



# Academic Success and Achievement of Freshmen University Students in Mathematics

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## Abstract

Even in university, students experience success and failure in their mathematics subjects. Thus, looking into the different factors that could affect academic success in mathematics is critical. Primarily, this research investigates the aspects of academic success inventory as predictors of the academic achievement of freshmen students at the university. This study utilized a descriptive-correlational research design to achieve the goal of this study. A total of 212 freshman university students enrolled in a mathematics class participated in this study. In addition, frequency count, percentage, mean, standard deviation, Pearson r Coefficient Correlation, and multiple regression analysis were used for statistical analysis. The results revealed that most students have a moderate perspective toward academic success factors, with fair academic achievement in mathematics. Moreover, findings also revealed that career decidedness, concentration, and socializing as academic success factors significantly predict the students' academic achievement. In addition, further discussions and implications were provided. Finally, this study recommends that students, teachers, school guidance coordinators, and school leaders should work together to assist students in achieving positive development in learning Mathematics.

## Subject Areas

Mathematics Education, Social Science, Educational Psychology

## Keywords

Academic Success Inventory, Achievement in Mathematics, Freshman University Students

## 1. Introduction

Mathematics education has always been considered a critical instrument in

community development. It is one of the foundations of science and technology that helps people improve their quality of life. Mathematics enables individuals to make informed decisions, solve complex problems, and create new technologies that enhance the quality of life. Yadav (2019) [1] explained that mathematics plays a vital and special role in our societies and is a key factor in the progress of humanity. The importance of mathematics education extends beyond just the practical applications. It also plays a crucial role in personal development. Through learning mathematics, people develop critical thinking skills, precision, and the ability to see patterns and connections. These skills are not only valuable in scientific and technical careers but also in everyday life. Consequently, mathematics education is essential for fostering critically thoughtful, responsible, and cooperative individuals within society, particularly among younger generations [2].

However, the context of Mathematics education has become increasingly critical due to the international assessment report that compromises the quality of learning considering the Philippine educational landscape. Almerino *et al.* (2020) [3] explained that Filipino students excel in acquiring knowledge but perform significantly lower tasks requiring higher-order thinking skills. According to the Programme for International Student Assessment (PISA) 2018 Report, Filipino students scored an average of 353 points in mathematical literacy, which is much lower than the Organisation for Economic Co-operation and Development (OECD) average of 489 points [4]. This score reflects proficiency below Level 1. Similarly, in the 2019 Trends in International Mathematics and Science Study (TIMSS), the Philippines scored 297 points in math, highlighting a significant performance gap compared to international standards [5].

On the other hand, the central focus of research in mathematics education nowadays is developing young learners' critical thinking skills. Many studies have examined how students' critical thinking is influenced by the cognitive and social aspects of their mathematics education. However, less attention has been given to how students' beliefs about their mathematics learning process affect their critical thinking skills [6].

Meanwhile, at the tertiary level, these students often struggle with the transition to higher education and experience different adjustment levels during their first year of college, affecting their academic success [7]. Additionally, it was noted that students' performance in college-level math at other state universities in the Philippines is generally satisfactory [8]. However, students still face challenges with various topics, likely due to low retention levels.

Academic success in learning mathematics is often seen as challenging and complex. Kuh *et al.* (2006) [9] described academic success as a blend of academic achievement, participation in meaningful educational activities, satisfaction, gaining necessary knowledge, skills, and competencies, persistence, achieving educational goals, and performance after college. More than a decade later, Alyalyan & Dustegor (2020) [10] offered a similar definition. Furthermore, despite having ways to define and measure academic success, several factors still

exist to provide all students with the opportunities to succeed academically [11].

Thus, this study primarily focused on the Academic Success Inventory (ASI) to describe the academic success of freshmen university students in learning mathematics. In this case, freshmen students were considered the main focus of the study since the general education mathematics course was offered at the first-year level at the university. A study exploring the reasons behind the success and failure of first-year mathematics students found that self-motivation is the most crucial factor for achieving success, rather than focusing on cognitive abilities [12]. Additional factors contributing to success include students' enthusiasm and interest in mathematical concepts, satisfaction from achieving desired outcomes, completing assignments, and having access to sufficient support materials [13].

