Research Capability and Emotional Confidence on Learners' Academic Engagement in Science

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ABSTRACT

This study investigates the relationship between Research Capability and Emotional Confidence as well as their combined effects on the learners' Academic Engagement in Science classes. The scope of this research is limited only to grade 11 STEM (Science, Technology, Engineering, and Mathematics) students enrolled in the first grading period of the school year 2023-2024. The study was conducted at Dologon National High School and had 60 participants who had subject science investigatory project. The research design employed in this study is Descriptive Correlational Quantitative research. The study utilized a total enumeration sampling. The data gathered was analyzed using SPSS in calculating the mean and the standard deviation as well as the correlation among the variables. Pearson's Correlation Coefficient was used to determine the correlation of the strength and direction of relationships between research capability, emotional confidence, and academic engagement. The study can be concluded that the students exhibit a high level of academic engagement in science. Students feel positive about their engagement in science activities that helps connect a deeper understanding of scientific concepts. The recommendations of this research include the following: a specified area to be observed on research capability and emotional confidence, integration of research skills into the curriculum, and creating interactive learning environment.

Keywords: Research Capability, Emotional Confidence, Academic Engagement, Science, and Investigatory Projects

INTRODUCTION

Scientific Research is practiced both by students and teachers as their discoveries and findings can help pivot a change in the world of academia or the daily lives of people. Several graduate studies students undergo such for professional development because it has been said that doing research is one way that an individual can acquire knowledge for their personal development. In doing research, one must have the right research capabilities and the corresponding emotional confidence. Their relationship is fundamental in shaping learners' academic engagement in science education. Research capability discusses essential skills such as critical thinking, data analysis, and problem-solving for conducting scientific inquiries effectively. On the other hand, emotional confidence refers to students' confidence regarding their emotional responses and abilities in taking scientific explorations, which influence their motivation and resilience in academic settings. Understanding how these dimensions interact is crucial for developing educational strategies that enhance research skills and emotional well-being, ultimately impacting greater engagement in science learning environments.

Thus, the study aimed to investigate the relationship between Research Capability and Emotional Confidence as well as their combined effects on the learners' Academic Engagement in Science classes. Specifically, this research examined the following conditions: a) evaluate the level of research capability among students engaged in science investigatory projects. b) examined the emotional confidence of students in terms of dealing with their science investigatory projects. And; c) investigate the interrelationship of research capability and emotional confidence to understand how the variables influence one another and contribute to the overall academic engagement of students undergoing science investigatory projects. The study is limited only one

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class and senior high school strand. For future adaptations of this study, the researcher would like to recommend expanding the scope by including participants from multiple schools to enhance generalizability.

METHODOLOGY

The research design employed in this study is Descriptive Correlational Quantitative research. The study was pilot-tested at Valencia National High School with one Grade 11 STEM (Science, Technology, Engineering, and Mathematics) class. The final conduction of the study to test the student's research capability and emotional confidence towards their academic engagement in science was held at Dologon National High School of all the Grade 11 class which has 61 number of students enrolled in STEM. However, only 60 participants were collected due to the fact that 1 student was excused because of a school activity. The study utilized a total enumeration sampling. They were disseminated with informed consent to ensure their willingness to participate fully acknowledging that any information gathered will be confidential and used only for the research purposes. The instrument to be utilized in this research is through a questionnaire.

The questionnaire made by the researcher was patterned from the studies of Lexie Estacio and Alvin Barcelona on the research capabilities portion, Imad Hussein Obaid and Ammar Abdul Ameer Obaid on the emotional confidence portion, and Stephen Mohamad on the academic engagement portion. A written letter of request was addressed to the principal of both the pilot-tested school and as well as to the final conducted school in requesting permission to pilot test and conduct the research study. The data gathered was analyzed using the desktop application SPSS in calculating the descriptive part of the research which is to determine the mean and standard deviation calculations of the research. Pearson's Correlation Coefficient was used to determine the correlation of the strength and direction of relationships between research capability, emotional confidence, and academic engagement.

TABLE 1.Descriptive Analysis for Research Capability

Sub Variable	Mean	SD	Descriptive Rating	Qualitative Interpretation
Understanding of Research Concepts	3.3983	.52189	Neutral	Moderately High
Application of Research Methods	3.5033	.42345	Neutral	Moderately High
Interpretation and Communication of Research Findings	3.5517	.53282	Agree	High
Grand Mean	3.4844		Neutral	Moderately High

Legend:

Range	*Descriptive Rating*	*Qualitative Interpretation*
4.51 – 5.00	Strongly Agree	Very High
3.51 – 4.50	Agree	High
2.51 – 3.50	Neutral	Moderately High
1.51 – 2.50	Disagree	Low
1.00 – 1.50	Strongly Disagree	Very Low

RESULTS AND DISCUSSION

This study examines the relationship between research capability and emotional confidence in relation to students' academic engagement in science. In this section, the presentation of the data gathered as well as the discussion, interpretation, and implication of the findings in the study will be found here.

