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The Math Mindset: How Master Business Students' Attitudes Impact Their Academic Success

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Abstract

Background: Math mindset of business students seeks to understand how students perceive the role of mathematics in quantitative subjects such as accounting, finance, economics, auditing, and budgeting.

Objectives: The objective of this study is to examine the role of self-confidence, value, motivation, and enjoyment of mathematics in achieving success in business studies. This investigation aims to explore students' belief systems regarding the independent and dependents variables.

Methods: This study applied descriptive and analytical survey research design. A total of 265 respondents from MBA and MBS programs at various universities and colleges within the Pokhara Valley were purposively selected. Primary data was collected through field visits. The survey included nine demographic questions and 31 structured items. The reliability of the instrument was verified using Cronbach's alpha. Data analysis was made using descriptive and inferential statistics.

Results: This study has found a positive correlation between success in business studies and independents variables such as self-confidence, value, motivation, and enjoyment of mathematics. It has been revealed that the value of mathematics and motivations towards mathematics have a significant impact on success in business studies at the master's level. Mathematics is recognized as highly useful and relevant to their future academic and professional careers. Furthermore, more than 80% of students have expressed the need for additional mathematics classes during their study time.

Conclusion: The motivations towards mathematics and value of mathematics have significantly influenced outcomes in university-level management studies. The majority of learners have indicated a need for additional mathematics support during their studies. This suggests that admission criteria could be revised to make mathematics a compulsory subject at the school level. New learners can be guided and motivated to apply mathematical knowledge to real-life situations. Further research is needed to explore the cause-and-effect relationship between business students' attitudes toward mathematics and their success in business studies across different colleges, periods, and locations, to validate and generalize these findings.

Keywords: Enjoyment, mathematics, motivation, self–confidence, success

JEL Classification: C20, C40, C70

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Introduction

Mathematical knowledge, skills, and concepts are essential components of the numerical subjects in business studies, contributing significantly to academic success (Ely & Hittle, 1990; Ross, 2022). A substantial portion of the course content in quantitative subjects revolves around the application of mathematics. Academic performance in mathematics differs significantly between an ideal learning environment and a dull learning environment (Shamaki, 2015). Therefore, improving the learning environment can lead to enhanced academic achievement in mathematics. It can have a significant impact on the overall quality of education. Mathematics is highly relevant in various accounting courses, particularly in Auditing, Advanced Accounting, and Financial Accounting. A range of mathematical skills is essential for success in all accounting courses (Villamar et al., 2020). Knowledge of mathematics, calculation abilities, and proficiency in various mathematical operations are necessary for different types of accounting courses.

The four categories of mathematical culture in test items were historical topics, interdisciplinary connections, aesthetics and recreation, and social roles. The distribution of content categories was diverse but uneven. Questions related to the social role of mathematics and technology received more emphasis than those focused on historical topics. The study provided empirical evidence about the integration of question items within mathematical culture (Lei et al., 2022). It suggested that greater emphasis should be placed on questions related to interdisciplinary connections, social roles, and aesthetics and recreation, rather than solely focusing on historical content. The mathematics curriculum has incorporated more experience-based content than cognitive or empirical-based material. Classroom activities in China emphasize problem-solving, with approaches such as "one problem, multiple solutions," "multiple problems, one solution," and "one problem, multiple changes" (Cai & Nai, 2007). These problem-solving activities aim to strengthen the application of mathematical concepts in real life.

Under the previous ten plus two curriculum (classes 11 and 12), more than 60% of students in the management stream studied business mathematics in class 12, which was an optional subject alongside marketing. The evaluation process for business mathematics was comparable to other management stream subjects. A small number of students in the education and arts streams also studied basic mathematics in classes 11 and 12. Prior to 2010, in the Proficiency Certificate Level (PCL) at Tribhuvan University (TU), all second-year I. Com. students were required to study business mathematics, with a total of 50 marks for the subject. Science students, on the other hand, were required to study mathematics for 100 marks at the PCL level, while some students from education and arts also took mathematics at this level. However, in the updated curriculum of class 11 and 12, only a single digit percentage of students have studied business mathematics in class 11 and 12.

