INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY: APPLIED BUSINESS AND EDUCATION RESEARCH
2025, Vol. 6, No. 11, 5517 – 5527
http://dx.doi.org/10.11594/ijmaber.06.11.13

Research Article

Students' Attitude Toward Science and Interest in STEM Careers

Ronald Camongol Dumapias*

Institute of Graduate Studies and Transnational Education, Far Eastern University Manila, City of Manila, 1015, Philippines

Article history:
Submission 25 August 2025
Revised 30 October 2025
Accepted 23 November 2025

**Corresponding author:*
E-mail:
ronald.dumapias@deped.gov.ph

ABSTRACT

Science, technology, engineering, and mathematics (STEM) are considered important areas in today's society. However, it can be observed that fewer STEM graduates enter the workforce and contribute to the nation's progress. This can be attributed to students' lack of interest in pursuing STEM careers. One factor influencing the interest in STEM is the students' attitude toward their science subjects. The main purpose of this study is to examine the relationship between attitudes toward science and students' interest in careers related to STEM. Further, this research investigated which aspect of attitudes toward science can significantly predict the level of interest in pursuing STEM. An online survey was conducted on 243 grade 9 students of Pasig City Science High School to gather data regarding their attitudes toward science and their interest in STEM careers. The survey results were analyzed using the Pearson correlation coefficient and multiple regression analysis. Results revealed a moderate positive relationship between the students' attitude toward science and their interest in STEM careers ($r = .54$, $p < .001$). Meanwhile, multiple regression analysis disclosed that the aspects of attitudes toward science, namely the students' interest in science, their value for science, and their confidence in science, can predict their interest in STEM ($F(3,239)=85.43$, $p < .001$, $R^2 = .52$), explaining 52% of the variance. However, among these aspects, the students' value for science is the most predictive and was the only significant predictor ($\beta = .65$, $p < .001$). Hence, it is essential to foster interest and a positive attitude towards science among junior high school students, enabling them to develop a passion for pursuing a STEM career.

Keywords: *Attitude toward science, Interest in STEM, Career interest, Career choice, Value for science*

How to cite:
Dumapias, R. C. (2025). Students' Attitude Toward Science and Interest in STEM Careers. *International Journal of Multidisciplinary: Applied Business and Education Research*. *6*(11), 5517 – 5527. doi: 10.11594/ijmaber.06.11.13

Background

Science, Technology, Engineering, and Mathematics (STEM) education has been regarded as an important aspect of today's world. This approach to teaching develops 21st-century skills that future professionals need to help in nation-building and improve the way of living of their people (Ramanathan & Tulivuori, 2022). Different regions worldwide have identified STEM education's role in producing globally competitive graduates ready to face the ever-changing landscape of future work areas (Chen et al., 2024). STEM drives social and economic advancements (*Gokongwei Brothers Foundation*, n.d.). The World Economic Forum has highlighted the need for skills that are heavily rooted in STEM fields (The Future of Jobs Report 2020). However, there remains a persistent problem of low enrolment rates in STEM courses arising from a lack of interest in choosing careers related to STEM (Fadlelmula et al., 2022; Vooren et al., 2022; Sahin et al., 2019).

Recent data reveal a declining number of students pursuing careers in STEM (Chen, 2021). This scenario is evident in the Philippines. In the Commission on Higher Education (CHED) report, the completion rate for STEM programs was only 21% (Rafanan et al., 2020). Anito et al. (2019) argued that this would lead to a shortage of STEM professionals in this country compared to the recommendation of UNESCO of 380 professionals per million.

Research shows that one factor that influences interest among students in choosing STEM is their attitude toward science (Zhao et al., 2022). Higde and Aktamis (2022) revealed that students' attitude toward science can affect their future career choices. Sellami et al. (2023) posited that the likelihood that students will pursue STEM careers was in line with their interest in mathematics and science subjects. Lastly, Zhang et al. (2022) argued that how students perceive their science subjects could predict their inclination to careers related to science and mathematics.

