

Scientific and Quantitative Literacy and Its Influence on Academic Achievement in Physical Science

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Introduction: Despite the importance of Physical Science, many students find the subject challenging. This study assessed Grade 12 students' scientific literacy, quantitative literacy, and academic achievement, as well as the relationships among these variables. The findings served as the basis for developing supplementary activity sheets designed to enhance student performance in the subject.

Methodology: Employing a descriptive-correlational design, this study assessed 231 Grade 12 students from ABM, GAS, HUMSS, Cookery, EIM, SMAW, and Tailoring strands in the Negros Island Region during the second semester of 2024–2025. Participants were selected via stratified random sampling to complete researcher-made and adapted questionnaires on Physical Science achievement, scientific literacy, and quantitative literacy. Data were analyzed using descriptive and inferential statistics to identify significant relationships.

Results: Results indicated developing interpretation of scientific literacy and quantitative literacy skills among the students, whereas results in terms of Physical Science academic achievement were interpreted at the approaching proficiency level. Significant positive correlations were found between both scientific and quantitative literacy and academic achievement in Physical Science.

Conclusion: Grounded in Jean Piaget's Constructivist Learning Theory and John Dewey's Theory of Progressive Education, this study demonstrates that scientific and quantitative literacy skills significantly influence academic achievement in Physical Science. The findings confirm a positive correlation between these foundational literacies and improved student performance, validating the importance of active, real-world learning strategies. Ultimately, these results underscore the critical role of educators in fostering cognitive development to ensure academic success in the sciences.

Practical Value: The practical value of this study lies in its potential to suggest to the curriculum design and teaching strategies in Physical Science. By emphasizing the development of scientific and quantitative literacy, educators, institutions, and the Department of Education can implement interventions—such as supplementary activity sheets—to enhance students' literacy. This underscores the potential to enhance academic outcomes and better equip students for future success in science-related fields and careers.

Direction for Future Research: Future research should examine the scalability of instructional interventions for scientific and quantitative literacy, using mixed-method and longitudinal designs to track their sustained impact on academic performance. Specifically, investigating how socio-economic and institutional factors influence achievement in subjects like Physical Science will be critical for developing inclusive educational practices.

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