In Nepal, admission criteria of bachelor of business-related fields are only the minimum GPA requirement for admission. Accounting, Finance, Auditing, Budgeting, and Microeconomics need depth knowledge of mathematics. Business mathematics and statistics are compulsory subjects in bachelor's programs in business studies. Most of the students of bachelor level did not study business mathematics and basic mathematics in classes 11 and 12. Therefore, the study is conducted to explore the cause and effect of the attitudes towards mathematics of master-level students on their academic success. They studied the old curriculum of the management stream in classes 11 and 12. Most of them studied business mathematics in class 12.

Review of Literature

The mathematical background of students is closely linked to their attitude toward mathematics. These attitudes influence students' efforts and their choices concerning future career paths. While personal characteristics impact learners' attitudes toward mathematics, mathematical abilities are a significant

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factor in achieving success in business studies (Opstad, 2021). Basic mathematical concepts and principles are necessary across all disciplines, but applied and practical mathematics—excluding trigonometry—are particularly essential for business students to gain comprehensive knowledge. The relevance of mathematics to students' careers is emphasized in local textbooks. However, research found a lack of resources and support regarding the importance of mathematics for students' careers, based on interviews with secondary-level mathematics teachers. This led the researchers to address this gap by conducting a pilot study aimed at supporting secondary-level mathematics teachers (Fitzmaurice et al., 2021). Therefore, locally relevant aspects of mathematics should be incorporated into both textbooks and curriculum.

Mathematical concepts and knowledge are decisive for developing mathematical models and techniques used in data analysis, risk management, financial planning, and operational optimization (Saini, 2023). Business mathematics has direct applicability in the workplace, enhancing practical skills, problem-solving abilities, and decision-making capabilities. Whether it is an advanced mathematics course or business mathematics, it should be required starting from the school level. Students with a weak background in mathematics in business schools tend to obtain lower grades in many core business courses. In contrast, students with a strong mathematical background consistently achieve higher scores in these subjects. The application of mathematical knowledge is more critical in business courses like administration and accounting than in other areas (Opstad, 2018). Mathematics serves as the foundational base for both non-science and science education. The Attitude towards Mathematics Inventory (ATMI) shows a strong correlation with achievement in business education. Specifically, the self-confidence component of ATMI plays a significant role in success in business. For non-quantitative subjects, the impact of ATMI is minimal, and there is a negative correlation between educational achievement and the motivational dimension of learning mathematics (Opstad, 2023). In quantitative subjects, particularly in science, technology, and management, mathematical knowledge, skills, concepts, and ideas are in high demand in the global market.

The mathematical skills and personal traits of learners have a significant impact on their attitudes towards statistics (Opstad, 2020). Basic mathematical knowledge and rules are closely correlated with students' attitudes towards statistics. The relationship between mathematics and its application in economics is essential, as many economic problems can be effectively solved using appropriate mathematical models. The study and research of economic mathematical problems are intertwined (Sun, 2022). Advanced mathematics is central to achieving quality education in economics. Silva et al. (2016) found that students with strong mathematical and statistical backgrounds who entered British universities showed statistically significant differences in their chosen degree programs, and educational qualifications. Mathematical and statistical skills are in high demand in today's world, particularly in fields such as science, technology, data analysis, risk management, and financial analysis, all of which are based on the knowledge of mathematics and statistics.

Business and Management Administration degrees in social science tracks are highly required in today's job market (Shrestha et al., 2024). Mathematical skills are strongly correlated with academic achievement in business degrees. Students with an advanced mathematical background tend to perform better and achieve higher grades in business programs (Chaves et al., 2021). On the other hand, students with a poor mathematical background struggle to achieve good grades in business degrees, which hampers their ability to meet the demands of the modern job market. The mathematical skills developed during upper secondary school significantly impact university performance and retention, particularly in business and economics studies. Mathematics at the higher secondary level is vital for success in these degree programs. Business and marketing knowledge alone is less effective than mathematical skills for achieving success in economics and business degrees (Chaves et al., 2022). Therefore, mathematical knowledge and skills are essential for university education in business and economics.

