PERCEIVED BARRIERS AND ACADEMIC PERFORMANCE IN PURSUING STEM CAREERS

ELLEN MAE E. NASAYAO
ellenmaenasayao186@gmail.com
Laguna State Polytechnic University, Philippines

ABSTRACT

STEM careers are expected to grow rapidly during the next decade. Due to course hurdles and challenges, many STEM applicants switch to non-STEM fields, perform poorly, or drop out of college without a degree.

This study examined STEM career academic performance and perceived barriers using a descriptive quantitative research design. It is exclusively eligible to San Antonio De Padua College 10th graders who will be entering senior high school in 2023. They average 16 years old. This examines students' views on STEM careers' barriers

The respondents in this study were 100 junior high school students at San Antonio de Padua College and they were selected via purposive sampling. The research instrument used in this study is a self-made, expert-validated survey questionnaire. Each indicator has five remarks about perceived barriers. The data was computed and analyzed using percentage, mean, standard deviation, and Pearson r correlation.

The study revealed that students were greatly influenced by the barriers and struggled to decide whether to pursue STEM careers. It was also shown that the gender of the respondents had a strong association with the student's academic performance. However, respondents' age and family income were shown to have no significant relationship with students' academic performance. Furthermore, the study discovered that students' interest, self-motivation, and self-efficacy have a substantial association with their academic performance. It follows that the three variables indicated are inversely proportional to students' academic performance. Peer Influence, on the other hand, was found to have no significant relationship with students' academic performance.

The study suggests and recommends that students considering a career in one of the STEM fields become acquainted with the field by reading relevant articles and watching relevant video tutorials. Furthermore, students should gain self-confidence and a profound appreciation for the STEM concepts offered. It also suggests that teachers and administrators should use a wide range of strategies and activities to help students understand scientific and mathematical concepts. Future researchers may include additional perceived barriers not mentioned in the current study.

Keywords:
Academic, Performance, STEM Careers

INTRODUCTION

Disciplines that make life interesting, convenient, and "cool" are the least attractive to students in this age of scientific growth, despite the fact that even five-year-olds use video games, mobile phones, and other types of technology. In this age of scientific growth, students are less interested in the disciplines that make life exciting, convenient, and "cool" (Atske, 2019). According to Chen and Soldner

(2013), despite the fact that the majority of industrialized economies have discovered that employment in STEM disciplines has enhanced innovation and production, there is still a lack of interest in STEM fields among students. This begs the question, considering that the primary factor that influences a student's choice of major is the likelihood that they will be able to secure gainful employment after completing their education.

Despite the enormous benefits that STEM graduates experience in the labor market (Arcidiacono et al., 2016), there is a widespread misunderstanding that qualified STEM workers are hard to come by. Because there is such a great demand for qualified professionals in the STEM professions, the students who are enrolled in this class should give serious thought to the question of whether or not they want to pursue a career in one of those fields.

Taking all of the information presented above into consideration, the goal of this study is to discover whether or not there is a connection between students' academic performance and the perceived barriers to pursue a career in one of the STEM fields. Because the research challenges associated with this subject have not been thoroughly addressed in context prior to this study, it is crucial that this study be conducted for the education systems on both the national and international levels.

The purpose of the study is to determine the relationship of the perceived barriers and the academic performance in pursuing STEM careers.

Specifically sought to answer the following questions.

1. What is the profile of the respondents with regards to;
   1.1 Age;
   1.2 Sex;
   1.3 Monthly Family Income?

2. What is the level of the perceived barriers of the students in terms of;
   2.1 Interest;
   2.2 Peer Influence;
   2.3 Self-Efficacy;
   2.4 Self-Motivation?

3. What is the level of the academic performance of students in terms of Second Quarter Average Grades?

4. Is there a significant relationship between the profile and academic performance of the students?

5. Is there a significant relationship between the perceived barriers and the academic performance of the students?

REVIEW OF RELATED LITERATURE

The students' level of academic performance is considered to be a noteworthy accomplishment at various points over the course of their education, and it is used as the dependent variable in this research.

