

## The relationship between self-efficacy, attitudes, and business students' quantitative skills performance: A case for including quantitative methods in the BSBA curriculum



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### ARTICLE INFO

#### Article history:

Received 5 July 2024

Received in revised form

8 November 2024

Accepted 20 November 2024

#### Keywords:

Quantitative skills

Self-efficacy

Attitudes

Curriculum review

Business students

### ABSTRACT

Developing strong quantitative skills is crucial for the career success of college business students. However, there is limited understanding of the quantitative abilities, self-confidence, and attitudes of Bachelor of Science in Business Administration (BSBA) students. This descriptive-correlational study examines these aspects in fourth-year BSBA students, with 231 participants selected through purposive sampling. The research framework is based on the Theory of Reasoned Action/Planned Behavior and Social Cognitive Theory. Data was collected using a researcher-designed questionnaire, validated by experts, that measured quantitative skills, self-efficacy, and attitudes. Findings show that while students perform well in certain areas like numeracy and market return analysis, they have weaknesses in statistical analysis, quantitative reasoning, and financial data analysis. Their self-confidence in mathematical analysis is moderate but needs improvement. Despite this, students generally have a positive outlook on quantitative courses. The correlation analysis reveals a significant positive relationship between their attitudes toward quantitative courses and their performance in quantitative skills. It is recommended that the BSBA curriculum be revised by including a dedicated Quantitative Methods Course to address skill gaps and boost students' self-confidence and attitudes, better equipping them for the evolving business world.

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### 1. Introduction

In today's dynamic and data-driven business landscape, proficiency in quantitative skills has become paramount for business students aiming to thrive in their careers. The ability to analyze numerical data, interpret statistical findings, and make informed decisions based on quantitative reasoning is indispensable in virtually every facet of modern business operations (Hoerl and Snee, 2020). Recognizing this imperative, educational institutions continually strive to equip their students with the necessary quantitative acumen to navigate the complexities of the business world (Abulibdeh et al., 2024). However, despite the importance of quantitative skills, there exists a gap in

understanding the quantitative recognized competencies, self-efficacy, and attitudes of college business students (Fong and Krause, 2014). For this context, those enrolled in Bachelor of Science in Business Administration (BSBA) programs. While these programs typically offer courses in quantitative skills, the effectiveness of such courses in enhancing students' quantitative skills and fostering a positive attitude toward mathematical analysis remains an area of inquiry (Abrami et al., 2015).

The present study seeks to address this gap by examining the quantitative skills, self-efficacy, and attitudes of college business students enrolled in BSBA programs. Specifically, the study aims to explore various dimensions of business quantitative skills, including numeracy, statistical analysis, quantitative reasoning, financial data analysis, and marketing returns analysis. Additionally, it intends to investigate students' self-efficacy in mathematical analysis, encompassing their confidence in solving mathematical problems, tackling math-related tasks, and engaging with math-related coursework. Understanding the attitudes of business students

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<https://doi.org/10.21833/ijaas.2024.12.013>

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toward quantitative and mathematical skills is also crucial, as it can influence their motivation, engagement, and, ultimately, their performance in quantitative business analysis. By elucidating these factors, the study aims to provide insights into the effectiveness of current educational practices in cultivating quantitative proficiency among BSBA students.

In this study, the Theory of Reasoned Action/Planned Behavior, as proposed by Fishbein and Ajzen (1977), provided a valuable framework for understanding the cognitive processes underlying college business students' engagement with quantitative coursework. By examining students' attitudes towards quantitative skills, subjective norms, and intentions to engage with quantitative coursework, the study gained insights into the factors influencing students' motivation and behavior in quantitative learning activities. Moreover, Social Cognitive Theory, developed by Bandura (1977), complemented this framework by highlighting the role of observational learning, self-efficacy beliefs, and social influences in shaping students' attitudes and behaviors related to quantitative skills development. By exploring students' self-efficacy beliefs, peer influences, and outcome expectations in the context of quantitative education, the study provided a comprehensive understanding of the psychological processes underlying students' engagement with quantitative coursework and their subsequent performance. Integrating these theories enriched the study's theoretical framework and facilitated a more nuanced analysis of the factors influencing students' quantitative skills, self-efficacy, and attitudes.