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Motivational beliefs of learners towards mathematics are used to predict the success of students in exams in their mathematical courses (Saadati & Celis, 2023). Motivational belief towards mathematics should support achieving good grades in quantitative disciplines in university education. The values of mathematics became the greatest of the learners were preparation, family, respect, and determination (Hunter,2021). Practice, family, respect, and persistence of the students supported them to develop the value of mathematics. Motivation in mathematics played a greater role in students of the experimental group to obtain better results in achievement tests (Gholami et al., 2020). Students need regular motivation classes to develop a positive attitude towards mathematics. Students with a positive attitude towards mathematics make it easy to understand the quantitative subjects in business studies. Efforts of intrinsic motivation and hard work in learning styles of mathematics were positively correlated with each other (Sengodan & Iksan, 2012). Intrinsic motivation towards mathematics is a self–efficacy to study mathematics-related subjects. It encouraged the students to understand and interpret the numerical results.

Learners with high self-confidence in mathematics tend to have strong mathematical communication skills (Auli et al., 2021). These communication skills are essential for fields such as accounting, finance, and microeconomics. Therefore, self-confidence in mathematics helps students better understand these subjects. Çiftçi and Yıldız (2019) concluded that self-confidence in mathematics had a moderate impact on students' achievements in mathematics. Self-confidence plays a significant role in achieving notable outcomes in mathematical learning and subjects related to mathematics in higher education.

Numerous previous studies have explored attitudes toward mathematics using four key factors: self-confidence, value, motivation, and enjoyment (Guy et al., 2015; Huang & Lin, 2015). These factors:value, motivation, self-confidence, and enjoyment—play a decisive positive role in shaping attitudes toward mathematics. Students with a positive attitude toward mathematics are more likely to understand and perform well in numerically based quantitative subjects. Business mathematics combines mathematical concepts with business principles and practices, making it an interdisciplinary subject aimed at solving real-world business problems using mathematical techniques. Key topics in business mathematics include financial mathematics, linear programming, game theory, probability, and statistics. A concrete understanding of business mathematics helps students enhance their problem-solving abilities, develop strong analytical skills, and make informed decisions in addressing complex business challenges.

Based on the above literature reviews, a strong understanding of mathematics is essential for studying business-related subjects. Students with a solid foundation in mathematics at the school level are more likely to achieve good grades in subjects such as business mathematics, statistics, accounting, finance, microeconomics, auditing, and budgeting. Several research studies have examined the impact of learners' attitudes towards mathematics on their success in business studies, focusing on independent variables like self-confidence, value, motivation, and enjoyment of mathematics. This investigation aims to explore the cause-and-effect relationship between the attitudes of master's level business students toward mathematics and their academic success in Pokhara Valley. Such studies have not yet been conducted in Pokhara Valley or its surrounding areas. The goal of this study is to assess the mathematical foundation of students and examine the impact of their mathematical knowledge on their academic outcomes.

The conceptual framework for this research is structured around independent and dependent variables, as outlined below:

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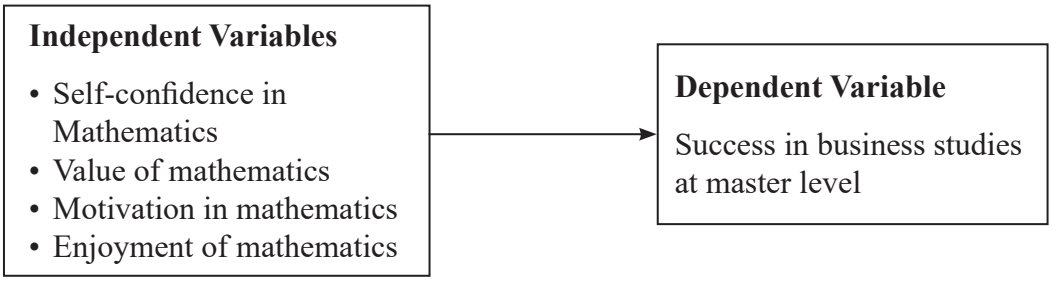
Figure 1

Conceptual Framework



Materials and Methods

This study applied descriptive and analytical survey research design to investigate attitudes toward mathematics and success in business studies at the master's level in Pokhara Valley. The descriptive research design was appropriate for identifying the status, patterns, and trends in the collected data regarding students' attitudes toward mathematics and their academic performance in business studies. The analytical component of the design was suitable for examining relationships, patterns, and potential influences between independent and dependent variables.