Meanwhile, TIMSS has been looking at students' attitudes toward science and mathematics in every assessment they have taken (Mullis & Martin, 2017). Here, attitude toward science is measured through three valid scales: students like learning science, students value science, and students are confident in science. All these constructs are integrated multidimensionally (Hwang & Son, 2021). The scale "students like learning science" measured the intrinsic motivation of the learners to study the subject. This means that the learners find science as interesting and enjoyable. On the other hand, the scale "students value science" measures the students' extrinsic motivation as they take science subjects. Lastly, the scale "Students Confident in Science" measures the students' self-concept, specifically in science (Mullis & Martin, 2017).

While rich literature supports the idea that attitude toward science affects students' interest in STEM careers, very few studies have investigated how the aspects of students' attitudes could predict their interest in STEM. This observation has fueled this investigation and focused on the students' attitudes toward science, particularly the three aspects of it, and their interest in choosing STEM. This study was framed by Eccles's (1984) expectancy-value theory (EVT). The EVT proposed that various factors determine students' expectancies and values. These factors may include their personal background characteristics and past learning experiences. Further, the theory posited that students' performance, perseverance, and choice determine how highly they regard an activity and how well they believe they will execute it (Wigfield & Eccles, 2000). EVT becomes a foundational theory because students in this study expect to succeed in a specific activity or decision, such as their career intentions. They will continue to engage in that activity or have that preference if they recognize the significance of such choices. As a result of their favorable attitude toward science, the students will anticipate success in STEM and seek employment in the field.

Grounded on EVT, the primary purpose of this study was to examine the relationship between students' attitudes toward science and their interest in STEM careers. Specifically, it sought to answer the following research questions:

RQ1. Is there a significant relationship between students' attitudes toward science and their interest in STEM careers?

RQ2. How do the aspects of attitude toward science predict the students' interest level in STEM careers?

Methods

Participants

This study involved 9th grade students of Pasig City Science High School (PCSHS), a secondary school in Pasig that offers a STEM strand to senior high school students. The researcher visited each of their classrooms and discussed the purpose of the study prior to the administration of the online survey. They were then given a link to the Microsoft Forms, where their informed consent to participate in the study was the initial question before proceeding with the rest of the form. This grade level was chosen because it is important to determine the interests of the students in STEM fields at this school age (Higde & Aktamis, 2022), and providing them with more science activities may lead to a more positive interest in careers related to STEM (Özülkü & Kloser, 2023). A total of 243 students responded to the online survey, of whom 154 were female and 89 were male. Age ranged from 13 to 16 years old, but most respondents were pooled at 14 (117 students) and 15 (120 students) years.

Instrument

Two research instruments were administered to address the research questions. The first instrument measured the attitude of the learners towards science. This instrument is an adopted portion of the Student Questionnaire used in TIMSS 2019 that measured the same construct. The Student Questionnaire of TIMSS 2019 was developed and tested by the International Association for the Evaluation of Educational Achievement (IEA). A necessary permit was secured from TIMSS & PIRLS International Study Center with permit number IEA-24-020. The attitude towards science measure (ATSM) consists of three subscales that represent three hypothesized constructs, namely: Students' Interest in Learning Science, Students' Confidence in Science, and Students' Perceived Value of Science. Each item on the scale was rated on a four-point Likert-type response format ranging from 1 (disagree a lot) to 5 (agree a lot). The following are examples of items from the ATSM:

For Interest in Learning Science:

- I enjoy learning science.
- I learn many interesting things in science.
- I look forward to learning science in school.

For students' confidence in science:

- I learn quickly in science.
- I am good at working out difficult science problems.
- My teacher tells me I am good at science.

For students' value for science:

- I think learning science will help me in my daily life.
- I need science to learn other school subjects.