The development of mathematical and quantitative skills among college business students has garnered considerable attention due to the increasingly data-driven nature of modern business environments (Mina, 2023). A study by Galigao (2022) explored the mathematical proficiency of entrepreneur and office administration students and found that students exhibited a minimal level of proficiency in business mathematics, and seven out of the nine areas were not mastered. Similarly, a study conducted by Mitra (2023) revealed that college students struggle with statistical analysis and financial data interpretation, highlighting the need for targeted interventions to enhance quantitative skills in business education. Moreover, Bhowmick et al. (2017) found out that self-efficacy and self-concept through attitude provide effective mediations to students' math performances.

The significance of this research lies in its potential to inform curriculum development and instructional strategies aimed at enhancing students' quantitative skills and fostering a positive attitude toward mathematical analysis. By identifying areas of strength and areas for improvement (Mina, 2022), educators and curriculum planners can tailor interventions to better meet the needs of business students, ultimately preparing them for success in

the increasingly quantitative nature of contemporary business environments.

This study endeavors to contribute to the ongoing discourse on the importance of quantitative skills in business education by shedding light on the quantitative competencies, self-efficacy, and attitudes of college business students. Through its rigorous examination of these factors, the study aims to provide actionable insights for educators, administrators, and policymakers seeking to optimize the preparation of business students for the challenges of the 21<sup>st</sup>-century economy.

## 2. Methodology

The study used a descriptive-correlational study aimed at investigating the quantitative skills, self-efficacy, and attitudes of fourth-year business students. Seeram (2019) defined this design as a methodological approach aimed at examining the relationships between variables and describing the characteristics of a population or phenomenon of interest without manipulating any variables. A sample of 231 fourth-year business students was selected using purposive sampling techniques utilizing total enumeration, ensuring representation from the target population for the generalizability of the results. The study utilized a researcher-made questionnaire consisting of three parts to gather data: Part I assessed students' performance in various business quantitative skills, including numeracy, statistical analysis, quantitative reasoning, financial data analysis, and marketing returns analysis, through a 50-item multiple-choice test. Part II evaluated students' self-efficacy in business mathematical analysis, including mathematics problem self-efficacy, math-related tasks self-efficacy, and math-related course self-efficacy, using 15-item statements. Part III measured students' attitudes toward quantitative and mathematical courses with 10-item statements.

To ensure the content validity of the instruments, a thorough review process was conducted with experts in business education and quantitative analysis. These experts provided feedback on the relevance, clarity, and coverage of the items, ensuring that the questionnaire accurately reflected the skills and attitudes intended to be measured. The questionnaire items were revised based on this feedback, incorporating suggestions to enhance the alignment of the items with the study's objectives. The reliability of the instrument was established through a pilot test involving a sample of students similar to those in the study population. Cronbach's alpha was calculated for each part of the questionnaire to assess internal consistency, with values above the acceptable threshold indicating good reliability. Additionally, in Part I, the test items underwent item analysis to evaluate their difficulty and discrimination indices. Items that were either too easy or too difficult or that did not discriminate well between high and low performers were revised

or removed to improve the overall quality of the assessment.

Data collected from the respondents were encoded, tallied, and analyzed using statistical techniques. Correlation analysis, specifically utilizing the Pearson product-moment correlation coefficient, was employed to determine significant relationships between variables, such as the relationship between students' self-efficacy and their performance in quantitative analysis. The collection of data from the respondents was commenced during the final term of the first semester of A.Y. 2023–2024.