The target population of this study consisted of master's level students enrolled in MBS and MBA programs at various universities and their affiliated colleges in Pokhara Valley. Due to the limited study area and respondents, purposive sampling was employed. It followed a quantitative research approach and adopted primary data. A total of 280 questionnaires were distributed to the respondents with the support of faculty members and students. Of the 275 questionnaires returned, 8 were incomplete and 2 were excluded based on quality concerns of this study. 265 respondents were used for the final analysis.

The study designed a structured questionnaire that included 9 demographic questions and 31 standardized items. These 31 items were organized into five thematic segments: the first segment included 6 questions related to self-confidence, the second contained 6 questions measuring the perceived value of mathematics, the third addressed motivation toward mathematics with 6 items, the fourth focused on enjoyment of mathematics through 6 questions, and the final segment included 7 questions related to perceived success in business studies. The questionnaire was prepared in English, and each item was rated on a six-point Likert scale: strongly agree (6), agree (5), partially agree (4), partially disagree (3), disagree (2), and strongly disagree (1). The data was collected since June 2024 to October 2024 through field visits. The collected data were analyzed using the statistical software SPSS version 20. The researchers selected several colleges located in the Pokhara Valley that offer master's level business studies programs. These included the School of Business (SOB) at Pokhara University, Prithvi Narayan Campus (PNC), Janapriya Multiple Campus (JMC), and Gupteshwor Mahadev Multiple Campus (GMMC). Prior to data collection, the researchers contacted the administrative offices of the respective institutions and obtained formal permission to conduct the study. Primary data was then collected with the assistance of faculty members and students at each campus.

The mean was used to indicate the central tendency of each construct, helping to identify which items were rated higher on average compared to others. The standard deviation, a fundamental measure of dispersion, was used to assess the variability of responses within each item. Together, these descriptive statistics helped summarize the position of the constructs. To analyze relationships between variables, Karl Pearson's correlation coefficient was computed. This coefficient measures the strength and direction of the linear relationship between dependent and independent variables. Furthermore, regression analysis was calculated to examine the influence of independent variables on the dependent variable. This analysis

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provided information about the slope, indicating the degree to which changes in independent variables predict changes in dependent variable. Therefore, correlation and regression were used as part of the analytical approach in this study.

The internal consistency of selected constructs has been presented.

Table 1

Reliability analysis

Constructs	No. of items	α-value
Self – confidence in mathematics	6	0.893
Value of mathematics	6	0.869
Motivation towards mathematics	6	0.824
Enjoyment of mathematics	6	0.877
Success in business studies	7	0.856
Total items	31	

The results in Table 1 show that the reliability of the constructs ranges from the lowest value of 0.826 to a highest value of 0.893. Both values are above 0.800, indicating that each construct in this study is highly consistent. The overall reliability of the entire model is 0.941.

Results and Discussion

Table 2

Demographic variables

Demographic	Variables	Frequency	Percentage
Sex	Male	95	35.8
	Female	170	64.2
Residence	Village	27	10.2
	Municipality	80	30.2
	Sub-metropolitan	12	4.5
	Metropolitan	146	55.1
Associated University	Thribhuwan University	219	82.3
	Pokhara University	46	17.7
Programs	MBA	50	19.25
	MBS	215	80.75
Campus	SOB ,Pokhara -30	46	17.4
	PNC, POkhara -01	190	71.7
	JMC, POkhara -08	10	3.8
	GMMC , Pokhara -17	19	7.2
Semester/Trimester	First semester	110	41.5
	Third Semester	109	41.1
	Third Trimester	24	9.5