Everaert et al. (2017) claimed that there are a number of variables that are related to students' academic performance, including locus of control, learning method, learning resources, expectation, volition, academic interest, learning attitude, and learning approach, as well as gender, interest, working status, parents' style, grade, and personality.

Demographic characteristics refer to attributes that describe the status of people or a person such as age, gender, or income. This study used age, gender, and family’s monthly income as STEM student’s demographic characteristics.

As cited by Cervera et al. (2013), based on date of birth, the school's organizational policy groups students in the same academic year. Students who were born in the same year are typically enrolled in the same course. The goal of this measure is to ensure that student differences are as small as possible.

The students' levels of interest in each lesson are directly tied to the learning goals that they have set for themselves as a group. According to the research of Ahinful et al. (2019), there is a correlation between academic achievement and academic interest. Consequently, students with a higher level of academic interest tend to possess higher academic performance. These earlier researches established an association between intrinsic interest and students' academic performance in different academic environments. In this sense, interest was the factor influencing the pupils' academic performance (Blankenburg et al., 2016).

The student peer group at school acts as an in-socializing adolescent with the peers to socialize with one other and support the young people should they be (Uzezi & Deya, 2017). Student interactions with peers are likely to have an impact on them, can be very important in helping them make decisions and may have an impact on their performance.

Corresponding to the assessment of the literature, there are enough research that have investigated the correlations between students' academic performance and their individual demographic profiles as well as the perceived hurdles that are indicators of academic achievement. This was proved in the piece of work of Hoe et. al (2013) entitled "Analyzing Student Records to Identify Patterns of Students' Performance," stating that there is a significant relationship between how students' background or history contributes to their performance at school.

The most significant predictor of academic performance is academic self-efficacy (Wernersbach et al., 2014). It is described as "personal assessments of one's capacities to plan and carry out actions to achieve specified categories of educational success". While people are under pressure, academic self-efficacy will still function. Low academic self-efficacy makes people more likely to experience feelings of anxiety, depression, tension, and inadequacy when faced with academic obligations. On the other hand, those with high levels of academic self-efficacy will be more assured in their capacity to complete academic assignments, both in terms of task preparation and task performance (Gafoor & Ashraf, 2012).

Wigfield et al. (2016) cited that goals, task values, motivational beliefs, and achievement motives are only a few of the many diverse structures that make up achievement motivation, which is not a single construct in and of itself.

METHODOLOGY

The research design used in this study was quantitative/descriptive survey method of research to determine the relationship between the perceived barriers and academic performance of the students. The respondents of the study involved one hundred (100) students enrolled in the tenth grade at a private school located in Pila, Laguna. The study will take place throughout the school year 2022-2023.

The respondents were selected via purposive sampling. In order to analyze and interpret the data gathered, frequency, percentage, weighted mean, standard deviation and Pearson r correlation were utilized in this study.

RESULT AND DISCUSSION

Figure 1. Profile of the Respondents with regards to Age

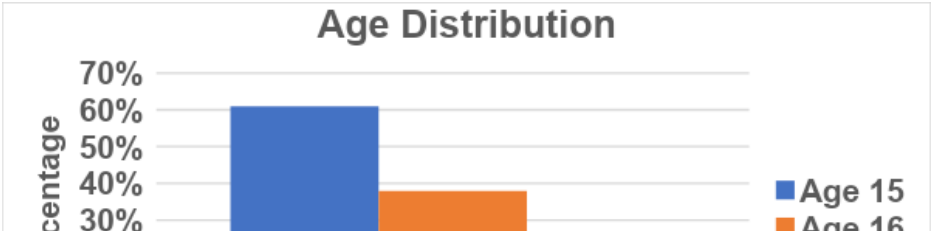

Figure 1 shows the profile of the respondents with regards to age. Out of 100 respondents, the age *"15 years old"* received the highest frequency of sixty-one (61) or 61% of the total sample population. Followed by the age of *"16 years old"* with the frequency of thirty-eight (38) or 38% of the total population. While the respondents of *"17 years old"* received the lowest frequency with two (1) or 1% of the total sample population. Based on the data presented in the preceding figure, this indicates that the profile of the respondents, in terms of age, consisted of a majority of individuals who were 15 years old at the time of the study.