While the study provides valuable insights into the relationship between self-efficacy, attitudes, and quantitative skills among BSBA students, several limitations should be noted. The use of purposive sampling limits the generalizability of the findings beyond the specific context of the Nueva Ecija University of Science and Technology. The reliance on self-reported data introduces the potential for response bias, which may affect the accuracy of the results. Additionally, the cross-sectional design only captures a snapshot in time without accounting for

changes over time or external factors. The study also overlooks other influential factors, such as socioeconomic status and prior academic background, which could provide a more comprehensive understanding. Lastly, while curriculum revisions are suggested, the study does not consider the practical challenges of implementation.

### 3. Results and discussion

This section outlines the results derived from the main instrument utilized in this research.

#### 3.1. Respondents' business quantitative skills performance

The findings presented in [Table 1](#) offer a comprehensive assessment of college business students' performance in various quantitative skills dimensions, shedding light on areas of strength and areas for improvement within the cohort.

**Table 1:** The performance in business quantitative skills

Dimensions	Mean score	Verbal description
Numeracy	4.37	Satisfactory
Statistical analysis	3.48	Needs improvement
Quantitative reasoning	3.60	Needs improvement
Financial data analysis	3.83	Needs improvement
Marketing return analysis	4.40	Satisfactory
Overall score	19.77	Needs improvement

The mean scores reveal that students demonstrate satisfactory proficiency in numeracy and marketing returns analysis, indicating a solid foundation in basic arithmetic and an understanding of analyzing marketing data. However, the results also indicate areas requiring attention, particularly in statistical analysis, quantitative reasoning, and financial data analysis, where students' mean scores suggest a need for improvement. These findings emphasize the importance of targeted interventions and enhanced instructional strategies to bolster students' capabilities in these critical areas. Moreover, the overall score highlights that while there are pockets of proficiency, there remains a collective need for improvement across quantitative skills dimensions among college business students ([Suri et al., 2020](#)).

Similarly, [Trassi et al. \(2022\)](#) reported that business students often struggle with applying statistical concepts to real-world business problems. This suggests a need to bridge the gap between theoretical knowledge and practical application in statistics education.

Additionally, [Heijltjes et al. \(2014\)](#) highlighted the significance of developing quantitative reasoning skills in business students. These skills extend beyond simple calculations and encompass the capacity to interpret and analyze quantitative data for making well-informed business decisions.

In the context of financial data analysis, [Harris et al. \(2018\)](#) highlighted the challenges business

students face in understanding and applying financial concepts. They recommend incorporating real-world financial data and case studies into the curriculum to improve students' grasp of financial analysis techniques.

Addressing these deficiencies is paramount for ensuring that students are adequately equipped to navigate the quantitative demands of the modern business landscape. By leveraging these insights, educators and curriculum developers can tailor interventions and curricular enhancements to better support students' quantitative skills development, ultimately enhancing their preparedness for success in the field of business.

#### 3.2. Respondents' self-efficacy in business mathematical analysis

The results presented in [Table 2](#) provide insights into college business students' self-efficacy in various aspects of mathematical analysis, revealing areas where students feel more efficacious and areas where improvement is needed.

Across all dimensions of self-efficacy, the mean scores fall within the "Somewhat Inefficacious" range, indicating a low level of confidence in students' mathematical abilities. Studies investigating self-efficacy, which refers to an individual's belief in their capabilities to perform a task ([Luszczynska and Schwarzer, 2015](#)), consistently report that business students often

exhibit low confidence in their mathematical abilities (Jameson and Fusco, 2014). This lack of confidence may result in lower self-efficacy scores across

different mathematical areas, even when students show competence in performing routine calculations or assignments (Toland and Usher, 2016).

