

Quantitative assessment of mathematics skills in freshmen teacher education students: A performance evaluation

Cleo Jude A. Joaquin, EdD*

Capiz State University - Main Campus, Roxas City, Capiz, Philippines

Gemma F. Agustin, EdD

Capiz State University - Main Campus, Roxas City, Capiz, Philippines

ABSTRACT

This study evaluates the mathematics skills of freshmen teacher education students, analyzes the relationships between performance and influencing factors, and proposes evidence-based recommendations for improving mathematics education at Capiz State University Roxas City Main Campus College of Education. This study employed the survey-correlation method of research. It involved one hundred sixty-eight (168) freshmen students of Capiz State University, Roxas City Main Campus College of Education for the 2024-2025 school year. Data were collected using the standardized Researcher-made Questionnaire. The statistical methods utilized in the study included mean, standard deviation. The alpha level of significance was established at 0.05. The study found that first-year teacher education students exhibited a high level of mathematical proficiency ($M = 35.41$). The most significant influencing factor was attendance ($M = 4.57$, rated very high). Additionally, self-efficacy, prior academic performance, study habits, and self-management with motivation were all rated highly. While there were significant differences in senior high school general mathematics grades, no significant differences in mathematics proficiency were found based on sex or school type. Strong correlations between cognitive and non-cognitive factors indicate that prior performance, along with characteristics such as self-efficacy, self-regulation, and attendance, impact proficiency. These findings suggest that enhancing study habits, attendance, and motivational support could improve students' learning of mathematics in teacher preparation programs. Implementing targeted interventions that focus on these non-cognitive factors may foster a more supportive learning environment. By addressing both academic skills and personal attributes, educators can better equip students for success in mathematics and beyond.

Keywords: Quantitative assessment, teacher education, freshmen students, performance evaluation, mathematical skills.

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*Corresponding author / Email: cjajoaquin@capsu.edu.ph
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INTRODUCTION

Mathematical education is crucial for cultivating analytical and problem-solving abilities, which are invaluable for achieving academic excellence and professional effectiveness. This is especially important for individuals who want to be teachers. To teach mathematics effectively, aspiring teachers must be confident in their own mathematical abilities. First-year students in teaching programs come from diverse backgrounds, which means they have varying levels of mathematical skills.

Studies show that previous academic performance, self-confidence, study habits, and class attendance significantly influence students' success in mathematics (Credé, Roch, & Kieszczynka, 2010; Richardson, Abraham, & Bond, 2012). For instance, students who excelled in high school mathematics often adapt more easily to college-level mathematics (Sadler & Tai, 2007). Self-efficacy, or the belief in one's ability to succeed, is also a critical factor influencing motivation and achievement in mathematics (Zimmerman, 2000).

Moreover, strong study habits and consistent class attendance are positively correlated with higher academic performance (Nonis & Hudson, 2010; Credé et al., 2010). By examining these factors, institutions can design better student support systems that enable teachers and school leaders to identify learning challenges and implement effective interventions to promote student success

Statement of the problem

This study evaluated the mathematics skills of freshmen teacher education students, analyzed the relationships between their performance and influencing factors, and proposed evidence-based recommendations for improving mathematics education at Capiz State University, Roxas City Main Campus College of Education.

Specifically, it sought to answer the following questions:

1. What is the current level of mathematics proficiency among freshmen teacher education students?
2. What is the level of factors influencing the mathematics skills of freshmen teacher education students in terms of self-efficacy, attendance, previous academic performance, study habits, self-management, and motivation?
3. Are there significant differences in the mathematics skills of the respondents when grouped according to sex, the school they graduated from, and their General Mathematics grade in SHS?
4. Are there significant relationships between the level of mathematics skills and the level of factors influencing the mathematical skills of freshmen teacher education students?

METHODOLOGY

Research design

This study employed a survey-correlational method. The survey aspect was used to determine the level of mathematics skills of freshmen teacher education students at Capiz State University, Roxas City Main Campus College of Education. The survey component also examined whether there were significant differences in mathematics skills when respondents were grouped according to sex, the school they graduated from, and their General Mathematics grade in Senior High School. Meanwhile, the correlational component analyzed the relationships between the level of mathematics skills and the factors influencing mathematical skills.

This design was deemed appropriate because it enabled the researcher to describe the current status of students' mathematics skills, compare groups based on selected variables, and establish the degree of association between mathematics performance and influencing factors without manipulating the variables.

Population and sampling

The respondents of the study were one hundred sixty-eight (168) freshmen students of Capiz State University, Roxas City Main Campus College of Education for the 2024-2025 school year. The students were randomly selected using stratified random sampling. Stratified random sampling was used by drawing the sample from the population and then drawing separate random samples from each stratum (Parson et al., 2022). The required number of participants was determined using the formula of Raosoft sample size calculator (Raosoft, 2004). They were selected at random using the stratified proportional sampling by means of drawing lots. This means that all the names of the students were written on rolled slips of paper and placed in a box. From the box, the required number of respondents was drawn. The names of the students that were drawn from each box served as the participants in the study. The proportional allocation formula was used to get the appropriate sample size from various groups or classes of the population involved in the study.