Per TIMMS and PIRLS, the reported reliability of scores for each of the three subscales of ATSM was .91, .87, and .92, respectively. In the current study, the calculated reliability of scores for the three subscales of ATSM was .84, .85, and .85, respectively. This implies a highly reliable research instrument.

In interpreting results from the Attitude Toward Science questionnaire, the researcher adopted the scale used in the TIMSS 2019 report. A high level indicates an average score greater than or equal to 3, corresponding to respondents having a more favorable or positive attitude toward science. A medium level indicates an average score of greater than two but less than 3. A low level indicates an average score of less than or equal to 2, corresponding to the students indicating a less favorable or negative attitude toward science. In summary, this is how the descriptive results were interpreted:

Score	Verbal Interpretation
≥ 3	High
$2 < AVE < 3$	Medium
≤ 2	Low

To measure the respondents' interest in STEM careers, the researcher utilized the Career Interest Questionnaire (CIQ) developed by

Tyler-Wood et al. (2010). The CIQ is a 13-item scale consisting of a five-point Likert-type response format ranging from 1 (strongly disagree) to 5 (strongly agree). The CIQ contains three subscales that represent three constructs, namely: 1) interest in pursuing science-related courses, 2) perception of a supportive environment for pursuing a career in science, and 3) perceived significance of a profession in science. Tyler-Wood et al. (2010) observed that Cronbach's Alpha was .94, indicating high reliability for this instrument. For this study, Cronbach's alpha was calculated to be .91, indicating an excellent level of reliability of the scores for the data collected. Prior permission to use this tool was sought from its developers.

To interpret the results of this questionnaire, the following verbal interpretation was applied based on the corresponding ranges:

Weighted Mean Range	*Verbal Interpretation*
4.21-5.00	Strongly Agree
3.41-4.20	Agree
2.61-3.40	Undecided
1.81-2.60	Disagree
1.00-1.80	Strongly Disagree

Data Analysis

The initial data analysis used descriptive statistics, particularly the mean and standard deviation. This was deemed necessary so that the researcher could have a summary of the characteristics of the data set gathered (Hayes, 2024).

A Pearson correlation coefficient was employed to answer the first research question. This technique can describe the strength and direction of a linear relationship between two quantitative variables and tell whether such a relationship is significant (Turney, 2024).

A multiple regression analysis was used to show the relationship between one dependent variable and two or more independent variables and how the independent variables could predict changes in the dependent variable (Bevans, 2023). This answered the second research question and determined the model between the aspects of attitudes toward science, which are the independent variables, and their interest in choosing STEM careers, the dependent variable. Normality assumption was done using a Q-Q plot, while linear relationship and test of homoscedasticity were done using residuals versus predicted plots. The Durbin-Watson value was used to establish the independence of observations, and the tolerance and VIF values were the bases for the multicollinearity of data. Lastly, the Casewise diagnostic, particularly the Cook's distance, was used to check outliers.

All statistical analyses were done using the statistical software JASP version 0.18.3

Results

Attitude Toward Science

The results of descriptive analyses are presented here before the main analyses of the data. All negative statements in the questionnaires were reversely coded. Table 1 below shows the mean score of the students in the part of the questionnaire that determined their interest in science or how well they like learning science.

Table 1. Mean Score of Students' Interest in Learning Science

	n	Mean	Std. Deviation
"I enjoy learning science."	243	3.099	0.654
"I wish I did not have to study science." (Reversed)	243	3.008	0.853
"Science is boring." (Reversed)	243	3.074	0.723
"I learn many interesting things in science."	243	3.584	0.557
"I like science."	243	3.053	0.734
"I look forward to learning science in school."	243	2.979	0.805
"Science teaches me how things in the world work."	243	3.527	0.676
"I like to conduct science experiments."	243	3.333	0.787
"Science is one of my favorite subjects."	243	2.576	0.912
Mean Interest in Science	**243**	**3.137**	**0.501**

The table above shows that the Grade 9 students of PCSHS have a high level of interest in their Science subjects (M = 3.14; SD = 0.50), with the statement "I learn many interesting things in Science." having the highest mean (M = 3.58; SD = 0.56) and the statement "Science is one of my favorite subjects." having the lowest mean (M = 2.58; SD = 0.91).