Figure 2. Profile of the Respondents with regards to Monthly Family Income

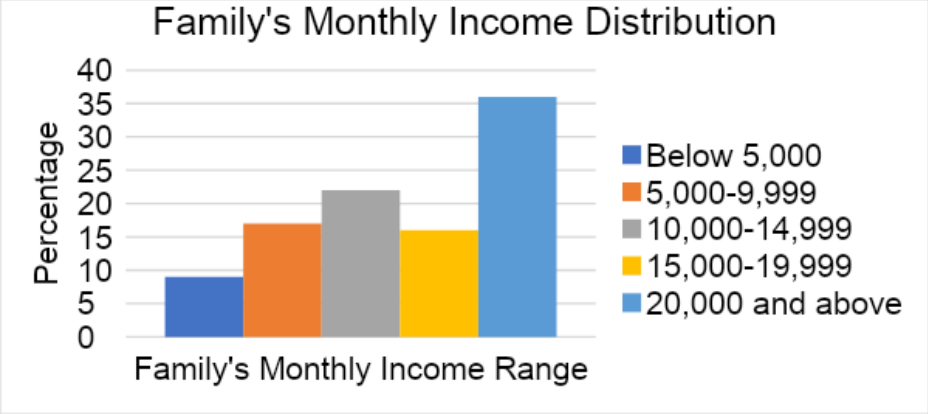

Figure 2 shows the profile of the respondents with regards to Family's Monthly Income. Out of 100 respondents, the monthly income ranges *"20,000 pesos and above"* received the highest frequency of thirty-six (36) or 36% of the total sample population. Followed by the monthly income range of *"10,000 to 14,999 pesos"* with the frequency of twenty-two (22) or 22%, *"5,000 to 9,999 pesos"* having a frequency of seventeen (17) or 17%, *"15,000 to 19,999 pesos"* with a frequency count of sixteen (16) or 16%, respectively, of the total sample. Moreover, the range of *5,000 pesos and below"* received the lowest frequency with nine (9) or 9% of the total sample population. According to the above data, this indicates that the majority of the student's family are able to cover their educational expenses.

Figure **3. Profile of the Respondents with regards to Sex**

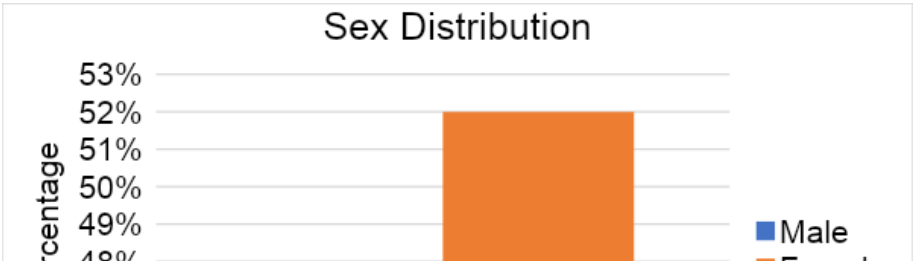

Figure 3 shows the profile of respondents with regards to Sex. Out of 100 respondents, dominantly "*Female"* respondents received the highest frequency of hundred and five (52) or 52% of the total sample population differently to the "*Male"* respondents with the lowest frequency of fifteen (48) or 48%. This illustrates that there is just a marginal difference between the number of responses received from males and females. As a direct outcome of this, the proportion of men and women among the responders is virtually identical.

Table 1. Level of Perceived Barriers of Students in terms of Interest

Statements	**MEAN**	**SD**	**REMARKS**
Creating objects or constructing structures is not something that interests me.	3.14	1.22	Moderately Agree
I perceive STEM to be a difficult subject area, hence I will not take a course in this field.	2.85	1.16	Moderately Agree
I have no personal interest that significantly influence my decision to study STEM.	2.72	1.29	Moderately Agree
I have little to no interest in the evolution of things, in research, or in innovations. This discourages me from entering a STEM field.	2.90	1.20	Moderately Agree
I lack enthusiasm for the disciplines of science and technology.	2.85	1.10	Moderately Agree
Weighted Mean **SD** ***Verbal Interpretation***	2.89 0.91 Moderately High		