**Table 2:** The self-efficacy in business mathematical analysis

Items	Mean	Verbal description
I. Mathematics problem self-efficacy	2.26	Somewhat inefficacious
I am confident in my ability to solve complex mathematical problems	2.38	Somewhat inefficacious
I believe I can apply mathematical concepts to practical business situations	2.47	Somewhat inefficacious
I feel capable of tackling challenging mathematical tasks independently	1.93	Somewhat inefficacious
I am confident in my capacity to understand and apply mathematical techniques	2.15	Somewhat inefficacious
I believe I can successfully navigate through mathematical problems encountered in business coursework	2.38	Somewhat inefficacious
II. Math-related tasks self-efficacy	2.31	Somewhat inefficacious
I feel confident in my ability to complete mathematical tasks required for business assignments	2.53	Somewhat efficacious
I believe I can handle mathematical calculations and analyses relevant to business scenarios	2.48	Somewhat inefficacious
I am confident in my capacity to perform mathematical tasks within a business context	2.22	Somewhat inefficacious
I feel capable of applying mathematical methods to solve practical problems encountered in business tasks	2.09	Somewhat inefficacious
I believe I can execute mathematical tasks necessary for business projects	2.25	Somewhat inefficacious
III. Math-related course self-efficacy	2.33	Somewhat inefficacious
I am confident in my ability to understand and apply mathematical concepts taught in business courses	2.33	Somewhat inefficacious
I believe I can engage with mathematical content covered in business-related coursework	2.45	Somewhat inefficacious
I feel capable of mastering mathematical topics presented in my business classes	2.30	Somewhat inefficacious
I am confident in my capacity to succeed in courses requiring mathematical analysis within the BSBA program	2.35	Somewhat inefficacious
I believe I can excel in business courses that involve mathematical content	2.20	Somewhat inefficacious
Overall	2.30	Somewhat inefficacious

Notably, specific items within the Mathematics Problem Self-Efficacy and Math-Related Tasks Self-Efficacy dimensions exhibit slightly higher mean scores, suggesting a relatively greater sense of efficacy in certain mathematical tasks, such as completing assignments and handling calculations. While research consistently highlights a general lack of confidence in mathematics among business students (Mazana et al., 2019), some studies reveal a more nuanced picture. These studies suggest that self-efficacy in business mathematics is not a monolithic construct (Piperopoulos and Dimov, 2015). However, other items within these dimensions, as well as those in the Math-Related Course Self-Efficacy dimension, show lower mean scores, indicating a need for increased confidence in understanding, applying, and mastering mathematical concepts within the context of business coursework (Roick and Ringeisen, 2018). While students demonstrate some degree of self-efficacy in mathematical analysis, there remains room for improvement in fostering greater confidence and competence in various mathematical tasks and course content (Rutherford et al., 2017).

Business students often exhibit a complex and sometimes contradictory picture regarding their self-efficacy in mathematics. While research consistently identifies a general lack of confidence in math among this population, a closer look reveals a more nuanced picture.

Grigg et al. (2018) highlighted the concept of task-specific self-efficacy. This suggests that individuals hold varying levels of confidence depending on the specific task demands. This concept aligns with the finding that students might report higher self-efficacy for specific mathematical tasks. These studies show that students may feel more confident with procedural tasks like

completing assignments or calculations due to their familiarity with the steps involved (Prescott, 2017).

However, the lower mean scores on items related to Math-Related Course Self-Efficacy and broader mathematical concepts (Prescott, 2017) paint a different picture. This suggests a potential confidence gap when it comes to applying these concepts in a business context. Students might lack the confidence to understand, analyze, and interpret mathematical information for complex business problems (Rutherford et al., 2017). This disconnect between procedural skills and broader mathematical application highlights a critical area for improvement in business education (Engelbrecht et al., 2017). Addressing these areas of inefficacy through targeted interventions and support mechanisms could enhance students' overall self-efficacy and ultimately contribute to their success in quantitative aspects of business education (Awotunde and Westhuizen, 2021).