Another aspect of attitudes toward science is the students' confidence in the subject. This was part of the online survey conducted, the results of which are presented in Table 2 below. It can be clearly seen that the participants had a medium confidence level in this subject (M = 2.40; SD 0.57). The statement "My teacher tells me I am good in Science" got the lowest score of M = 2.05 with SD = 0.78. Meanwhile, the highest confidence level comes from their self-concept that they usually do well in science, with a mean of 2.65 and an SD of 0.74.

Table 2. Mean Score of Students' Confidence in Science

	n	Mean	SD
"I usually do well in science."	243	2.650	0.742
"Science is more difficult for me than for many of my classmates." (Reversed)	243	2.514	0.768
"Science is not one of my strengths." (Reversed)	243	2.239	0.872
"I learn things quickly in science."	243	2.547	0.756
"I am good at working out difficult science problems."	243	2.267	0.765
"My teacher tells me I am good at science."	243	2.049	0.770
"Science is harder for me than any other subject." (Reversed)	243	2.617	0.917
"Science makes me confused." (Reversed)	243	2.300	0.855
Mean confidence in Science	**243**	**2.401**	**0.567**

The last aspect of attitudes toward science was how the students value this subject. Data from the responses can be seen in Table 3 below.

The table clearly shows that the respondents have a very positive view of how they value science. This means they are highly motivated to study science and learn everything they can in this subject. It is important to note that the lowest score was recorded in the statement, "I would like a job that involves using science." (M = 2.68; SD = 0.97).

Table 3. Mean Score of Students' Perceived Value of Science

	n	Mean	SD
"I think learning science will help me in my daily life."	243	3.399	0.745
"I need science to learn other school subjects."	243	2.967	0.760
"I need to do well in science to get into the university of my choice."	243	3.481	0.746
"I need to do well in science to get the job I want."	243	3.074	0.937
"I would like a job that involves using science."	243	2.675	0.973
"It is important to learn about science to get ahead in the world."	243	3.350	0.736
"Learning science will give me more job opportunities when I am an adult."	242	3.227	0.865
"My parents think that it is important that I do well in science."	241	3.228	0.900
"It is important to do well in science."	242	3.517	0.707
Mean Students Value Science	**243**	**3.213**	**0.555**

Meanwhile, the overall attitude of the respondents toward science is shown in Table 4 below. The overall mean (M = 2.953; SD = 0.431) of the attitude of the respondents toward science indicates a medium level. This results from the multidimensional integration of

the three aspects shown above. It can be noted that even though two of the aspects were at a high level, the students' confidence in science influenced the overall attitude and pulled it towards the medium level.

Table 4. Overall Mean of Attitude Toward Science

	n	Mean	SD
Mean Attitude Towards Science	243	2.953	0.431

Interest in STEM Careers

The STEM Career Interest Questionnaire by Tyler-Wood et al. (2010) was administered to determine the respondents' interest level in STEM careers. A summary of the results is shown in Table 5 below. Most of the respondents' answers in the statements had a verbal interpretation of "undecided." The items that registered to be at the "agree" level were items 2 (M=3.53; SD=1.10), 4 (M=3.56; SD=1.13), 10 (M=3.65; SD=1.00), and 13 (M=3.74; SD=0.94) only. Meanwhile, the highest score was with the statement, "Scientists make a meaningful difference in the world," with a verbal interpretation of strongly agree (M=4.58; SD=0.71). This means the respondents strongly agree with the statement, with a very small dispersion from the mean. On the other hand, the statement, "Having a career in science would be challenging," had the lowest mean (M = 1.55; SD = 0.83), after reverse coding. This means the respondents may see STEM-related careers as too difficult or demanding, which could negatively affect their overall interest in tracking the STEM career path. The overall score (M=3.32; SD=0.75) for the STEM career interest was definitely within the "undecided" range. This shows that the grade 9 students of PCSHS have not yet decided whether they will have a STEM career choice.