Therefore, this study determines the level of academic success and achievement of freshmen university students. Moreover, it investigates how academic success factors affect students' academic achievement in mathematics and looks into its predictive capacity.

### **1.1. Theoretical Framework**

The Academic Success Inventory for College Students (ASICS) is a comprehensive assessment tool designed for widespread use as a screening instrument to identify college students at risk of poor academic progress. It also helps to pinpoint interventions tailored to their specific strengths and weaknesses. ASICS is grounded in the theoretical frameworks of Astin (1998) [14] and Tinto (1998) [15] concerning student and environmental characteristics, persistence, and departure. Additionally, it incorporates various aspects of motivation theories, including self-determination [16], attribution theory [17], and achievement goal theory [18].

### **1.2. Research Objectives**

This research aims to explore the academic success and achievement of freshmen university students in mathematics. Specifically, it seeks to describe the levels of academic success inventory and mathematics achievement among these students, determine the relationship between the academic success inventory and their academic achievement in mathematics, and identify key predictors of their mathematical achievement. By achieving these objectives, the study will provide valuable insights into the factors influencing freshmen students' success, offering data-driven educational interventions and support recommendations.

## **2. Methodology**

### **2.1. Research Design**

The current study utilized a descriptive-correlational research design. According to Stangor & Walinga (2019) [19], descriptive research aims to capture the current situation, while correlational research seeks to identify connections between variables and predict future events based on existing information. This study in-

tends to describe the student's academic success and achievement level. Moreover, it also aims to determine the relationship between academic success and academic achievement in mathematics. Hence, the descriptive-correlational research design suits the objective of the study.

## 2.2. Respondents of the Study

The respondents in this study were freshmen university students at Nueva Ecija University of Science and Technology. The sample comprises 212 students, 55 males and 157 females. Their mean age is 18.74, with a standard deviation of 1.78. The respondents studied secondary and elementary education and enrolled in a mathematics class during the 1<sup>st</sup> semester of the academic year 2023-2024.

## 2.3. Research Instrument

### Academic Success

Academic success was assessed using the Academic Success Inventory for College Students (ASICS) Scale by Prevatt *et al.* (2011) [20]. It is a newly developed self-report instrument designed to evaluate the academic success of college students. The 50-item instrument has ten factors that measure general academic skills, career decidedness, internal and external motivation, anxiety, concentration, socializing, personal adjustment, and perceived efficacy of the instructor. An example item is: "I felt confident I could understand even the most difficult material in this class." The questionnaire was rated on a scale of 1 (Strongly Disagree) to 4 (Strongly Agree). Negatively worded items are reverse scored so that higher scores on items reflect more positive functioning. The Cronbach alphas for the ASICS were as follows: General Academic Skills (0.93), Internal Motivation/Confidence (0.86), Perception of Instructor Efficacy (0.92), concentration (0.87), External Motivation/Future (0.88), Socializing (0.84), Career Decidedness (0.87), Lack of Anxiety (0.77), Personal Adjustment (0.86), and External Motivation/Current (0.62). Thus, the instrument had acceptable to excellent internal consistency.

### Academic Achievement

Data about the student's achievement in mathematics was gathered from the final grades in the subject. According to York *et al.* (2015) [21], academic achievement was frequently measured with grades and GPA.

## 2.4. Data Collection Procedure

Before data collection commenced, ethical approval was obtained from the college ethics review board. The college dean and the relevant department chairpersons also secured permission to conduct the study. Mathematics teachers were then contacted to schedule appropriate times for administering the questionnaire. Students were informed about the research project, including the voluntary nature of participation, their right to withdraw at any time and assurances of confidentiality. Upon providing informed consent, students completed the survey under classroom conditions, which took less than 15 minutes.

