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THE MEDIATING EFFECT OF SCIENCE INTEREST ON THE RELATIONSHIP BETWEEN STUDENTS' ENGAGEMENT AND ATTITUDES TOWARD SCIENCE AMONG GRADE 10 STUDENTS

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ABSTRACT

This study explored the mediating role of science interest in the relationship between students' engagement and attitudes toward science among Grade 10 students from public schools in Laak South District, Davao de Oro. Using a quantitative research design with a descriptive and correlational approach, data were collected from 249 Grade 10 students across three public secondary schools. To measure the level of student engagement, the scale used was The Students' Science Engagement Scale by Baraquia. Attitudes toward science were assessed using the Attitudes Toward Science Questionnaire by Al-Mutawah and Fateel while science interest was evaluated via the Biology Interest Questionnaire by Knekta et al. Results indicated a high level of engagement among students, moderate attitudes toward science, and a high level of science interest. The correlation analysis revealed significant interrelationships between the variables for student engagement and attitudes toward science, science interest and attitudes toward science, and students' engagement and science interest. The relationship between student engagement and attitude toward science was partially mediated by science interest. All these findings indicate that developing both interest in science and student engagement can enhance attitudes toward science.

KEYWORDS: *science education, students' engagement, science interest, attitudes toward science, Grade 10 Students, descriptive and correlational approach, mediation analysis, Laak South District, Davao De Oro, Philippines*

INTRODUCTION

Recent studies point out a major world issue which is negative attitudes among students toward science, which further affects learning achievements and career selection in science-related industries (Mao et al., 2021; Logan, 2023). Negative attitudes, fueled by traditional teaching styles, hinder productive science learning and lead to shortages of skilled workforce in areas like engineering and healthcare that pose a potential threat to the economy (Astalini et al., 2019; Arikan & Günay, 2020).

In Africa, 26% of the students said that science learning was boring, and 39% said it was not relevant to real life (Hadzigeorgiou & Schulz, 2019). Similar concerns were seen in Indonesia, where 3.2% and 4.1% of the students attributed negative attitudes to disinterest and poor learning experiences, respectively (Astalini et al., 2019). In Malaysia, 75% of students find science boring due to ineffective teaching methods (An & Chua, 2023), and in Bahrain, 40% labeled science as difficult (Weng et al., 2024).

In the Philippines, the Department of Education prioritized addressing barriers to quality science education (Palines & Dela Cruz, 2021). A study in Manila showed that poor scientific performance relates to students not enjoying and seeing value in science (Maala, 2023). The National Achievement Test scores showed science as the weakest subject with a general average of 28.42% (Cariño, 2019). Further, only 22% of Filipino students passed a science proficiency level, stating that it is too hard and not relevant (Calleja et al., 2023).

In Davao de Oro, for instance, data from a local school revealed low participation. Here, 60% of the students were disengaged, and 55% were minimally active in classroom science activities. Most of them used a passive learning approach, with 30% doing tasks for compliance and 20% missing deadlines. This means that there is a challenge in developing positive attitudes toward science in the region.

Research indicates that positive attitudes toward science enhance motivation, achievement, and process skills, though these relationships remain underexplored in specific contexts like the Philippines (Liou, 2020; Mirana, 2019). This study addresses this gap by investigating the relationship between engagement, attitudes, and the mediating role of science interest among Filipino students. Findings will inform targeted interventions for improving attitudes toward science and will be shared with DepEd, schools, and research forums for broader dissemination.

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STATEMENT OF THE PROBLEM

This study aims to determine whether science interest explains the relationship between students' engagement and attitudes toward science among Grade 10 students.

This will specifically provide answers to the following questions:

1.What is the level of student's engagement in terms of:
- 1.1. Engagement on science lessons and tasks;
- 1.2. Science learning involvement; and
- 1.3. Science effort and preparation?

2.What is the level of attitudes toward science of students in terms of:
- 2.1. Liking learning science;
- 2.2. Valuing science; and
- 2.3. Confident in science?

3.What is the level of science interest of students in terms of:
- 3.1. Feelings;
- 3.2. Value; and
- 3.3. Reengagement?