	Fifth Trimester	22	8.3
Occupation of Parents	Agriculture	100	37.7
	Business	57	21.5
	Teacher	19	7.2
	Job holder	35	13.2
	Aboard	17	6.4
	other	37	14.0
Studied math in class 11 and 12	Basic Mathematics	22	8.3
	Business Mathematics	191	72.1
	No Mathematics	52	19.6
Extra support for math	Yes	216	81.5
	No	49	18.5

Among the 265 master's level students in MBS and MBA programs, 35.8% were male and 64.2% were female, with nearly two-thirds of the learners being female. This suggests that a larger proportion of females had a background in business studies. According to Table 2, 10.2% of the learners lived in rural areas, 30.2% resided in municipalities, 4.5% lived in sub-metropolitan areas, and 55.1% lived in metropolitan areas. This indicates that 89.8% of the learners lived in municipal or metropolitan areas. Most of the learners, 82.3%, were enrolled at Tribhuvan University, while 17.7% attended Pokhara University. The majority of students were associated with constituent and affiliated colleges of Tribhuvan University. Additionally, 80.75% of the students followed the Master of Business Studies (MBS) curriculum, while 19.25% were enrolled in the Master of Business Administration (MBA) program.

The sample for this study included 46 students from the School of Business, Pokhara-30 Khudi, 190 students from Prithvi Narayan Campus, Pokhara-01 Bagar, 10 students from Janapriya Multiple Campus, Pokhara-08, and 19 students from Gupteshwor Mahadev Multiple Campus, Pokhara-17. The sample comprised 110 first-semester students, 109 third-semester students, 24 students in their third trimester, and 22 students in their fifth trimester. Additionally, 100 respondents had parents with an agricultural background, 57 had parents in business, 19 had teacher parents, 35 had parents employed in other jobs, 17 had parents abroad, and 37 had parents from other backgrounds, all of whom pursued higher education in business studies in Pokhara.

Among the 265 respondents, 8.3% had studied basic mathematics, 72.1% had studied business mathematics, and 19.6% had not taken any mathematics in classes 11 and 12. This indicates that 80.4% of master's level business students had a mathematical background at the secondary level. Additionally, 216 out of 265 students, or 81.5%, acknowledged the need for extra support in mathematics during their bachelor's and master's programs to achieve good grades. Most of the students had a mathematical background at school level, however they realized extra support in mathematics at university level.

Descriptive Analysis

Table 3

Self- confidence in mathematics

Particulars	Mean	S.D
I learn mathematics easily.	4.43	1.023
I believe I am good at solving mathematics problems.	4.43	0.927

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I can solve mathematics problems without too much difficulty.	4.05	0.999
I expect to do fairly well in any mathematics class that I take.	4.32	0.996
Mathematics does not scare me at all.	4.30	1.026
I have a lot of self-confidence when it comes to math.	4.38	1.06

Note: Number of respondents are 265.

Table 3 shows that the highest average was 4.43, with a standard deviation of 0.927. This indicates that most respondents agreed with the second statement. The lowest average was 4.05, with a standard deviation of 0.999, suggesting that fewer respondents felt they could solve mathematics problems without much difficulty. Overall, most respondents were capable of mathematics and found it easy to perform mathematical computations.

Table 4

The value of mathematics

Particulars	Mean	S.D
I think studying mathematics is useful.	4.87	1.107
Mathematics is important in everyday life.	4.84	1.032
Mathematics is a very worthwhile and necessary subject.	4.74	1.006
A strong mathematics background could help me in professional life.	4.84	0.928
Mathematics is one of the most important subjects for students to study.	4.88	0.938
I can think of many ways in which I use mathematics outside the classroom.	4.57	0.90

Note: Number of respondents are 265.

The highest average in Table 4 was 4.88, with a standard deviation of 0.938, indicating that the majority of MBS and MBA students agreed that mathematics was one of the most important subjects to study. However, a smaller group of higher-level business students acknowledged using mathematics outside the classroom, with an average of 4.57 and a standard deviation of 0.90. The difference between the highest and lowest averages was minimal; suggesting that the responses for all the paradigms related to the value of mathematics had little variation. The averages for the first, second, fourth, and fifth statements were closely make straight, indicating that students consistently agreed that mathematics was both important and useful in their daily and professional lives.