## 2.5. Data Analysis

This study used both descriptive and predictive analysis. First, the researchers used mean and standard deviation to describe the academic success inventory. Second, frequency count and percentage were used to describe the achievement in mathematics. Third, Pearson's  $r$  correlation was used to determine the relationship between the variables. Lastly, Multiple Linear Regression was utilized to determine the predictors of achievement in mathematics.

## 3. Results and Discussion

### 3.1. Academic Success Inventory of Freshmen University Students

The Academic Success Inventory (ASI) data offers significant insights into first-year college student's academic performance and accomplishments, specifically in mathematics.

**Table 1** ASI results for the first-year university students revealed a mean score of 2.83 with  $SD = 0.47$ , indicative of moderate academic achievement. The results of this study indicate that although the students exhibit particular fundamental abilities and drive, there is potential for enhancement in various areas such as decision-making, internal motivation, academic proficiency, concentration, and personal adaptation. Students with a moderate Academic Success Inventory may exhibit a balanced combination of learning approaches, study skills, and self-efficacy. Their ASI scores indicate a moderate perception of academic achievement, expectations, and stress levels. These students will likely have reasonable confidence in their abilities to perform academic tasks and manage academic challenges. Their self-efficacy levels may be neither exceptionally high nor low, allowing them to approach academic tasks with moderate persistence and confidence. According to Orçanlı *et al.* (2021) [22], the Academic Success for College Students Inventory Scale proposes a holistic method for assessing academic achievement beyond traditional quantitative measures like GPA. Considering qualitative aspects alongside GPA, it aims to provide a more comprehensive understanding of students' academic success, including their interests, knowledge, and engagement in specific courses. This approach is expected to offer valuable insights for evaluating student performance and educational institutions' effectiveness.

**Table 1.** Level of academic success inventory of freshmen university students.

Academic Success Inventory	M	SD	Verbal Description
1) Career Decidedness	2.86	0.44	Moderate
2) Internal Motivation/Confidence	2.68	0.37	Moderate
3) External Motivation/Future	3.34	0.44	High
4) General Academic Skills	3.01	0.37	Moderate
5) Lack of Anxiety	2.01	0.58	Low
6) Concentration	2.62	0.47	Moderate

**Continued**

7) External Motivation/Current	3.01	0.45	Moderate
8) Personal Adjustment	2.21	0.56	Low
9) Perceived Instructor Efficacy	3.31	0.48	High
10) Socializing	3.24	0.52	Moderate
<b>Overall Mean</b>	<b>2.83</b>	<b>0.47</b>	<b>Moderate</b>

**1) Career Decidedness**

Regarding Career Decidedness ( $M = 2.86$ ,  $SD = 0.44$ ), data shows that some freshmen students exhibit substantial certainty while others grapple with doubts or difficulty making significant career choices. Moderate Career Decidedness suggests that these students are open to exploring different career paths, seeking guidance from career counselors, and considering the potential consequences of their decisions. Students with clear career aspirations and academic goals often show greater focus and commitment to their studies. On the contrary, students uncertain about their career path may struggle with motivation in their mathematics coursework. A similar result was found in the study of Yasar & Sunay (2020) [23], wherein students demonstrated moderate decisiveness regarding their career choices. These findings can be attributed to the limited decision-making abilities and commitment to decisions among university students during their educational journey. Moreover, Yu *et al.* (2021) [24] explain that proactive personality and career exploration improve students' career decisions from a positive perspective. It implies that students who exhibit proactive personalities and engage in thorough career exploration are likelier to feel confident and committed when selecting their career paths.