Table 5. Mean of Students' Career Interest

		n	Mean	SD
1.	"I would like to have a career in science."	243	3.272	1.203
2.	"My family is interested in the science courses I take."	243	3.531	1.103
3.	"I would enjoy a career in science."	241	3.253	1.128
4.	"My family has encouraged me to study science."	243	3.564	1.202
5.	"I will make it into a good college and major in an area needed for a career in science."	243	3.387	1.149
6.	"I will graduate with a college degree and major in an area needed for a career in science."	243	3.210	1.154
7.	"I will have a successful professional career and make substantial scientific contributions."	243	3.025	1.160
8.	"I will get a job in a science-related area."	243	3.169	1.220
9.	"Someday when I tell others about my career, they will respect me for doing scientific work."	243	3.222	1.154
10.	"A career in science would enable me to work with others in a meaningful ways."	242	3.653	1.008
11.	"Scientists make a meaningful difference in the world."	242	4.579	0.709
12.	"Having a career in science could be challenging." (Reversed)	243	1.551	0.833
13.	"I would like to work with people who make discoveries in science."	243	3.737	0.943
Mean Interest in Choosing STEM		**243**	**3.319**	**0.750**

Note: Verbal interpretation as follows: 4.21-5.0 = strongly agree; 3.41-4.20 = agree; 2.61-3.40=undecided; 1.81-2.60=disagree; 1.0-1.80=strongly disagree.

Relationship Between Attitude toward Science and STEM Career Interest

A Pearson correlation coefficient was computed using JASP to determine the relationship between students' attitudes toward science and their interest in careers related to STEM. Prior to this, the assumption of normality was established by a non-significant result of the Shapiro-Wilk test. Further, no significant outliers were observed using a scatter plot. The result of the correlation is shown in Table 6 below.

The students' attitude toward science and their interest in STEM careers showed a significantly moderate positive relationship, $r(241) = .54$, $p < .001$. This could mean that students with a high attitude toward science can also have a moderately high interest in STEM careers.

Table 6. Pearson's Correlations

			n	Pearson's r	p
Mean Attitude Towards Science	-	Mean Interest in Choosing STEM	243	0.543	< .001

Predictive Ability of the Aspects of Attitude toward Science

A multiple linear regression was done to determine the predictive ability of the aspects of students' attitudes toward science on their interest in STEM careers. A residual vs. predicted plot was used to test the linear relationship and homoscedasticity of the residuals. Figure 1 shows that there was no violation of these two assumptions.

Figure 1

Residual vs Predicted Plot

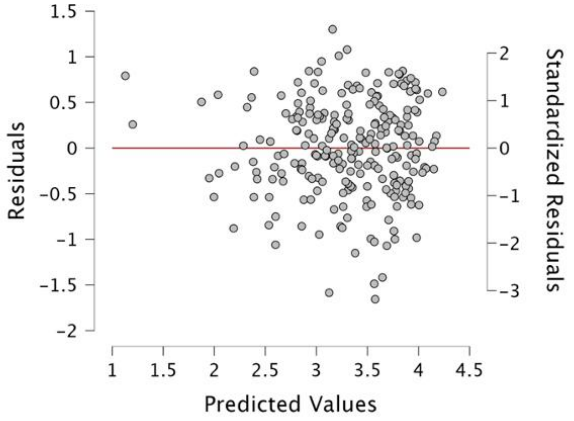
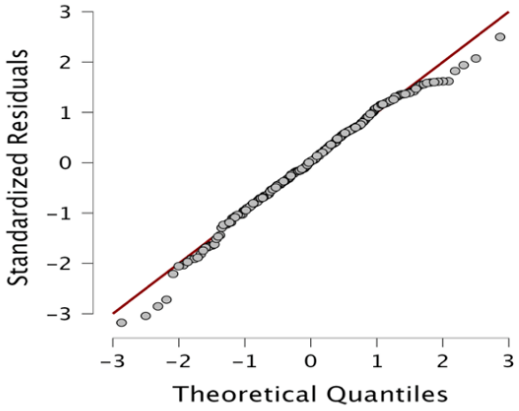