Table 1 illustrates the level of perceived barriers of students in terms of interest. From the statement above, *"The student states that Creating objects or constructing structures is not something that interests me,"* yielded the highest mean score *(M=3.14. SD=1.22)*. This is followed by *"The student has little to no interest in the evolution of things, in research, or in innovations. This discourages him from entering a STEM field (M=2.90, SD=1.20)*. Moreover, the statement *"I have no personal interest that significantly influence my decision to study STEM." got the lowest mean score (M=2.72, SD=1.29)*. All statements were remarked as *Moderately Agree*.

The level of perceived barriers of students in terms of Interest attained a weighted mean score of 2.89 and a standard deviation of 0.91 and was Moderately High among the respondents. This implies that interest is a huge factor and a constraint in pursuing STEM careers. It is quite improbable that a person will be successful if they lose their drive and interest in what they are doing.

Table 2. Level of Perceived Barriers of Students in terms of Peer Influence

Statements	**MEAN**	**SD**	**REMARKS**
My family doesn't really affect my decisions that much; they just basically wants me to have a decent career and lifestyle.	4.14	1.04	Agree
As advised by my high school teachers, I will pursue science and math-related careers.	2.90	1.10	Moderately Agree
My family had always told me about the opportunities that sciences provided, the money and also the respect for STEM learners.	3.38	1.18	Moderately Agree
My parents always encouraged me to pursue a career I am passionate about.	4.16	1.06	Agree
My friends have a significant impact on my decision to pursue a career in a STEM, since we often talk the numerous opportunities available in this field.	2.97	1.21	Moderately Agree
Weighted Mean **SD** ***Verbal Interpretation***	3.51 0.71 High		

Table 2 illustrates the level of perceived barriers of students in terms of peer influence. From the statement above, *"My parents always encouraged me to pursue a career I am passionate about,"* yielded the highest mean score *(M=4.16. SD=1.06)*. This is followed by *"My family doesn't really affect my decisions that much; they just basically wants me to have a decent career and lifestyle," (M=4.14, SD=1.04).* These statements were remarked *as Agree.* Furthermore, the statement *"As advised by my high school teachers, I will pursue science and math-related careers" got the lowest mean score (M=2.90, SD=1.10)* and was remarked as *Moderately Agree*.

The level of perceived barriers of students in terms of peer influence attained a weighted mean score of 3.51 and a standard deviation of 0.71 and was High among the respondents.

This shows that the influence of peers is a barrier in the pursuit of careers in STEM fields such as physics, chemistry, and engineering. It is quite obvious that the majority of students in modern times base their career decisions on the choices made by their peers and their parents. In point of fact, Boechnke (2018) discovered that a student's academic success and grade point average in mathematics was closely associated to their ability to be inspired and motivated by their peers.

Table 3. Level of Perceived Barriers of Students in terms of Self-Efficacy

Statements	**MEAN**	**SD**	**REMARKS**
I am the type of student who struggles with science and mathematics.	3.61	1.18	Agree
In a professional setting, I don't see myself having much success (especially one related to STEM).	2.77	1.15	Moderately Agree

I doubt my abilities to solve task-related challenges.	3.00	1.11	Moderately Agree
I'm uncertain about my ability to figure out answers to a problem independently.	3.02	1.16	Moderately Agree
I lack the skills to combine scientific knowledge and mathematical analysis to develop practical innovations.	3.00	1.10	Moderately Agree
Weighted Mean **SD** ***Verbal Interpretation***	3.08 0.89 Moderately High		

Table 3 illustrates the level of perceived barriers of students in terms of self-efficacy. From the statements above, *"I am the type of student who struggles with science and mathematics,"* yielded the highest mean score *(M=3.61. SD=1.18)* and was remarked as Agree and the rest of the statements were marked as *Strongly Agree.* This is followed by *"I'm uncertain about my ability to figure out answers to a problem independently," (M=3.02, SD=1.16).* Furthermore, the statement *"In a professional setting, I don't see myself having much success (especially one related to STEM)" got the lowest mean score (M=2.77, SD=1.15).*

The level of perceived barriers of students in terms of self-efficacy secured a weighted mean score of 3.08 and a standard deviation of 0.89 and was Moderately High among the respondents.