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A. Research Capability of Students

The level of research capability among students of Dologon National High School in relation to their academic engagement in science is presented in Table 1. The table shows the sub-variables, mean scores, standard deviation, descriptive rating, and qualitative interpretation.

The table summarizes students' performance across three sub-variables related to their research capability in the context of academic engagement in science. The first sub-variable, "Understanding of Research Concepts," has a mean score of 3.3983 and a standard deviation of 0.52189. This is categorized with a "Neutral" descriptive rating. This indicated that the students possess a moderately high level of understanding in this area, although there is a potential for further development. The "Application of Research Methods," shows a mean score of 3.5033 and a standard deviation of 0.42345. Similar to the first sub-variable, it is rated as "Neutral," reflecting a moderately high ability among students to effectively apply various research methods.

The lower standard deviation suggests that responses are relatively consistent across participants. The third sub-variable, "Interpretation and Communication of Research Findings," scores the highest with a mean of 3.5517 and a standard deviation of 0.53282. This sub-variable is rated as "Agree," with a high qualitative interpretation, indicating that students feel confident in their ability to interpret and communicate research findings at a high level. The overall assessment is reflected in the Grand Mean, which is calculated at 3.4844 and rated as "Neutral," with a qualitative interpretation of "Moderately High." This grand mean provides a comprehensive overview of students' research capability, suggesting that while they exhibit strengths in certain areas, there remains an opportunity for growth across the board.

The findings were supported by the study of Bullo et al. (2024) which stated "the research capability of senior high students is generally less competent." This is also similar to the results above due to the fact that it has a descriptive rating of "neutral" and a qualitative interpretation of "moderately high" which indicates that the students are assertive on a few research studies that they have done or were currently doing however there is certainly a gap for growth among them. Faldas et al. also supported the results which is there is no significant difference in the research capabilities and academic achievement of students. There are only little to no significant changes at all when it comes to the research capabilities of students in relation to their academic engagement.

B. Emotional Confidence of Students

The data presented in the table provides insights into students' emotional confidence and responses related to their engagement in science. Each sub-variable is assessed based on its mean score, standard deviation, descriptive rating, and qualitative interpretation, offering a comprehensive overview of students' emotional dimensions in the context of scientific learning.

TABLE 2.Descriptive Analysis for Emotional Confidence

Sub Variable	Mean	SD	Descriptive Rating	Qualitative Interpretation
Emotional Confidence in Science Engagement	3.5583	.55305	Agree	High
Emotional Responses to Science Challenges	3.6967	.55631	Agree	High
Emotional Support and Confidence Building	3.7033	.61395	Agree	High
Grand Mean	3.6528		Agree	High

Legend:

Range	*Descriptive Rating*	*Qualitative Interpretation*
4.51 – 5.00	Strongly Agree	Very High
3.51 – 4.50	Agree	High
2.51 – 3.50	Neutral	Moderately High
1.51 – 2.50	Disagree	Low
1.00 – 1.50	Strongly Disagree	Very Low

The first sub-variable, "Emotional Confidence in Science Engagement," has a mean score of 3.5583 with a standard deviation of 0.55305. This score falls within the "Agree" category, indicating that students generally feel confident when engaging in science-related activities. The relatively low standard deviation suggests that there is consistency among students in their feelings of emotional confidence, reflecting a strong collective belief in their abilities to participate actively in scientific inquiry. The second sub-variable, Emotional Responses to Science Challenges, shows an even higher mean score of 3.6967 and a standard deviation of 0.55631. This also falls under the "Agree" rating, suggesting that students possess a positive emotional response when faced with challenges in science. The high mean indicates that students are likely to approach difficulties with resilience and determination, which is crucial for effective learning and problem-solving in scientific contexts. The third sub-variable, Interpretation and Communication of Research Findings, has a mean score of 3.7033 and a standard deviation of 0.61395, also categorized as "Agree." This suggests that students feel capable of interpreting and effectively communicating their research findings, further enhancing their engagement in scientific discourse. The Grand Mean of 3.6528 reinforces these findings, indicating an overall high level of emotional confidence among students regarding their engagement in science. This collective data underscores the importance of fostering emotional resilience and confidence to enhance students' academic experiences and success in the field of science. The study of Obaid (2022) reinforced the need for personal character through cognitive and emotional elements that make the students able to perform their tasks and face the pressures with emotional confidence. The high mean indicates that students are likely to approach difficulties with resilience and determination which is crucial for effective learning and problem-solving in scientific contexts This emotional resilience is vital in encouraging a proactive learning environment where students are motivated to participate actively in scientific inquiry. Furthermore, the ability to interpret and communicate research findings reflects a deeper understanding of scientific concepts, which is essential for academic success. According to Shengyao et al. (2024), emotional intelligence was positively related to positive psychological characteristics, psychological well-being, and academic achievement. Therefore, a student must be mentally prepared to partake in scientific investigations and be particular as well as knowledgeable on the type of investigation they have undertaken.

C. Academic Engagement of Students in Science

The data presented in the table below has insights into students' academic engagement in science. The sub-variable is assessed based on its mean score, standard deviation, descriptive rating, and qualitative interpretation.