Table 5

Motivation towards mathematics

Particulars	Mean	S.D
I can get good grades in mathematics	4.68	0.925
I know I can succeed with math.	4.58	0.887
I'm sure that I can learn math.	4.80	0.938
I think I could do better in math so far.	4.74	0.874
Learning math gives me knowledge and skills relevant to my future career.	4.78	0.937

Learning more mathematics opens up better paid job opportunities	4.61	0.959

Note: Number of respondents are 265.

The smallest and largest averages in Table 5 were 4.58 and 4.80, respectively, with standard deviations of 0.938 and 0.887. This suggests that most students were confident in their ability to learn mathematics, while fewer students felt certain that they could succeed in it. The difference between the highest and lowest averages was 0.22 which indicates that each construct was similarly influenced. Respondents generally agreed that they applied their mathematical knowledge to their future careers and believed they could learn, perform well, and achieve good grades in mathematics. They were motivated to study mathematics with a positive attitude.

Table 6

Enjoyment of mathematics

Particulars	Mean	S.D
Mathematics is a very interesting subject	4.69	1.009
I am happier in a mathematics class than in any other classes	4.48	1.000
I would prefer to do an assignment in mathematics than to write theory.	4.58	1.108
I like to solve new problems in mathematics.	4.57	1.032
I gain great satisfaction from solving a mathematics problem.	4.77	0.980
I am willing to take more than the required amount of mathematics	4.39	0.972

Note: Number of respondents are 265.

The means of the first, second, third, fourth, fifth, and sixth statements were 4.69, 4.48, 4.58, 4.57, 4.77, and 4.39, respectively. The highest mean, 4.77, was for the fifth statement, with a standard deviation of 0.980. This indicates that the majority of respondents agreed that they gained great satisfaction from solving mathematics problems. The lowest mean, 4.48, was for the second statement, with a standard deviation of 1.000, suggesting that a minority of respondents agreed that they were happier in a mathematics class than in any other class. The difference in the means of any two statements among the six was less than or equal to 0.29, which is a small number, indicating that the responses to these statements were consistent. On the base of the fifth and second statements pointed out that there were some problems in mathematics classes.

Table 7

Success in business studies

Particulars	Mean	S.D
I feel that math knowledge will help me to get a good grade in Business Math.	4.98	0.927
I realize that math's ideas support me to understand Statistics easily	4.89	0.887
I realize that math's knowledge supports the concept of financial analysis and investment.	4.75	0.946
I realize that mathematical concepts support achieving remarkable marks in financial accounting and budgeting.	4.66	0.949
I feel that mathematical concepts are used in Business Economics, Microeconomics, and Macroeconomics.	4.70	0.924

I realize that math is used in cost accounting.	4.65	0.935
I realize that math is not used in Organizational Management, Marketing, and Business Law.	4.15	1.064

Note: Number of respondents are 265.

The highest and second-highest means in Table 7 were 4.98 (with a standard deviation of 0.927) and 4.89 (with a standard deviation of 0.887), respectively. Most respondents believed that mathematical knowledge helped them achieve good grades in business math, and those mathematical concepts made it easier for them to understand statistics. The lowest mean was 4.15 (with a standard deviation of 1.064) for statement seven, indicating that fewer students agreed with this statement. Overall, most respondents moderately agreed that mathematics helped them understand and achieve good grades in subjects like finance, accounting, economics, and budgeting.

Table 8

Correlation matrix showing the relationship between the set of independent variables

	Self Confidence in Mathematics	The value of mathematics	Motivation towards mathematics	Enjoyment of Mathematics	Success in Business Studies
Self Confidence in Mathematics	1	0 .349**	0.535**	0.597**	0.321**
The value of mathematics		1	0 .656**	0.492**	0.609**
Motivation towards mathematics			1	0 .707**	0.535**
Enjoyment of mathematics				1	0 .457**
Success in Business Studies					1

The correlation coefficients between the various independent variables and the dependent variables were positive, suggesting that success in business studies is positively associated with self-confidence, value, motivation, and enjoyment of mathematics. The value placed in mathematics shows a strong correlation with success in business studies. Therefore, business students should develop a positive attitude towards mathematics to achieve excellent academic results. Motivation toward mathematics also strongly correlates with success in business studies, while self-confidence and enjoyment of mathematics show a moderate correlation with academic achievement. In conclusion, value, motivation, enjoyment, and self-confidence in mathematics are essential factors contributing to success in business studies.

