responses would remain confidential and would be used solely for academic purposes.

3.5 Data Analysis

Data collected from the 83 participants were entered into Microsoft Excel and analyzed using descriptive statistics such as mean, standard deviation, and percentage to summarize the responses. Correlation analysis was also conducted to explore relationships between key variables such as enjoyment and engagement, clarity of instruction and problem-solving skills, and confidence and self-perception.

3.6 Ethical Consideration.

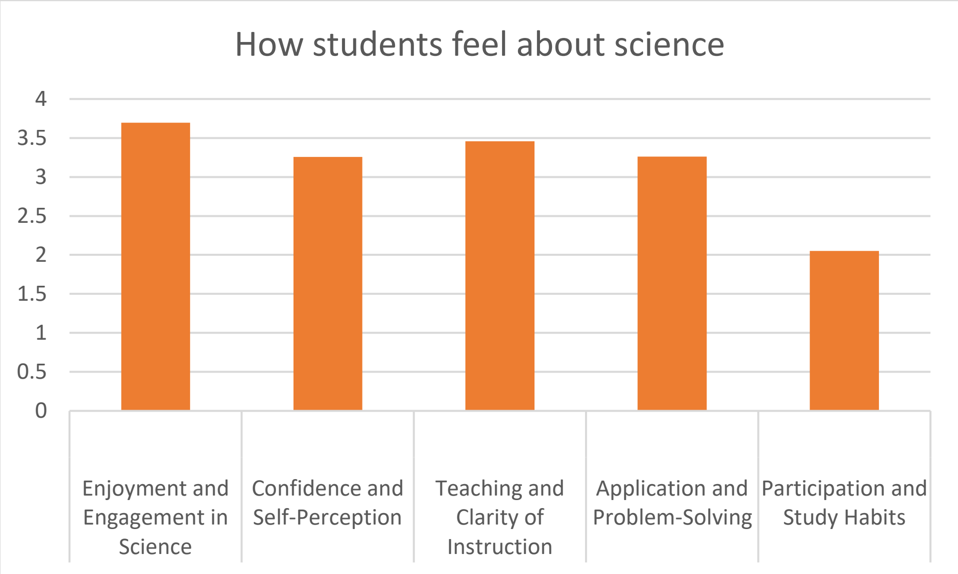
Ethical guidelines were strictly followed throughout the study. Participants were informed that participation was voluntary and anonymous, and they were free to withdraw at any time without any consequences. All data were stored securely and used solely for research purposes.

4. Data Analysis

The value of Cronbach's alpha was calculated as $\alpha = 1314 \times 0.7395 \approx 1.0769 \times 0.7395 \approx 0.796$. Based on this Cronbach's alpha value of approximately 0.80, it was concluded that the survey questions were well-prepared and thoughtfully designed to investigate students' performance in science. The survey focused on five key areas: enjoyment and engagement in science, confidence and self-perception, teaching and clarity of instruction, application and problem-solving, and participation and study habits. These categories reflected different dimensions of students' learning experiences and were likely developed to provide a comprehensive understanding of their perceptions.

A Cronbach's alpha of 0.80 indicated good internal consistency among the items, suggesting that the questions within each category were closely related and reliably measured the same underlying construct (George & Mallery, 2003). The consistency in student responses across related items implied that the questions were clearly worded, relevant, and well-aligned with the intended constructs being measured.

4.1 Bar graph



The bar graph titled *"How Students Feel About Science"* presents the average ratings of students across five key areas of their science learning experience, based on a Likert scale likely ranging from 1 to 5. The highest-rated category was Enjoyment and Engagement in Science, with an average score just below 3.7. This indicates that most students enjoyed learning science and felt actively involved in lessons. Such findings suggest a positive attitude toward the subject and a high level of motivation driven by engaging and interesting activities.

The second highest score, approximately 3.5, was observed for Teaching and Clarity of Instruction. This implies that students generally found their science teachers' explanations clear and the instructional methods effective. Such clarity likely supported better understanding of scientific concepts.

Both Application and Problem-Solving and Confidence and Self-Perception received similar average scores, slightly above 3.2. These results suggest that students felt moderately confident in their ability to apply scientific knowledge to solve problems. However, there remains room for improvement in fostering stronger problem-solving skills and boosting students' confidence through targeted support and practice.

The lowest average score, around 2.0, was recorded for Participation and Study Habits. This is a significant concern, as it suggests limited student involvement in science activities and weak study practices. Poor participation and study habits can hinder academic progress, indicating a need for strategies to encourage more active learning and regular study routines among students.