When seen in this light, it is easy to conclude that a lack of self-efficacy is one of the numerous barriers that must be overcome in order to pursue a career in one of the STEM fields. This would signify that a person's ambition in pursuing a career is hampered by a lack of self-esteem on their part.

Table 4. Level of Perceived Barriers of Students in terms of Self-Motivation

Statements	**MEAN**	**SD**	**REMARKS**
I'll be less sure about taking STEM courses since I don't have any female peer mentor in this field.	2.73	1.02	Moderately Agree
Since I don't have a career plan yet, STEM doesn't excite me.	2.86	1.30	Moderately Agree
STEM professions offer no options or career opportunities for me.	2.49	1.24	Disagree
I'm not encouraged to pursue a STEM career since I lack desire within myself.	2.74	1.14	Moderately Agree
STEM is a long and hard road to take, so I'm not eager to go down it.	2.83	1.21	Moderately Agree

Weighted Mean	2.73
SD	0.93
Verbal Interpretation	Moderately High

Table 4 illustrates the level of perceived barriers of students in terms of self-motivation. From the statements above, *"Since I don't have a career plan yet, STEM doesn't excite me,"* yielded the highest mean score *(M=2.86. SD=1.30)* and was remarked as Moderately Agree. This is followed by *"STEM is a long and hard road to take, so I'm not eager to go down it," (M=2.83, SD=1.21)* which is also remarked as *Moderately Agree.* Furthermore, the statement *"STEM professions offer no options or career opportunities for me" garnered the lowest mean score (M=2.49, SD=1.24)* and was remarked as *Disagree.*

The level of perceived barriers of students in terms of self-motivation obtained a weighted mean score of 2.73 and a standard deviation of 0.93 and was Moderately High among the respondents. This implies that self-motivation is a factor in choosing STEM careers.

Table 5. Level of Academic Performance of Students in terms of Second Quarter Average Grade

Grading Scale	**FREQUENCY**	**RELATIVE FREQUENCY (IN %)**	**REMARKS**
90-100	39	39%	Outstanding
85-89	33	33%	Very Satisfactory
80-84	23	23%	Satisfactory
75-79	5	5%	Fairly Satisfactory
Below 75	0	0%	Did Not Meet Expectation
Weighted Mean		87.01	
SD		4.62	
Verbal Interpretation		Very Satisfactory	

Table 5 displays the academic performance of grade 10 pupils based on their Second Quarter average grade. The grading scale of *"90-100"* earned the greatest frequency of thirty-nine (39) or 39% of the entire sample population, which was designated as *Outstanding* out of 100 respondents. Then came *"85-89"* with a frequency of thirty-three (33) or 33% of the total population, and it was rated as *Very Satisfactory*. Respondents with grades ranging from *"80-84"* had a frequency of twenty-three (23) or 23% recognized as *Satisfactory*. Five (5) people, or 5% of the total population, had grades ranging from *"75-79"* which was considered *Fairly Satisfactory*. Based on the data presented in the preceding table, there is a computed weighted mean of *87.01* and a standard deviation of *4.62* which entails a *"Very Satisfactory"* level. This implies that the respondents generally perform better academically. Because of this, students have an excellent shot at getting into a top-tier STEM college or university after graduating from high school. They did, however, evaluate several considerations.

Table 6. Relationship between Demographic Profile and Academic Performance

Academic Performance	**Profile**	**r value**	**Degree of Correlation**	**p-value**	**Analysis**

Second Quarter Average Grade	*Age*	0.024	Very Weak relationship	0.813	*Not Significant*
	Family Income	0.150	Very Weak relationship	0.136	*Not Significant*
	Sex	0.242	Weak relationship	0.015	*Significant*

Scale	Strength
±0.80 – ±1.00	Very Strong
±0.60 – ±0.79	Strong
±0.40 – ±0.59	Moderate
±0.20 – ±0.39	Weak
±0.00 – ±0.19	Very Weak

**significant at .05 level of significance*

Table 6 presents the correlation results between the profile variables and academic performance of students. The *Sex* of the respondents was observed to have a significant relationship with the academic performance of students. This is based on the computed p value of 0.015, which is smaller than the alpha of 0.05, indicating that there is significance. However, the *Age (r=0.024)* and *Family Income (r=0.136)* of the respondents were shown to have no significant link with students' academic achievement because their p values were greater than the alpha 0.05.