TABLE 3.Descriptive Analysis for Academic Engagement

Sub Variable	Mean	SD	Descriptive Rating	Qualitative Interpretation
Academic Engagement of Students in Science	3.7383	.65667	Agree	High
Grand Mean	3.7383		Agree	High

Legend:

Range	*Descriptive Rating*	*Qualitative Interpretation*
4.51 – 5.00	Strongly Agree	Very High
3.51 – 4.50	Agree	High
2.51 – 3.50	Neutral	Moderately High
1.51 – 2.50	Disagree	Low
1.00 – 1.50	Strongly Disagree	Very Low

The data presented reflects the academic engagement of students in science, with a mean score of 3.7383 and a standard deviation of 0.65667. This score falls within the "Agree" category, indicating a high level of engagement among students in their science studies. The mean suggests that students are generally enthusiastic and committed to their learning experiences in science, actively participating in activities and discussions related to the subject. The standard deviation of 0.65667 indicates some variability in the responses, suggesting that while many students demonstrate strong engagement, there may be differences in individual perceptions and levels of involvement. Factors such as personal interest, teaching methods, and prior knowledge could contribute to this variability. Overall, the findings imply that students exhibit a high level of academic engagement in science, which is essential for fostering a deeper understanding of scientific concepts and

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enhancing educational outcomes. Encouraging this engagement can lead to improved performance and a greater appreciation for science, ultimately preparing students for future challenges in scientific fields. The grand mean of 3.7383 reinforces this positive outlook on student engagement in science education.

As stated by Muhamad (2024) in his study, there is a significant relationship that exists between the learning environment and academic engagement. The learning environment, in terms of enjoyment of science lessons and investigation, significantly influences the academic engagement in science of junior high school students. This means that emotional confidence and learning environment directly impact one another because the learning environment can or cannot build emotional confidence in a learner affecting his or her academic engagement. Similarly, in the study of Oglu and Babazade (2024), active learning improves student engagement and academic performance, promoting a transformative approach to teacher-centered methods that include lectures. This simply denotes that students are likely to achieve more in their academics if they are emotionally prepared to conduct scientific investigations in their science classes.

D.Correlation of Research Capability and Emotional Confidence on Students' Academic Engagement

Table 4 below presents the correlations between research capability and emotional confidence in the academic engagement of students in their science class.

Variables, Pearson R, and Significance as listed in the table with their corresponding coefficients. The variables column lists the two independent variables Research Capability and Emotional Confidence which are analyzed for their relationship with Academic Engagement.

TABLE 4. Correlation Analysis Table for The Relationship of Research Capability and Emotional Confidence of Students' Academic Engagement

	Pearson R	Significance
Variables	Academic Engagement	
Research Capability	.628**	0.00
Emotional Confidence	.853**	0.00
Grand Mean	.7405	

** = correlation is significant at the 0.01 level (2-tailed)

The Pearson correlation coefficient for research capability is 0.628, indicating a moderate to strong positive relationship with academic engagement, which is statistically significant at $p < 0.01$. This suggests that as students' research capabilities improve, their academic engagement in science also increases. In contrast, the correlation with emotional confidence is notably stronger at 0.853, also statistically significant ($p < 0.01$). This indicates a strong relationship, implying that higher emotional confidence is closely associated with greater academic engagement. The grand mean of 0.7405 reflects an overall positive trend in the relationships among these variables, emphasizing the importance of both research capability and emotional confidence in cultivating students' academic engagement in science. These findings suggest that enhancing emotional confidence may be particularly effective in boosting student engagement.

The study of Muhamad (2024) agrees with the findings of this study. He stated in his study that "the science learning environment indicators that significantly influence the academic engagement of junior high school students". This indicated that for the students to have excellent performance in their academic engagements in the science classes, they must have a conducive environment for learning. One factor that disrupts a learner's academic engagement is the experiential barriers such as transportation and internet access, behavioral support from peers and family, and proper teaching methods according to a study by Tuiloma et al. (2022). At Dologon National High School, students experience these barriers which affect their learning and engagement in their science classes. However, due to their peers and motivated teachers who created a conducive learning environment for their students, the students have been inspired and are motivated to learn as well.

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CONCLUSION

The study can be concluded that the students exhibit a high level of academic engagement in science. Students feel positive about their engagement in science activities that helps connect a deeper understanding of scientific concepts. The strong correlations between academic engagement with research capability (r = 0.628) and emotional confidence (r = 0.853) further emphasize the importance of these factors in enhancing students' educational experiences. The statistically significant relationships suggest that as students' emotional confidence and research capabilities improve, their engagement in science also increases. This highlights the necessity for educational strategies that promote emotional resilience and research skills, as these elements are vital for improving academic performance and cultivating a genuine appreciation for science. Factors such as socioeconomic conditions of students and school infrastructure influence the learning ability of students affecting their academic engagement not just in their science class but in their academic endeavor. Overall, encouraging high levels of academic engagement not only enhances students' understanding of scientific principles but also prepares them for future challenges in scientific fields, ultimately contributing to their success in both academic and professional endeavors.

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