Figure 2

Q-Q Plot for Residuals and Predicted Values



The assumption of normality of the residuals was also tested, and based on the Q-Q plot presented in Figure 2, there was no violation of this assumption.

Based on the Casewise diagnostics, two cases were identified as outliers. However, with very small Cook's distance values of 0.04 and 0.06, these were considered insignificant and did not influence the regression line. Meanwhile, the assumption of independence of observation was not violated based on the Durbin-Watson values, which were approximately 2, and with p-values, which were all greater than 0.05. This can be viewed in Table 7, while the multicollinearity assumption was also not violated based on the tolerance and VIF values shown in Table 8.

Table 7. Model Summary - Mean Interest in Choosing STEM

					Durbin-Watson		
Model	**R**	**R^2**	**Adjusted R^2**	**RMSE**	**Autocorrelation**	**Statistic**	**p**
H_0	0.000	0.000	0.000	0.750	0.035	1.917	0.516
H_1	0.719	0.517	0.511	0.524	0.081	1.831	0.185

Table 8. Linear Regression Model Coefficients

						Collinearity Statistics	
Model		**Unstandardized**	**Standard Error**	**Standardized**	**p**	**Tolerance**	**VIF**
H_1	(Intercept)	-0.130	0.240		0.589		
	Interest in Science	0.165	0.093	0.110	0.077	0.523	1.912
	Students Value Science	0.872	0.069	0.646	< .001	0.782	1.278
	Students confidence in Science	0.054	0.076	0.041	0.472	0.618	1.619

In summary, a multiple regression was run to predict the students' interest in STEM careers based on their interest in science, value for science, and confidence in science. The data was screened for assumptions and outliers, and no significant outliers were found. All assumptions of linearity, normality, homoscedasticity, and multicollinearity were met. The multiple regression model statistically significantly predicted the students' interest in STEM, $F(3,239)=85.43$, $p < .001$, $R^2 = .52$. However, among the variables used, only the students' value for science was found to add statistical significance to the prediction. Regression coefficients and standard errors can be found in Table 8 above. Looking at the standardized coefficient, the value of students for science is the best and the only significant predictor for STEM career interest as it can increase it by a factor of 0.646 for every unit increase in value for science.

Discussion

This study has contributed to the present understanding of students' interest in choosing the STEM field. By examining their attitude toward science, this research has determined a moderate relationship between the attitude and their STEM career interest. While correlation does not show causality, the results of the Pearson correlation indicate that a high level of attitude toward science would also suggest a high level of interest in pursuing STEM in the future. Consequently, a low attitude toward science can result in low interest in careers related to STEM. This is in line with the research of Zhao et al. (2022), which highlighted that attitude toward science is a major factor influencing young learners' STEM career intentions. Another study supports this finding and says that the future career choices of learners are affected by how much they show appreciation and motivation in science (Higde & Aktamis, 2022).

Further investigation was conducted on which aspect of attitude toward science most influences their career aspirations. For this purpose, multiple regression was employed, and a statistically significant model was produced. The three aspects of attitude toward learning science can positively predict interest in pursuing STEM. However, the only significant factor is the value of the students for science. This value for science comes from the extrinsic motivation of the students to learn science (Mullis & Martin, 2017). An explanation for this finding can be found in the study of Özülkü and Kloser (2023). Their research emphasized that the extrinsic motivational disposition related to science plays a big role in developing interest among students in pursuing careers related to STEM. In the study of Kibirige and Modjadji (2022), it was highlighted that the way students perceived the value of science contributed significantly to the reasons for choosing STEM.

