

Author	Bello, Alwielland Q.
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ABSTRACT

This study aimed to develop a structural model of the physics achievement of college STEM freshmen students and its interaction with grit, expectancy-value, and 21st century skills. A total of 1,176 freshmen students enrolled in STEM-based college courses participated in the study. Forty-five percent (45%) of the participants had a STEM background in senior high school, while the remaining 55% did not have a STEM background, but were enrolled in STEM-based college courses. Results showed that more than 90% of the participants, regardless of having a STEM background in senior high school, had very low physics achievement. In contrast, the participants demonstrated high level of grit, moderate level of 21st century skills, and high expectancy-value. In terms of the interaction among college STEM freshmen students' physics achievement, grit, expectancy-value, and 21st century skills, the study established that grit did not have a significant effect on physics achievement. On the other hand, expectancy value (e.g. students' enjoyment and perceived usefulness of a task) mediated the influence of 21st century skills (e.g. effective communication and leadership) on physics achievement. Implications on tertiary STEM education and basic education are discussed, particularly on the aspects of Physics content, assessment, pedagogy, and learning resources; the use of technology, guidance and counseling; and teacher professional development.