4.Is there a significant relationship between:
- 4.1. Students' engagement and attitudes toward science of students?
- 4.2. Science interest and attitudes toward science of students?
- 4.3. Students' engagement and science interest?

5. Does science interest significantly mediate the relationship between students' engagement and attitudes toward science of students?

HYPOTHESIS

The researcher proposed the following hypotheses, which were evaluated at a significance level of 0.05.

1. There is no significant relationship between students' engagement and attitudes toward science of students.
2. There is no significant relationship between science interest and attitudes toward science of students.
3. There is no significant relationship between students' engagement and science interest.
4. Science interest does not significantly mediate the relationship of students' engagement and attitudes toward science of students.

THEORETICAL AND CONCEPTUAL FRAMEWORK

Based on the study by Abualrob, (2019), it asserts that active participation cultivates a positive attitude towards learning because content is engaging and meaningful. In addition, Ainley and Ainley, (2011), and Hasni, (2015), suggest that students in hands-on activities tend to favor science. Singh et al. (2002) and Hidi (1990) point out that relevance to modern education and everyday life is an important factor for students' engagement, while Toli and Kallery (2021) show that active involvement maintains interest. Osborne et al. (2003) and Raved and Assaraf (2010) indicate that personal relevance and interest in science are significant determinants of positive attitudes, with Hasni (2015) pointing out interest as essential in a research-based society.

The conceptual framework integrates these findings by proposing science interest as a mediator between student engagement and attitudes toward science. Engagement—comprising lesson participation, learning involvement, and effort—directly and indirectly influences attitudes, which include liking, valuing, and confidence in science. Science interest, characterized by feelings, value, and re-engagement, amplifies the effect of engagement on attitudes, underlining its critical role in fostering favorable perceptions of science. This model both directly and indirectly incorporates pathways to reveal the complicated interactions between such variables.