Meanwhile, while interest in science and confidence in science contributed to the model's predictive ability, their coefficients were very small and were found not significant. This finding does not agree with numerous research works that established the relationship between interest and confidence in career choice. One of these studies is the one conducted by Sellami et al. (2023), which proved that the students' inclination toward STEM careers is influenced by their interest in related subjects. As for confidence in science, which others view as self-efficacy, the findings of this study do not align with the investigation of Han et al. (2021), where they determined that self-efficacy significantly influenced the STEM aspirations of the students directly or indirectly. This may be attributed to the context of Pasig City Science High School, where students are expected to possess high levels of interest and confidence in science. This could limit the variability in the responses gathered for this study. Another possible explanation for this could be attributed to the manner of science and mathematics instruction in the school where this study was conducted. Though not covered by this investigation, it is interesting to look at for future studies because, according to Özülkü and Kloser (2023), tailoring the science instruction to reflect the importance of this discipline better may potentially develop a stronger and deeper passion for STEM careers among the students. Lastly, in the Filipino context of career decisions, students are often guided by extrinsic values such as job stability, expectations of their parents, and the possible perception of their society of their chosen career (Nazareno et al., 2021). These factors are more closely aligned with the construct value for science rather than their interest or confidence in this subject.

The findings of this study align with the expectancy-value theory (Eccles, 1984), which posits that students' choice or expectancy is determined by factors that could include their past learning experiences. This means that how they develop their attitude toward science from their past learning episodes could influence their career choices as they anticipate success in such choices.

Conclusion

From the discussion above, it can be concluded that students' interest in pursuing STEM careers can be developed by providing them with experiences in Science that could develop a positive attitude toward this subject matter. Moreover, quantitative analyses confirmed that students' value for science significantly predicts their interest in STEM careers ($\beta = .65$, $p < .001$), accounting for more than half of the explained variance ($R^2 = .52$). This emphasizes that valuing science is the strongest factor that can influence the likelihood of students pursuing STEM careers. This further means that how a student perceives and values their Science subject can be indicative of their future inclination towards careers related to science, technology, engineering, and mathematics. The more they are exposed to activities that foster their value for the subject, the more they are willing to explore STEM careers and see themselves as future engineers, scientists, or persons in the medical field. Therefore, it can be recommended for teachers to explore such activities that will make their science classes as engaging and interesting that it could be. Moreover, such activities must be highly relevant for the students, so that they can relate to them and find value in what they are doing in their science class.

Acknowledgement

The researcher greatly appreciates the help and assistance of the Institute of Graduate Studies of Far Eastern University-Manila, particularly Dr. Rommel Bunuan, for his feedback and comments on this research undertaking. Equal gratitude goes to Pasig City Science High School, especially the Grade 9 students of school year 2023-2024, for participating in this study. Lastly, to the researcher's wife for all the support and encouragement towards the completion of this work.

References

Anito, J.C., Jr., Morales, M.P.E., & Palisoc, C.P. (2019). The pedagogical model for Philippine STEAM education. Paper presented during the National Forum for STEAM in Higher Education, Manila, Philippines.

Bevans, R. (2023, June 22). *Multiple Linear Regression | A Quick Guide (Examples)*. Scribbr. https://www.scribbr.com/statistics/multiple-linear-regression/

Chen, X. (2021). Who participates in the skilled technical workforce after college and what are their educational pathways? *Journal of Research in Technical Careers*, *5*(1), 23. https://doi.org/10.9741/2578-2118.1092

Chen, Y., So, W. M. W., Zhu, J., & Chiu, S. W. K. (2024). STEM learning opportunities and career aspirations: the interactive effect of students' self-concept and perceptions of STEM professionals. *International Journal of STEM Education*, *11*(1). https://doi.org/10.1186/s40594-024-00466-7