**2) Internal Motivation/Confidence**

Regarding Internal Motivation/Confidence ( $M = 2.68$ ,  $SD = 0.37$ ), the results demonstrate that freshmen students tend to express moderate confidence in their abilities to understand challenging material, achieve satisfactory grades, and possess the necessary skills for success in the mathematics course. Students who exhibit high confidence levels in their abilities and derive satisfaction from learning new material may approach mathematics coursework with enthusiasm and perseverance. Inversely, students who experience doubts or worries about their abilities may struggle to maintain motivation, hindering their academic progress in mathematics. In the study of Çiftçi & Yıldız (2019) [25], self-confidence has emerged as a critical factor influencing students' mathematics achievement. It underscores the importance of nurturing students' belief in their mathematical capabilities to enhance their achievement. In addition, academic self-confidence played a role in affecting both the performance impairment and intrusive worry aspects of test anxiety [26]. Students with higher academic self-confidence tended to experience reduced performance impairment and intrusive worry compared to their counterparts.

**3) External Motivation/Future**

Concerning External Motivation/Future ( $M = 3.34$ ,  $SD = 0.44$ ), which had the highest mean rating, the data shows that first-year students express a high level of external motivation concerning the relevance of mathematics to their future endeavors. The high level of external motivation suggests a positive outlook among students regarding the relevance and applicability of their academic endeavors to their future professional lives. Students who see their mathematics course as relevant to their future careers are likelier to work diligently and perform well. Conversely, students without a clear future orientation or external motivation may struggle to find value in their coursework, leading to decreased motivation. Musu-Gillette *et al.* (2015) [27] emphasize recognizing the interconnectedness between students' long-term trajectories, interests, and value for mathematics and their college major choices. Furthermore, students had confidence, enjoyed mathematics classes, were motivated, and found it helpful [28]. They even suggested that teachers should try to teach mathematics, highlighting its applicability in different careers.

#### **4) General Academic Skills**

In terms of General Academic Skills ( $M = 3.01$ ,  $SD = 0.37$ ), the table shows that freshmen students had a moderate level of commitment and dedication among the participants towards their academic endeavors. Individuals with moderate general academic skills in mathematics demonstrate a fundamental understanding of mathematical concepts and abilities, enabling them to engage with basic mathematical assignments and academic coursework effectively. Although not proficient in all aspects of mathematics, they have the potential to attain moderate levels of success through diligent effort and perseverance. Based on a study, a firm grasp of fundamental mathematical concepts in the early stages lays a vital groundwork for future mathematical proficiency and academic success [29]. Mastery of basic skills is essential for students to advance to more complex mathematical concepts and techniques. Moreover, Ribner (2017) [30] states that high levels of early executive function may buffer against low levels of early academic skills; the model slightly improved the variance explained in mathematics and reading achievement.

#### **5) Lack of Anxiety**

Lack of anxiety ( $M = 2.01$ ,  $SD = 0.58$ ) is the lowest mean rating, and the analysis indicates a low level of anxiety among the participants concerning their academic pursuits. Generally, students reported experiencing some degree of anxiety during their academic endeavors. Students who experience anxiety during tests or while studying may struggle to perform optimally in mathematics courses, leading to lower grades and decreased confidence in their mathematical abilities. According to Namkung (2019) [31], mathematics-anxious students have less enjoyment, motivation, and confidence, leading them to avoid mathematics courses. This avoidance can impact their academic and career choices, steering them away from STEM fields and higher education opportunities. Furthermore, students with lower levels of math anxiety had a mastery goal perspective and less use of maladaptive self-protective coping strategies [32].

## 6) Concentration

In terms of Concentration ( $M = 2.62$ ,  $SD = 0.47$ ), the table suggests a moderate concentration level among the participants during their academic pursuits.

Freshmen students reported that, although they could generally concentrate in class, they also faced challenges with distractions. Those who struggle to focus may find it difficult to engage with mathematical content, hindering their understanding and problem-solving abilities. Similar results were found, where most students had moderate learning concentration [33]. Students who can concentrate on a single task while disregarding distractions are considered to have intense concentration skills, which can fluctuate due to factors like mental fatigue and motivation for learning. In addition, Servatyari *et al.* (2018) [34] highlight that teachers' ethical conduct and appropriate interactions with students are identified as the most influential factors in the classroom. Teacher behavior can enhance educational outcomes and boost student engagement and concentration levels.