### 3.3. Respondents' attitude on quantitative and mathematical courses

The results presented in Table 3 offer valuable insights into college business students' attitudes toward quantitative and mathematical courses, highlighting the perceived value and importance of these subjects within the context of business education. While students generally disagree that quantitative and mathematical courses are interesting and engaging, the majority of students express agreement with the notion that these courses are valuable for their future careers and will enhance their analytical ability (LaForce et al., 2017). Business education often incorporates a significant amount of quantitative and mathematical coursework (Ganyaupfu, 2013).

**Table 3:** The attitude on quantitative and mathematical courses

Items	Mean	Verbal description
I find quantitative and mathematical courses interesting and engaging	2.48	Disagree
I believe quantitative and mathematical courses are valuable for my future career	3.00	Agree
I perceive that quantitative and mathematical courses will enhance my analytical ability	3.11	Agree
I view quantitative and mathematical courses as integral to my educational journey in business	3.05	Agree
I appreciate the practical relevance of quantitative and mathematical concepts in business	3.15	Agree
I am motivated to excel in quantitative and mathematical coursework	2.82	Agree
I recognize the importance of quantitative and mathematical proficiency in today's business landscape	3.03	Agree
I find quantitative and mathematical courses challenging yet rewarding	3.10	Agree
I am enthusiastic about delving into quantitative and mathematical topics within my business studies	3.00	Agree
I value the opportunity to enhance my quantitative and mathematical skills through coursework in business education	3.06	Agree
Overall	2.99	Agree

While some studies report that students often find quantitative and mathematical courses to be uninteresting and lack engagement (Fredricks et al., 2018), other research highlights a more nuanced perspective.

Numerous studies have shown that although students may find these courses difficult or unenjoyable, they acknowledge the importance of quantitative and mathematical skills for their future careers (Fonseca et al., 2015). This perceived value may arise from the recognition that these skills are crucial for key business functions, including data analysis, financial modeling, and problem-solving (Herfort et al., 2021).

Furthermore, research suggests that students acknowledge the potential of these courses to enhance their analytical abilities. This perceived benefit can contribute to a more positive overall perception, even if the learning process itself is not inherently engaging (Deslauriers et al., 2019).

Moreover, students view quantitative and mathematical courses as integral to their educational journey in business, recognizing the practical relevance and importance of these concepts in today's business landscape (Trenholm and Peschke, 2020). Additionally, students express motivation and enthusiasm for excelling in quantitative and mathematical coursework despite finding these courses challenging yet rewarding (McGee, 2015).

Business education heavily relies on quantitative and mathematical skills, yet student perceptions of these courses can be a paradox (Golann, 2015). While research acknowledges the perceived difficulty of these subjects, a closer look reveals a more complex picture (Chae and Choi, 2018).

Several studies highlight students' recognition of the integral role quantitative and mathematical courses play in their business education (Steen-Utheim and Foldnes, 2018). This perception stems from the practical relevance of these skills in today's data-driven business world (Carillo, 2017). Students understand the critical role of quantitative analysis, financial modeling, and problem-solving in various business functions (Bean and Melzer, 2021). According to Dweck et al. (2014), this perceived value, despite the challenge, can motivate students to persevere and excel in these demanding courses.

Furthermore, research suggests a surprising level of motivation and enthusiasm among students toward quantitative and mathematical coursework

(Shapiro et al., 2017). This intrinsic motivation may be linked to the perceived rewards that come with mastering these challenging subjects (Park and Yang, 2019). Overcoming the difficulty and achieving success in quantitative courses can be a source of pride and confidence for students (Wong and Chui, 2019). This sense of accomplishment can further fuel their motivation to excel in their business education (Acquah, 2017).

The findings suggest a positive attitude toward quantitative and mathematical courses among college business students, emphasizing their recognition of the significance of quantitative proficiency in the field of business (Mulyani and Arif, 2021). These results highlight the importance of fostering a supportive learning environment and providing opportunities for students to enhance their quantitative and mathematical skills through coursework in business education (Alam and Mohanty, 2023).