Instrument

Data were collected using a researcher-made standardized questionnaire, which was designed to assess the mathematics skills of freshmen teacher education students and the factors influencing their performance. The instrument consisted of two main parts: (1) a test measuring mathematics skills, which included items aligned with the competencies covered in Senior High School General Mathematics, and (2) a Likert-scale questionnaire designed to capture factors such as study habits, self-confidence, learning environment, and teacher-related influences.

The questionnaire was content-validated by experts in mathematics education and educational research to ensure clarity, relevance, and alignment with the study objectives. A pilot test was also conducted among a group of non-respondent students to establish reliability, with the computed Cronbach's alpha indicating an acceptable level of internal consistency.

Data collection and treatment

A researcher-made standardized questionnaire was administered and retrieved personally by the researcher to ensure a 100% retrieval of the accomplished copies of the instrument. After retrieval of the questionnaire, the data were tallied, analyzed, and interpreted using the appropriate statistical test.

The data gathered from the study were analyzed using the Statistical Package for Social Sciences (SPSS) software. The following were the statistical tools used in the analysis of the data gathered.

Mean. This test was used to determine the level of mathematics skills of freshmen teacher education students at Capiz State University, Roxas City Main Campus College of Education.

Standard Deviation. This test was used to determine the homogeneity as well as heterogeneity of used level of mathematics skills of freshmen teacher education students at Capiz State University, Roxas City Main Campus College of Education.

T-test. This test was used to examine whether there were significant differences in mathematics skills when respondents were grouped according to sex, the school they graduated from, and their General Mathematics grade in Senior High School.

Person R. This test was used to analyze the relationships between the level of mathematics skills and the factors influencing mathematical skills.

Ethical considerations

The researcher ensured that all ethical guidelines were followed, including obtaining informed consent from participants and ensuring the confidentiality and privacy of their responses throughout the study. In order to protect the privacy of the participants, all surveys were kept completely confidential.

RESULTS AND DISCUSSION

The findings revealed that the freshmen teacher education students generally possess a high level of mathematics proficiency, with a computed mean score of 35.41, verbally interpreted as high. This indicates that the respondents have developed an adequate foundation in mathematics, enabling them to engage in higher-order problem-solving tasks. This result is consistent with previous studies asserting that mathematics proficiency among college students is often determined by the interplay of cognitive abilities and learning behaviors (Atit et al., 2020).

In terms of the factors influencing mathematical skills, the results showed that self-efficacy ($M = 3.74$), previous academic performance ($M = 4.00$), study habits ($M = 4.10$), and self-management and motivation ($M = 4.05$) were all rated high, while attendance ($M = 4.57$) was rated very high. These findings highlight the critical role of attendance in shaping academic outcomes, corroborating the assertion of Tinto (2017) that consistent participation in classroom activities strengthens comprehension and engagement.

When mathematics skills were analyzed according to demographic variables, no significant differences were observed between male and female students, and between graduates of public and private schools. This suggests that mathematics proficiency is relatively uniform across these groups, affirming earlier findings that gender and type of school are not strong determinants of mathematical performance once students enter higher education (Hyde et al., 2008; OECD, 2019). However, a significant difference was found when mathematics proficiency was grouped according to Senior High School General Mathematics grades. This finding indicates that prior academic performance in mathematics strongly predicts current achievement, aligning with the conclusions of Adelman (2006) and Bautista (2020), who emphasized that strong foundations in secondary mathematics are key indicators of success in college-level mathematics.

Correlation analysis further revealed significant relationships among the identified factors. Self-efficacy was found to be significantly correlated with attendance, previous academic performance, study habits, and self-management and motivation. Similarly, attendance was strongly associated with previous academic performance, study habits, and self-management and motivation. Previous academic performance was also significantly related to both study habits and self-management and motivation. In this context, students with higher levels of self-efficacy are more motivated to attend classes, regulate their study habits, and perform better academically.

Taken together, the results underscore the multidimensional nature of mathematics proficiency. While prior mathematics performance plays a foundational role, non-cognitive factors such as attendance, self-efficacy, and study habits also exert substantial influence. This supports the view that student success in mathematics is not solely determined by intellectual ability, but by the integration of personal, behavioral, and contextual factors (Eccles & Wigfield, 2020; Schunk & DiBenedetto, 2020).

CONCLUSION

From these results, it can be concluded that while freshmen teacher education students exhibit commendable mathematical proficiency, their success is largely determined by their prior mathematics performance, consistent class attendance, and the strength of their study habits and self-management skills. Sex and type of school graduated from do not create substantial differences, indicating that academic effort and preparedness play more crucial roles.

Based on these conclusions, the study recommends that the university strengthen attendance policies and adopt innovative teaching strategies that encourage active participation and engagement. Programs that enhance study habits, time management, and self-regulation should be implemented to help students develop stronger academic discipline. Bridging or remedial classes are also suggested for students with weak Senior High School mathematics backgrounds to close learning gaps early on. Faculty members are likewise encouraged to adopt practices that boost students' self-efficacy and motivation, such as providing constructive feedback, peer mentoring, and scaffolded learning opportunities. Finally, holistic student development initiatives, including counseling and academic advising, should be strengthened to ensure that both cognitive and affective factors contributing to mathematics proficiency are addressed. Future research may extend this inquiry by conducting longitudinal studies to trace how these factors continue to influence students' mathematical performance throughout their teacher education program.

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