## 7) External Motivation/Current

Concerning External Motivation/Current ( $M = 3.01$ ,  $SD = 0.45$ ), the data reveals a moderate level of external motivation among the participants, particularly concerning their academic performance in mathematics. It suggests that, on average, students reported being moderately driven by external factors such as parental expectations, scholarship requirements, and university regulations to achieve success in their mathematics coursework. Students who are externally motivated may be more likely to exert effort and engage actively in their mathematics studies to meet external expectations and achieve desired outcomes. The study by Xu, Ma & Duan (2018) [35] highlights the correlation between students' perceptions of their parents' academic expectations and their capacity for self-regulated learning (SRL), emphasizing the importance of parental engagement in cultivating students' SRL abilities. Moreover, Subotnik (2019) [36] concludes that nurturing talent and skills necessitates particular environments, such as having skilled instructors and mentors, and specific responses to challenges, like persistence and deliberate practice. Without integrating these elements, talent development is improbable, and potential will remain unrealized.

## 8) Personal Adjustment

Regarding Personal Adjustment ( $M = 2.21$ ,  $SD = 0.56$ ), the freshmen student had a low level of personal adjustment. Results indicated that some students experience personal problems external to the academic environment, which hinder their performance in the course and affect their overall adjustment to university life. Students who encounter personal difficulties, such as health issues, family problems, or financial concerns, may experience heightened stress levels and diminished coping resources, negatively affecting their ability to concentrate, engage effectively in their studies, and perform well in mathematics courses. Rooji's (2017) [37] findings demonstrate that academic adjustment predicts university GPA and credits significantly. Universities are encouraged to incorporate the cultivation of self-regulated study skills, which are the primary deter-

minants of academic adjustment, into the first-year curriculum. Maladaptive coping strategies, such as avoidance or denial, can hinder adaptation, while a positive perception of the university environment can facilitate smoother adjustment [38].

### 9) Perceived Instructor Efficacy

Regarding Perceived Instructor Efficacy, the students hold a high level of perceived instructor efficacy ( $M = 3.31$ ,  $SD = 0.48$ ) among the participants. Thus, freshmen students perceived their instructors as capable and motivated individuals who positively influenced their academic experiences in mathematics. Specifically, students expressed satisfaction with the quality of teaching, attributed their performance to effective instruction, and acknowledged the instructors' role in motivating them to excel in the course. According to Barni (2019) [39], teachers' self-efficacy was positively associated with conservation values regardless of the type and level of motivation for teaching. The results highlight the importance of understanding how personal values intersect with motivation in shaping teachers' perceptions of their capabilities and classroom effectiveness. Additionally, teaching self-efficacy, influenced by length of service in school and perceived autonomy support, is critical in shaping teacher engagement levels. Moreover, the impact of teaching self-efficacy on engagement is moderated by autonomy support, underscoring the importance of supportive environments in enhancing teaching effectiveness and student involvement [40].

### 10) Socializing

Regarding socializing ( $M = 3.24$ ,  $SD = 0.52$ ), the participants have a moderate level of social engagement. Thus, most freshmen students reported engaging in social activities, such as partying and spending time with friends, at a reasonable rate throughout the academic term. The respondents recognize the influence of social activities on academic commitments, but it may not be perceived as overwhelmingly detrimental or completely negligible. It underscores the importance of considering the balance between social engagements and academic obligations in the lives of individuals, as reflected in their responses. Ayalew (2021) [41] explains that social integration at a university encompasses interpersonal connections, support systems, interactions with peers, and a feeling of belonging. This is fostered through extracurricular involvement, informal interactions with peer groups, and engagement with faculty and staff members. Furthermore, a research study suggests that university students increasingly utilize social networking sites (SNS) for chatting, discussion, and file sharing, which benefits knowledge sharing and enhances student learning [42].