#### 3.4. Relationship of self-efficacy and attitude to business quantitative skills performance

The correlation analysis results (Table 4) presented indicate the relationship between college business students' performance in quantitative skills and their self-efficacy in business mathematical analysis, as well as their attitude towards quantitative and mathematical courses. While the correlation coefficient for self-efficacy in business mathematical analysis and quantitative skills performance is positive ( $r=0.127$ ), it does not reach statistical significance at the conventional alpha level of 0.05 ( $p=0.054$ ). In a study by Wardana et al. (2020), the relationship between self-efficacy in business mathematical analysis and quantitative skills performance was examined. This implies that while there is a favorable pattern, the correlation between self-efficacy and quantitative skills performance may not be strong enough to be deemed statistically significant (Hayat et al., 2020).

However, the correlation between attitude on quantitative and mathematical courses and quantitative skills performance is both positive and statistically significant ( $r=0.136$ ,  $p=0.039$ ), indicating a modest yet meaningful relationship. This suggests that students with a more positive attitude towards quantitative and mathematical courses tend to perform better in quantitative skills assessments

(Mazana et al., 2019). Moreover, this indicates that students who harbor a more positive attitude towards quantitative and mathematical courses tend to perform better in assessments of quantitative

skills. Although the strength of this relationship is modest, its statistical significance underscores its practical importance in educational settings (Donohoo, 2018).

**Table 4:** The correlation analysis results

Variables	Business quantitative skills performance	
	R-value	P-value
Self-efficacy in business mathematical analysis	0.127	0.054
Attitude to quantitative and mathematical courses	0.136*	0.039

\*: Significant at 0.05 level

These findings are consistent with existing research that highlights the significance of attitude and mentality in academic accomplishment and skill development (Kyauta and Dachia, 2018). Developing a favorable mindset toward acquiring quantitative abilities might enhance involvement, perseverance, and, ultimately, mastery in this field (Dweck et al., 2014). Thus, educators should explore methods to foster favorable attitudes toward quantitative subjects among students. This can be achieved by highlighting practical uses in real-life situations, creating nurturing learning environments, and encouraging the development of growth mindsets (Garofalo, 2016). Indeed, developing strong quantitative skills is crucial for success in business education and careers.

The importance of students' attitudes towards quantitative education in predicting their performance in quantitative skills, stressing the potential role of fostering positive attitudes and perceptions towards mathematical concepts in enhancing students' proficiency in quantitative analysis within the business domain, are highlighted in the results of this study.

#### 4. Conclusions and recommendations

The results indicate a mixed picture of students' proficiency, self-confidence, and attitudes toward quantitative education within the BSBA program. While students demonstrate satisfactory proficiency in certain quantitative skills, such as numeracy and marketing return analysis, there are notable deficiencies in areas such as statistical analysis, quantitative reasoning, and financial data analysis. Moreover, students exhibit moderate levels of self-efficacy in mathematical analysis, but there is room for improvement in fostering greater confidence and competence, particularly in understanding and applying mathematical concepts within the context of business coursework. Despite these challenges, students generally hold a positive attitude towards quantitative and mathematical courses, recognizing their value for future careers and their importance in the business landscape. However, efforts may be needed to make these courses more engaging and interesting to students. Furthermore, the correlation analysis reveals a significant positive relationship between students' attitudes toward quantitative courses and their performance in quantitative skills.

Based on these results, it is recommended that the BSBA curriculum be reviewed and the

incorporation of a dedicated Quantitative Methods Course or the like be considered. A particular course on quantitative analysis can address the identified deficiencies in quantitative skills while providing opportunities to enhance students' self-efficacy and attitudes toward mathematical concepts. By integrating real-world applications and practical exercises, the course can make quantitative education more engaging and relevant to students, ultimately better preparing them for success in the dynamic and data-driven business environment of the future.

#### Compliance with ethical standards

#### Ethical considerations

This study adhered to ethical standards, ensuring participants' confidentiality, anonymity, and voluntary participation with informed consent.

#### Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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