Table 9

Regression Analysis showing Effect of Independent Variables on the Dependent Variable, Success in Business Studies in master level

Model	B	T	Sig	VIF
(Constant)	10.108	5.752	0.000	
Self –confidence in mathematics	0.004	0.059	0.953	1.619
Value of mathematics	0.451	6.805	0.000	1.763
Motivation of mathematics	0.235	2.473	0.014	2.760
Enjoyment of mathematics	0.109	1.497	0.136	2.316

The variance inflation factor (VIF) values in table 9 were all below 5, with the highest VIF being 2.760. This indicates that multi-collinearity was not an issue in the study. The p-values for the value

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of mathematics and motivation for mathematics were 0.000 and 0.014; respectively. This suggests that the value of mathematics and motivation for mathematics significantly impacted success in business studies at the master's level. The beta coefficient for the value of mathematics in relation to success in business studies was 0.451, meaning that for each unit increase in the value of mathematics; success in business studies is expected to increase by 0.451 units. Similarly, the beta value for motivation toward mathematics in relation to achievement in commercial studies was 0.235, indicating that a one-unit increase in motivation toward mathematics is expected to increase success in commercial studies by 23.5%.

The p-value for enjoyment of mathematics in relation to the output variables was 0.135, which is greater than 0.05. Therefore, enjoyment of mathematics did not significantly affect success in business studies, although it still showed a positive relationship with the dependent variables. The self-confidence in mathematics was insignificant with the success in business studies. This suggests that self-confidence in mathematics did not have a meaningful impact on the outcome of business studies. The R-squared value was 0.418, indicating that 41.8% of the variation in the output variables was explained by the input variables. The remaining part of success in business studies was influenced by other input variables expect above explained variables.

The major finding of this survey revealed that 216 out of 265 students (81.5%) required extra support classes for mathematics during their university studies. Interestingly, more than 80% of these students had previously studied mathematics in classes 11 and 12. This suggests that mathematics courses could be compulsory at the school level for students intending to pursue university-level business studies. Additionally, it highlights the need for an increase in the credit hours dedicated to mathematics in university programs, particularly in management streams. The study also demonstrated that mathematics is an interdisciplinary subject at the university level and is essential for students following higher education. It emphasized the importance of a compact mathematical foundation, which has been linked to success in core business subjects (Opstad, 2018). A strong understanding of mathematics allows students to perform well in quantitative business courses, thereby underlining the value of mathematics in the broader academic context. Overall, this study highlights the necessity of a rigorous mathematics education both at the school level and at university to ensure students are well-prepared for their academic and professional careers.

This fact-finding study revealed that self-confidence and enjoyment of mathematics did not significantly influence success in business studies. However, the value of mathematics and motivation to study the subject had a considerable impact on students' performance in business-related fields. Self-confidence and motivation in mathematics were found to influence achievement in business studies (Opstad, 2024). The study also noted that while motivation in mathematics produced similar results, the effect of self-confidence was contradictory. Specifically, self-confidence in mathematics had a moderate impact on success in commercial studies at the university level (Cifti & Yildiz, 2021). Furthermore, many of the respondents' friends had gone abroad to track better education and career opportunities. As they felt that political instability in their home country and insufficient job opportunities made it difficult to trust the government. As a result, self-confidence in mathematics did not significantly affect their success in business studies.

Most respondents agreed that mathematics is an important subject for higher education, essential in everyday life and professional settings. Mathematical skills are fundamental for success in all accounting courses (Villamar et al., 2020), and this study shows similar results. However, some respondents mentioned that mathematics is not always applicable outside of the classroom, mentioning issues with teaching methods, learning activities, and real-life applications. This study found that the value of mathematics significantly influenced success in business studies. Factors such as the learner's family background,

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study habits, respect for mathematics, and determination contributed to an increase appreciation of the subject (Hunter, 2021), which in turn played a significant role in achieving success in commercial studies. Mathematical well-being (MWB) and its value are closely connected in mathematical education (Hill et al., 2019), and this study presented similar findings. The beta coefficient for the value of mathematics was 0.451, meaning that the value of mathematics accounted for 45.1% of success in business studies. To enhance the value of mathematics, faculty members, campuses, and senior students should organize real-life-oriented mathematical activities both in the classroom and in social settings.