## 3.2. Level of Academic Achievement in Mathematics of Freshmen University Students

**Table 2** provides a comprehensive overview of the academic achievement levels of freshmen university students in mathematics. Most students fall within the fair category (80 - 84), with 105 students comprising 49.53% of the sample. Additionally, a considerable number of students demonstrate good performance

(85 - 90), with 37 students accounting for 17.45% of the sample, falling within this range. Furthermore, a notable proportion of students exhibit poor performance (75 - 79), with 46 (21.70%) falling within this category. A smaller percentage of students showcase very good performance, with six (2.83%) achieving scores between 90 and 94. Lastly, a smaller proportion of students, accounting for 8.49% of the sample, attain very poor scores, with 18 students achieving scores of 74 and below. Overall, the data illustrates a diverse spectrum of academic achievement levels among freshmen university students in mathematics, ranging from excellent to very poor.

**Table 2.** Level of academic achievement in mathematics.

Academic Achievement	f	%	Verbal Description
90 - 94	6	2.83	Very Good
85 - 89	37	17.45	Good
80 - 84	105	49.53	Fair
75 - 79	46	21.70	Poor
74 and below	18	8.49	Very Poor
<b>Total</b>	<b>212</b>	<b>100.00</b>	

The majority of the students had a fair level of achievement in mathematics. It indicates that most students likely demonstrate a moderate understanding of mathematical concepts and may perform adequately in certain areas but struggle with more complex or abstract concepts. They may exhibit inconsistent performance, showing strengths in some areas while encountering challenges in others. The analysis results were slightly below the results of the study by Vergara (2021) [43], which found that most university students had good mathematics achievement. In the recent 2022 Programme for International Students Assessment (PISA), the Philippines ranked poorly in mathematics, with sixth to the last among 81 countries. The Department of Education (DepEd) said that the Philippines' poor showing in the 2022 PISA indicates a five- to six-year lag in learning competencies in the country [44].

Overall, the data illustrates a varied distribution of academic achievement levels among freshmen university students in mathematics, with a significant portion of students performing at moderate to poor levels. These findings underscore the importance of implementing targeted interventions and support mechanisms to address the diverse academic needs of students and improve their overall performance in mathematics.

### 3.3. Relationship of Academic Success Inventory and Academic Achievement in Mathematics of Freshmen University Students

**Table 3** revealed significant associations between academic success and achievement in mathematics of freshmen university students. Specifically, career deci-

dedness ( $r = 0.197, p < 0.001$ ), concentration ( $r = 0.233, p < 0.001$ ), personal adjustment ( $r = 0.198, p < 0.001$ ), and socializing ( $r = 0.334, p < 0.001$ ) demonstrated statistically significant correlations with academic achievement in mathematics. These findings suggest that students with higher career decidedness, concentration, personal adjustment, and socializing tend to perform better in mathematics.

**Table 3.** Relationship of academic success inventory and academic achievement in mathematics.

Variables	1	2	3	4	5	6	7	8	9	10	11
1) Academic Achievement	1										
2) Career Decidedness	0.197**	1									
3) Internal Motivation Confidence	-0.031	0.316**	1								
4) External Motivation Future	-0.022	0.238**	0.331**	1							
5) General Academic Skills	-0.056	0.287**	0.535**	0.480**	1						
6) Lack of Anxiety	0.039	0.025	0.145*	-0.089	-0.066	1					
7) Concentration	0.233**	0.273**	0.331**	0.214**	0.291**	0.348**	1				
8) External Motivation Current	-0.131	0.071	0.182**	0.313**	0.305**	-0.121	-0.141*	1			
9) Personal Adjustment	0.198**	0.109	0.057	-0.092	-0.032	0.323**	0.245**	-0.164*	1		
10) Perceived Instructor Efficacy	0.042	0.060	0.025	0.286**	0.115	-0.030	0.218**	-0.050	0.068	1	
11) Socializing	0.334**	0.109	0.041	0.190**	0.114	0.102	0.253**	-0.115	0.172*	0.367**	1

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ .