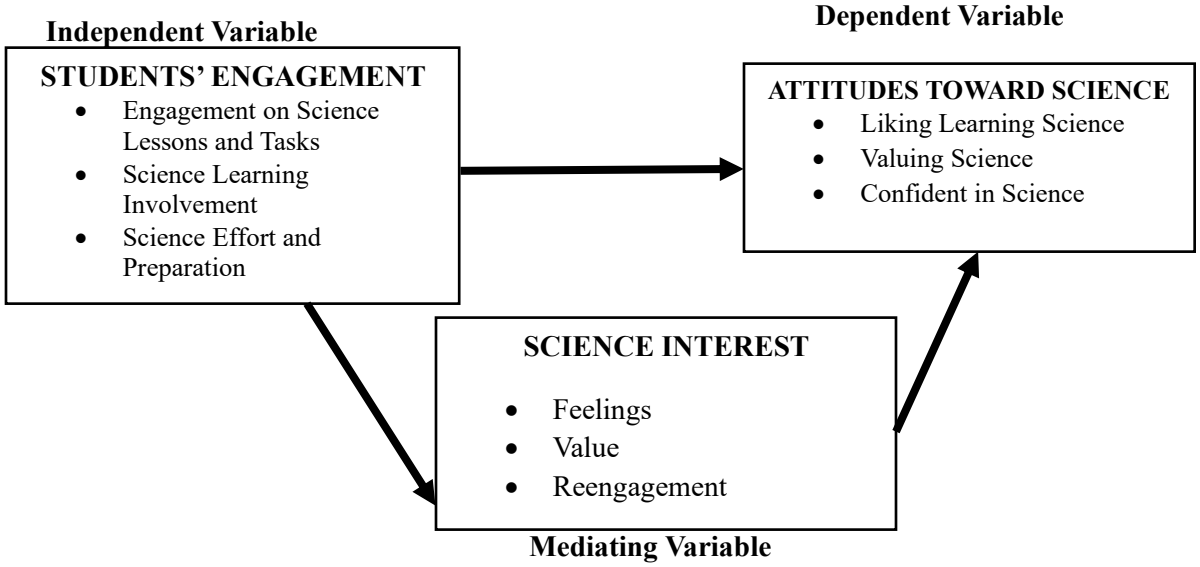


Figure 1. Conceptual Paradigm of the Study

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METHODS

This research was conducted through a quantitative design involving descriptive and correlational approaches. It aims to study the relationship among Grade 10 students' engagement, interest in science, and attitudes toward science. Stratified random sampling selected 249 respondents from three public secondary schools of Laak South District, Davao de Oro. The three validated questionnaires included in the collection of data are the Students' Science Engagement Scale (SSES), Biology Interest Questionnaire (BIQ), and Attitude Towards Science Questionnaire (ATSQ) with Cronbach's alpha above 0.8. In terms of ethical considerations, it followed proper protocols in terms of informed consent, confidentiality, and health measures while conducting in-person surveys. Statistical treatments included mean, standard deviation, Pearson r correlation, and Sobel z test for mediation analysis, enabling a thorough examination of relationships and mediating effects among variables. Findings aim to inform interventions to enhance students' engagement and attitudes toward science.

RESULTS AND DISCUSSION

The study revealed several key findings. The level of students' engagement obtained an overall mean of 3.88 with a standard deviation of 0.99, classified as high, indicating that behaviors linked to engagement are regularly demonstrated by the respondents. Among the three indicators, "science effort and preparation" achieved a mean of 3.88 with a standard deviation of 1.00, described as high. Similarly, "engagement in science lessons and tasks" and "science learning involvement" both recorded a mean of 3.88 with a standard deviation of 0.98, also described as high, reflecting a very high level of engagement across all indicators.

The level of attitudes toward science was measured with an overall mean of 3.50 and a standard deviation of 0.94, classified as moderate. This suggests that while students exhibit some positive attitudes toward science, there is room for improvement in their perceptions of the subject. Among the indicators, "liking learning science" had the highest mean of 4.03 with a standard deviation of 0.90, described as high. This was followed by "valuing science," which had a mean of 3.85 and a standard deviation of 0.96, also classified as high. However, "confidence in science" recorded the lowest mean of 3.51 with a standard deviation of 0.96, classified as moderate.

The level of science interest was found to be high, with an overall mean of 3.79 and a standard deviation of 0.96. Among its indicators, "value" achieved the highest mean of 4.03 with a standard deviation of 0.92, followed by "feelings," which had a mean of 3.83 and a standard deviation of 0.97, both described as high. Conversely, the indicator "reengagement" had a mean of 3.50 with a standard deviation of 1.00, classified as moderate.

The first null hypothesis was rejected due to a modest, positive, and significant association between students' engagement and attitudes toward science ($r = 0.420$, $p < 0.000$). Similarly, the second null hypothesis was rejected, indicating a modest, positive, and significant association between attitudes toward science and science interest ($r = 0.494$, $p < 0.000$). The third null hypothesis was also rejected, as a substantial, positive, and significant correlation was found between students' engagement and science interest ($r = 0.784$, $p < 0.000$).

Finally, science interest significantly mediates the relationship between students' engagement and attitudes toward science ($z = 4.682$, $p < 0.05$, ratio < 0.80). This highlights that science interest plays a pivotal role in shaping students' perceptions and emotional connections
to science, serving as a crucial mechanism through which engagement impacts attitudes.

CONCLUSION AND RECOMMENDATION

The study concludes that Grade 10 students are frequently engaged in science, highly interested, and moderately attitudinal towards the subject. Engagement, which is active participation, consistent involvement, and preparation, is significantly related to more positive attitudes and heightened interest in science. Similarly, students' interest, reflected in their enthusiasm, value, and re-engagement with science, mediates the relationship between engagement and attitudes, emphasizing the interconnected nature of these factors. Additional recommendations include including interactive and inquiry-based learning to promote students' interest and attitude; providing teachers with strategies and resources for hands-on activities; involving parents in promoting curiosity at home and convincing the school administrators and other officials of the DepEd to implement and monitor science engagement programs. Future studies will look into other elements like emotional intelligence and digital tools to deepen understanding and further improve the science learning experience.

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