According to the statistics above, it implies that gender is a significant predictor of academic success in school. Boys and girls can both thrive academically, regardless of gender. Age and family income, on the other hand, were shown to be insignificant. This indicates that students' ages and the financial situation of their families have no impact on their academic performance. Students, regardless of age or financial means, have the ability to attain academic achievement.

Table 7. Relationship between Perceived Barriers and Academic Performance

Academic Performance	Perceived Barriers	r value	Degree of Correlation	P-value	Analysis
Second Quarter Average Grade	*Interest*	-.304	Very Weak relationship	0.002	*Significant*
	Peer Influence	.145	Very Weak relationship	0.150	*Not Significant*
	Self-Motivation	-.336	Very Weak relationship	0.001	*Significant*
	Self-Efficacy	-.286	Very Weak relationship	0.004	*Significant*

Scale	Strength
±0.80 – ±1.00	Very Strong
±0.60 – ±0.79	Strong

±0.40 – ±0.59	Moderate
±0.20 – ±0.39	Weak
±0.00 – ±0.19	Very Weak

**significant at .05 level of significance*

Table 7 presents the correlation results between the perceived barriers and academic performance of students. *Interest (r = -.304), Self-Motivation (r = -0.336), and Self-Efficacy (r = -0.286)* were observed to have a significant relationship with the academic performance of students. This is based on their computed p values obtained which were lesser than the alpha 0.05, hence there is a significance. Additionally, it can be noticed that the r-values of *Interest, Self-Motivation, and Self-Efficacy* are negative. It entails that the three mentioned variables are inversely proportional with the academic performance of the students.

This implies that the students' academic achievement is negatively correlated with their interest, self-motivation, and self-efficacy, and vice versa. Peer Influence, on the other hand, was found to have no significant correlation with academic achievement. This suggests that peer influence has no effect on the academic performance of students. They can perform well or poorly regardless of whether they are encircled by peers.

CONCLUSION

The study revealed a significant relationship between student profile and academic performance. As a result, the researcher concludes that the null hypothesis 1 stating that there is no significant relationship between student's demographic profile and academic performance is partially rejected. It means that there is a sufficient evidence to conclude that there is a significant relationship between the profile and academic performance because the correlation coefficient is significantly different from zero. As a consequence of this, it asserts that factors such as age, gender, and family income all have an influence on the academic performance of students.

Furthermore, the study demonstrates a significant relationship between perceived barriers and student's academic performance. As a result, the researcher concludes that null hypothesis 2 is partially rejected, claiming that there is no significant relationship between perceived barriers and student's academic performance. The correlation coefficient is substantially different from zero, which indicates that there is sufficient evidence to conclude that there is a significant relationship between the variables. This indicates that variables such as a student's level of interest, self-efficacy, peer influence, and self-motivation all have a role in the academic achievement of the student. The academic performance of a student may be significantly hindered by one or more of the factors included in this study.

RECOMMENDATIONS

1. It is suggested that school administrators may design programs that would assist students in improving their abilities in science and mathematics. They should also Identify various activities that the student can participate in that will help them better understand scientific and mathematical concepts.

2. Teachers must ensure that the students have access to worksheets and activities that will assist them in developing abilities connected to STEM. As well as to employ a variety of teaching strategies and seek to build constructive partnerships with the parents of their students.

3. For the students who are considering a profession in one of the STEM fields would do well to familiarize themselves with the field by reading appropriate materials and watching relevant video tutorials. They can also make more progress along the STEM path if they develop confidence in themselves and a deep appreciation for the topics covered in those professions.

4. Finally, for future researchers who are interested in doing the same study may incorporate additional perceived barriers that were not included from the present research.

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