Students who exhibit high levels of career decidedness, concentration, personal adjustment, and socializing tend to achieve better grades and test scores in mathematics. They clearly understand their career goals, which motivates them to engage more deeply in their studies. Their ability to focus for extended periods helps them understand complex mathematical concepts and solve intricate problems, leading to deeper learning. They also have the emotional stability to handle the challenges of mathematics coursework, and they benefit from a supportive social network, which encourages and assists them in their studies. These factors contribute to their overall academic success in mathematics.

Koyuncuoğlu (2021) [45] found that students with high academic achievement had higher mean scores of career decidedness than students with low and moderate academic achievement. The analysis results also corroborate with Li & Yang (2016) [46], wherein students' performance in both immediate and delayed posttests was significantly and positively influenced by their concentration level during learning. Also, da Costa *et al.* (2018) [47] revealed a notable positive correlation between self-adjustment and student academic performance. The analysis suggests that effective self-adjustment is associated with enhanced student academic achievement. Furthermore, the level of socialization is a crucial factor in academic environments, specifically with instruction and knowledge acquisi-

tion [48]. The assertion made by the majority of the participants is that socialization enhances their self-assurance and promotes efficient interpersonal communication.

Conversely, internal motivation confidence ( $r = -0.031, p > 0.05$ ), external motivation future ( $r = -0.022, p > 0.05$ ), general academic skills ( $r = -0.056, p > 0.05$ ), lack of anxiety ( $r = 0.039, p > 0.05$ ), external motivation current ( $r = -0.131, p > 0.05$ ), and perceived instructor efficacy ( $r = 0.042, p > 0.05$ ) do not show a significant correlation with academic achievement in mathematics. This means that factors such as self-confidence, future aspirations, general academic skills, anxiety levels, current external motivation, and the perceived efficacy of instructors do not appear to be significantly related to performance in mathematics. Thus, these variables did not directly influence mathematics achievement. Still, there was a possibility that they indirectly directly influenced mathematics achievement since most of the dimensions of the academic success inventory were intercorrelated. Further research is needed to understand better the relationship between these factors and mathematics achievement and the potential mechanisms underlying these relationships.

### 3.4. Predictors of Academic Achievement in Mathematics of Freshmen University Students

**Table 4** presents the regression analysis model to identify predictors of academic achievement in mathematics among freshmen university students. The results indicate several variables that significantly predict mathematics achievement. Career Decidedness emerged as a significant positive predictor ( $\beta = 0.173, p' = 0.012$ ), suggesting that students with a clear career direction tend to perform better in mathematics. Similarly, Concertation also showed a significant positive association with mathematics achievement ( $\beta = 0.212, p' = 0.007$ ), implying that students with better concentration skills tend to have higher mathematics scores. Furthermore, Socializing demonstrated a significant positive relationship with mathematics achievement ( $\beta = 0.322, p' < 0.001$ ), indicating that students who engage more in social activities tend to perform better academically in mathematics. The model accounts for 21.6% of the student's mathematics achievement variance.

Career Decidedness, Concertation, and Socializing were identified as significant predictors of mathematics achievement. Students with a clear career direction tended to perform better in mathematics, highlighting the importance of having a sense of purpose and direction in academic pursuits. Strong concentration skills also positively impact mathematical achievement, emphasizing the need for interventions to improve students' focus and attention. Additionally, social engagement emerged as a predictor of mathematics achievement, suggesting that social interactions and support networks can shape students' learning and understanding of mathematics. These findings underscore the importance of considering non-academic factors in promoting students' success in mathematics.

**Table 4.** Predictors of academic achievement in mathematics.

Variables	B	SE	$\beta$	t	P	R <sup>2</sup>	F	p
(Constant)	74.329	3.946		18.837	0.000			
1) Career Decidedness	1.800	0.711	0.173	2.530	0.012*	21.6%		
2) Internal Motivation Confidence	-0.835	0.993	-0.066	-0.841	0.401			
3) External Motivation Future	-0.504	0.814	-0.048	-0.620	0.536			
4) General Academic Skills	-1.654	1.037	-0.134	-1.596	0.112			
5) Lack of Anxiety	-0.911	0.565	-0.116	-1.614	0.108			
6) Concentration	2.060	0.756	0.212	2.724	0.007*		5.522	0.000
7) External Motivation Current	-0.104	0.720	-0.010	-0.144	0.886			
8) Personal Adjustment	0.913	0.565	0.110	1.616	0.108			
9) Perceived Instructor Efficacy	-1.082	0.671	-0.114	-1.614	0.108			
10) Socializing	2.842	0.616	0.322	4.613	0.000*			

Note: \*  $p < 0.05$ .