Motivation for mathematics has a significant influence on success in business studies and is strongly correlated with succession in business studies. Motivation toward mathematics positively impacts performance in business mathematics (Opstad, 2024). Motivational beliefs about mathematics help learners achieve better results in mathematics-related subjects (Saadati & Celis, 2023; Gholami et al., 2020). This study supports similar findings from previous research. Motivation promotes a positive attitude toward mathematics-related subjects, enabling learners to better understand quantitative topics and apply them in real-life business contexts. The majority of respondents believed that learning mathematics was important for their future careers. Some students, parents, and stakeholders argued that if students were motivated toward mathematics in earlier educational stages, they would find it easier to connect with and enjoy mathematics related subjects at the university level. The strength of intrinsic motivation for mathematics was clearly linked to diligent learning styles (Sengodan & Iksan, 2012). This study presents a similar argument to past research, highlighting that motivation toward mathematics is important at all educational levels and across all subjects. Mathematical knowledge and concepts encourage learners to develop problem-solving, analytical, and creative thinking skills across all disciplines. Mathematics forms the foundational basis for all quantitative subjects.

The enjoyment of mathematics was positively correlated with success in business studies at the higher level, although it did not significantly influence performance in those studies. Most participants in the study expressed the greatest satisfaction when solving familiar numerical problems, but they were less eager about mathematics classes compared to other subjects. Additionally, they showed little interest in tackling new math problems or completing mathematical assignments. This suggests there are issues within mathematics classes that need improvement. University-level mathematics courses should be made more student-friendly by incorporating various research activities related to the subject. The fundamental principles of mathematics are essential for understanding business mathematics, statistics, financial analysis, economics, and accounting. The study concluded that mathematics is an interdisciplinary subject that plays a decisive role in business studies.

Conclusion and Suggestions

This study explores how master's-level business students' attitudes toward mathematics affect their academic success, focusing on four key factors: self-confidence in mathematics, motivation toward mathematics, perceived value of mathematics, and enjoyment of mathematics. The findings reveal a positive correlation between academic success and all four attitudes. However, only the value of mathematics and motivation towards mathematics significantly influenced academic outcomes. Self-confidence and enjoyment, while positively correlated, did not show a direct impact on performance. Many students acknowledged the need for extra mathematics classes during their studies, despite having studied the subject of mathematics at the school level. The study also highlights that students recognize mathematics as highly applicable and valuable for both their personal and professional lives.

Most respondents emphasized that mathematics is essential for further studies and future careers. This suggests a potential revision of university admission criteria to include mathematics as a compulsory subject at the school level for business studies. Additionally, new business students can be better motivated and guided to apply mathematical knowledge in real-life situations. To address learners' needs

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and inquiries, the credit hours allocated to mathematics may be increased. While most students in the survey reported being good at mathematics during school and felt comfortable practicing it, they did not enjoy their mathematics classes. This highlights the need for faculty members to enhance the quality of mathematics education. Teaching and learning activities should be improved to create a more student-friendly and engaging learning environment.

This research study sheds light on the learning environment for mathematics-related subjects, the economic status of students, family influence, and job prospects. Some former students expressed that they struggled to apply mathematics effectively in their fields. The findings indicate that the values of mathematics and student motivation are essential aspects of business education, make parallel with views from educated individuals. The study predominantly involved respondents from specific classes, and further research in different locations and timeframes is needed to generalize and validate these results. Additional variables should be considered to better understand the causes and effects of students' attitudes toward mathematics and their success in business studies.

Author contribution statement

The author solely conducted conceptualization, data collection, analysis, writing tasks, addressing the comments of reviewers, and finalizing the manuscript.

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