Table 1
4.2 Mean Scores of Students' Perceptions Across Different Aspects of Science Learning

Aspect of Science Learning	Mean Score
Enjoyment and Engagement in Science	3.69
Confidence and Self-Perception	3.26
Teaching and Clarity of Instruction	3.46
Application and Problem-Solving	3.26
Participation and Study Habits	2.05

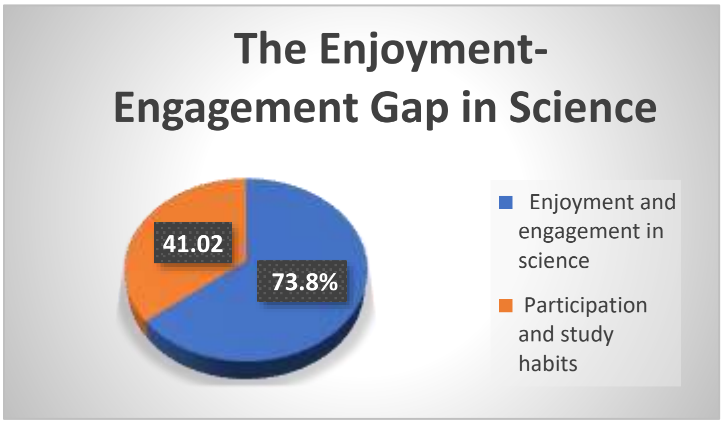
The analysis of mean scores provides insights into the factors that influence students' learning and interest in science education. Table 1 presents the mean scores for five key aspects of science learning. Among the measured factors, *Enjoyment and Engagement in Science* received the highest mean score (M = 3.69), suggesting that students generally find science enjoyable and are actively engaged during science lessons. This high level of enjoyment may positively contribute to their sustained interest in the subject.

The factors *Teaching and Clarity of Instruction* (M = 3.46) and *Confidence and Self-Perception* (M = 3.26) also received relatively high ratings, indicating that clear teaching methods and students' self-belief in their abilities are influential in their science learning experiences. These results align with previous findings that effective teaching strategies and self-efficacy are critical components in science education (Bandura, 1997; Osborne et al., 2003).

Similarly, *Application and Problem-Solving* scored a mean of 3.26, which suggests that students moderately perceive science as useful and relevant to real-life problem-solving. However, *Participation and Study Habits* recorded the lowest mean score (M = 2.05), indicating that students may struggle with consistent participation and effective study routines in science. This lower engagement in study habits could hinder overall learning outcomes despite interest in the subject.

Table 2

4.3 Gap in Mean Scores Across Aspects of Students' Science Learning



A significant disparity was observed between students' perceptions of enjoyment and engagement in science and their reported participation and study habits. Specifically, 73.8% of students indicated positive perceptions regarding their enjoyment and engagement in science. In contrast, only 41.02% of students reported positive perceptions related to their participation and study habits. This difference of 32.78% highlighted a substantial gap in students' experiences.

The findings suggest that while students generally enjoyed science, they faced challenges in the practical aspects of learning, such as active participation and effective study strategies. This discrepancy presents a potential challenge for educators aiming to foster well-rounded science learning experiences.

5.Discussion

The present study investigated the factors that influenced students' learning and interest in science education. Data collected from 83 participants revealed both strengths and gaps in students' science learning experiences. Descriptive statistics and correlation analysis were used to interpret the responses across five key categories: enjoyment and engagement in science, confidence and self-perception, teaching and clarity of instruction, application and problem-solving, and participation and study habits.

The findings showed that *Enjoyment and Engagement in Science* received the highest mean score (M = 3.69), indicating that students generally enjoyed science lessons and felt actively involved. This aligned with prior research that suggested positive emotions such as enjoyment play a crucial role in sustaining student motivation and interest in science subjects (Osborne, Simon, & Collins, 2003; Pekrun, 2006). Students' favorable emotional engagement was likely driven by interactive and interesting classroom activities, which have been found to enhance both short-term attention and long-term interest in scientific topics.

Teaching and Clarity of Instruction also received a relatively high mean score (M = 3.46), indicating that students perceived their teachers' explanations as clear and helpful. Effective instructional clarity has been associated with improved comprehension and retention of scientific concepts, which in turn fosters better academic performance (Hattie, 2009). This finding suggested that the pedagogical approaches used in the classrooms were supportive of students' conceptual understanding.

Moderate scores were observed in *Confidence and Self-Perception* (M = 3.26) and *Application and Problem-Solving* (M = 3.26). These results implied that while students somewhat believed in their own scientific abilities and saw some relevance of science to everyday life, these areas still required enhancement. According to Bandura (1997), self-efficacy significantly influences academic motivation and perseverance. Therefore, strategies that build students' confidence—such as goal-setting, feedback, and collaborative inquiry—could support deeper engagement in science learning. Additionally, contextualized, real-world applications of science may help students better connect their learning to practical use, enhancing both understanding and interest (Hmelo-Silver, Duncan, & Chinn, 2007).

The most concerning finding was the low mean score in *Participation and Study Habits* (M = 2.05), indicating weak engagement outside of classroom instruction. Despite their interest and enjoyment, students did not appear to consistently participate in science-related tasks or follow effective study routines. This gap between emotional engagement and behavioral involvement suggested a lack of self-regulated learning strategies. Zimmerman (2002) emphasized that students' academic achievement depends not only on interest but also on their ability to manage their learning through planning, monitoring, and evaluating their own progress. The low engagement in study habits may hinder long-term academic success and the development of deeper understanding.