This finding aligns with previous research emphasizing the role of career decidedness as a mediator of the relationship between interest value and dropout intention [49]. Moreover, enhancing students' belief in their ability to make career decisions influences their contentment with the course major and predicts their self-determined motivation. Enhanced career self-efficacy facilitated students in gaining the confidence needed to navigate their way into the workforce or pursue further education at the graduate level.

Also, Servatyari *et al.* (2018) [50] stated that learning concentration had a significant relationship with student's grade point averages, and the most influential factor in concentration in class was the teacher's ethics and their appropriate behavior toward the student. Furthermore, Erwiza (2019) [51] highlights that their learning environment does not solely determine students' learning achievement but is also influenced by factors such as interest, concentration, and critical thinking. The teachers' endeavors in facilitating learning foster a positive rapport with students, enhancing their engagement in learning and cultivating a focused environment conducive to learning and critical thinking. These factors undeniably influence the academic achievements attained by students.

Apart from this, Ainin *et al.* (2015) [52] found that socialization variables through social acceptance significantly predicted social media usage intensity. It was also found that social media usage intensity significantly predicted academic performance. Similarly, The analysis of Moussa & Ali (2022) [53] indicated that students in higher education exhibit elevated levels of happiness and academic achievement. Furthermore, a significant correlation was observed between the happiness levels of these students and their academic performance.

In this analysis, other variables, such as General Academic Skills, Lack of Anxiety, External Motivation Future, External Motivation Current, Personal Adjustment, and Perceived Instructor Efficacy, did not show significant predictive

power for mathematics achievement.

These findings suggest that career decisiveness, concentration ability, and social engagement are crucial predictors of mathematics achievement among students. However, it is essential to consider the study's limitations, such as its cross-sectional nature and potential unmeasured variables, which may impact the generalizability of the results. Further research is warranted to explore additional factors and their interactions better to understand the predictors of mathematics achievement among students.

#### **4. Conclusions**

Based on the findings of the study, the following conclusions were drawn:

- 1) Students have a moderate perspective on the academic success of learning mathematics. Specifically, students had moderate career decidedness, internal motivation/confidence, general academic skills, concentration, external motivation/current, and socializing. Moreover, they had high external motivation/future and perceived instructor efficacy, while low lack of anxiety and personal adjustments.
- 2) Most of the students performed fairly well in their mathematics subject, which indicates that most students likely demonstrated a moderate understanding of mathematical concepts.
- 3) Students with higher career decidedness, concentration, personal adjustment, and socializing tend to perform better in mathematics.
- 4) The student's academic success in career decidedness, concentration, and socializing were significant positive predictors of mathematics achievement.

#### **5. Recommendations**

In light of the aforementioned conclusions, this study recommends the following:

- 1) Teachers may implement interventions designed for freshmen students to enhance their career decidedness, internal motivation and confidence, general academic skills, concentration, external motivation for current studies, and social engagement.
- 2) Teachers are encouraged to implement innovative teaching strategies that integrate academic success inventory concepts in improving their academic performance in Mathematics.
- 3) Guidance counselors may develop programs focusing on the factors that affect the student's academic success to increase motivation further and drive towards a positive outlook on learning Mathematics.
- 4) School leaders may also develop action plans based on the identified predictors of academic success and performance of the students to support their studies and future careers.
- 5) Further research might be conducted concerning the factors of the learners' academic success in a larger locale to validate the results of this study and offer a

wider range of perspectives that could help students attain positive results in learning Mathematics.

### Conflicts of Interest

The authors declare no conflicts of interest.

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