The analysis further revealed that while students had favorable perceptions of science instruction and showed high levels of enjoyment, these positive feelings did not necessarily translate into active participation or strong study behaviors. This mismatch highlighted a need for educational interventions that support metacognitive skill development and promote accountability in learning. For instance, incorporating structured homework routines, self-assessment tools, and reflective journals could help bridge the gap between interest and academic discipline.

In conclusion, the study highlighted the importance of balancing emotional engagement with cognitive and behavioral strategies to support effective science learning. Although students enjoyed science and found instruction clear, greater attention must be given to improving their confidence, real-world application skills, and most importantly, their participation and study habits. Addressing these gaps could lead to improved learning outcomes and a more sustained interest in science education.

6. Recommendation

This study showed that students enjoy learning science and feel engaged in class. However, it also revealed some areas that need improvement, especially when it comes to study habits and participation. Based on these findings, the following recommendations are made to help improve students' learning and interest in science.

1. **Keep Science Fun and Interesting**
Since students enjoy science, teachers should continue using fun, hands-on activities and real-life examples that capture students' attention. When students are emotionally engaged, they are more likely to stay interested and motivated (Pekrun, 2006). Science lessons should be active, creative, and give students a chance to explore and discover.
2. **Help Students Believe in Themselves**
Some students were not very confident in their science abilities. Teachers can build students' confidence by giving encouraging feedback, celebrating small successes, and allowing students to make choices in their learning. When students believe they can succeed, they are more likely to try (Bandura, 1997).

3. **Support Good Study Habits**
Although students enjoyed class, their study habits were weak. Teachers should guide students on how to manage their time, stay organized, and review their work regularly. Giving students tools like checklists, study plans, or journals can help them become better, more independent learners (Zimmerman, 2002).
4. **Make Science More Relevant to Daily Life**
Some students didn't clearly see how science connects to real life. To fix this, teachers can use examples from the students' own experiences and communities. Letting students solve real problems or do small projects about things that matter to them can make science feel more useful (Hmelo-Silver, Duncan, & Chinn, 2007).
5. **Listen to Students' Ideas**
It's important to hear what students think about how they learn best. Giving them a chance to reflect, share opinions, and ask questions can help them feel more involved. When students know their voice matters, they are more likely to take learning seriously and feel respected.

7. Limitations

While this study provided useful insights into what influences students' interest and learning in science, there were some limitations that should be considered:

1. **Limited to One School and Grade Level**
The research was conducted only at Lamgong Higher Secondary School with Class VI students. As a result, the findings may not represent students from other classes, schools, or regions. Different schools may have different teaching styles, resources, or student backgrounds that could affect the results.
2. **Basic Research Knowledge and Experience**
The study was carried out by researchers with limited research experience. As a result, some aspects such as sampling techniques, in-depth analysis, or the use of advanced research tools may not have been fully applied. This could affect the depth and accuracy of the findings.
3. **Use of Self-Reported Data**
Data were collected using questionnaires, and students may not have answered honestly or may have misunderstood some questions. This can influence the reliability of the results.
4. **Focus on Mean Scores Only**
The study focused mainly on average scores (mean), without deeper qualitative analysis. This means some rich details or explanations behind the numbers may have been missed.

References

Ayasrah, M. A., Alkhawaldeh, N. A., & Al Momani, M. M. (2024). *Enhancing science engagement through interactive learning: A classroom-based study*. Journal of Science Education and Technology, 33(1), 25–38.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.

Gagnier, K. M., Lazonder, A. W., & Verhoeven, M. (2024). *Self-perception, motivation, and engagement in science education: A longitudinal study*. Science Education, 108(2), 290–310.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference* (4th ed.). Allyn & Bacon.

Ghanem, C. (2019). *The impact of student-centered science activities on motivation and interest*. International Journal of Science and Mathematics Education, 17(6), 1017–1032.

Haatainen, O., Uitto, A., & Estola, E. (2021). *Instructional clarity and science teaching: The role of self-efficacy*. Research in Science Education, 51(4), 1275–1292.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*(2), 99–107. https://doi.org/10.1080/00461520701263368

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*(2), 99–107. https://doi.org/10.1080/00461520701263368

Hudson-Smith, R., Connolly, M., & Francis, R. (2019). *Hands-on versus lecture-based learning in science: A comparative study*. Journal of Education in Science, Environment and Health, 5(2), 115–124.

Iglesia, D. A., Martinez, C., & Ruiz, M. (2021). *Motivational variables and engagement among pre-service science teachers*. Teaching and Teacher Education, 97, 103207.

Iglesia, D. A., Ruiz, M., & Gomez, R. (2023). *Understanding science engagement: The mediating role of enjoyment and goal relevance*. Journal of Research in Science Teaching, 60(5), 849–867.

Mohamad, N. A. (2024). *Enjoyment and engagement in science education: A quantitative study in secondary schools*. International Journal of Science Education, 46(1), 58–72.

Ogegbo, A. (2023). *Computational thinking in science education: Teacher training and its impact on engagement*. Journal of STEM Education, 24(3), 43–59.

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

Özdemir, S., & Hastürk, G. (2021). *Preschool teachers' self-efficacy in science teaching and its impact on pedagogy*. Early Childhood Education Journal, 49(5), 905–917.

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2