Eccles, J. S. (1984). Sex differences in achievement patterns. *PubMed*, *32*, 97–132. https://pubmed.ncbi.nlm.nih.gov/6398860

Fadlelmula, F. K., Sellami, A., Abdelkader, N., & Umer, S. (2022). A systematic review of STEM education research in the GCC countries: trends, gaps and barriers. *International Journal of STEM Education*, *9*(1). https://doi.org/10.1186/s40594-021-00319-7

Gokongwei Brothers Foundation. (n.d.). https://www.gokongweibrothersfoundation.org/stories/teach-stem-now-and-help-build-the-future

Han, J. H., Kelley, T. R., & Knowles, J. G. (2021). Factors influencing student STEM learning: Self-Efficacy and outcome expectancy, 21st century skills, and career awareness. *Journal for STEM Education Research*, *4*(2), 117–137. https://doi.org/10.1007/s41979-021-00053-3

Hayes, A. (2024, March 13). *Descriptive statistics: Definition, overview, types, example*. Investopedia. https://www.investopedia.com/terms/d/descriptive_statistics.asp

Hiğde, E., & Aktamış, H. (2022). The effects of STEM activities on students' STEM career interests, motivation, science process skills, science achievement and views. *Thinking Skills and Creativity*, *43*, 101000. https://doi.org/10.1016/j.tsc.2022.101000

Hwang, S., & Son, T. (2021). Students' Attitude toward Mathematics and its Relationship with Mathematics Achievement. *Journal of Education and E-learning Research*, *8*(3), 272–280. https://doi.org/10.20448/journal.509.2021.83.272.280

Kibirige, I., & Modjadji, S. E. L. (2022). Grade 10 girls' experiences in choosing STEM subjects in Rakwadu Circuit, South Africa. In *IntechOpen eBooks*. https://doi.org/10.5772/intechopen.102518

Mullis, I. V. S., & Martin, M. O. (Eds.). (2017). *TIMSS 2019 Assessment Frameworks*. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2019/frameworks/

Nazareno, A., Lopez-Relente, M. J., Gestiada, G., Martinez, M., De Lara, M. L., & Roxas-Villanueva, R. M. (2021). Factors Associated with Career Track Choice of Senior High School Students. *The Philippine Journal of Science, 150(5)*. https://doi.org/10.56899/150.05.15

Özülkü, E., & Kloser, M. (2023). Middle school students' motivational dispositions and interest in STEM careers. *International Journal of Science Education*, 1–21. https://doi.org/10.1080/09500693.2023.2234778

Rafanan, R. J. L., De Guzman, C. Y., & Rogayan, D. V. (2020). Pursuing STEM Careers: Perspectives of Senior High School Students. *Participatory Educational Research, 7*(3), 38–58. https://doi.org/10.17275/per.20.34.7.3

Ramanathan, S., & Tulivuori, J. (2022, February 24). STEM education is vital to national development. Here's how we can support it. *Asian Development Blog*. Retrieved March 25, 2024, from https://blogs.adb.org/blog/stem-education-vital-national-development-here-s-how-we-can-support-it#:~:text=STEM%20%E2%80%93%20a

n%20integrated%20approach%20to,need%20to%20improve%20people's%20lives.

Şahin, A., Waxman, H. C., Demirci, E., & Rangel, V. S. (2019). An investigation of harmony public school students' college enrollment and STEM major selection rates and perceptions of factors in STEM major selection. *International Journal of Science and Mathematics Education*, *18*(7), 1249–1269. https://doi.org/10.1007/s10763-019-10017-0

Sellami, A., Santhosh, M., Bhadra, J., & Ahmad, Z. (2023). High school students' STEM interests and career aspirations in Qatar: An exploratory study. *Heliyon*, *9*(3), e13898. https://doi.org/10.1016/j.heliyon.2023.e13898

The Future of Jobs Report 2020. (2020). World Economic Forum. Retrieved March 25, 2024, from https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

Turney, S. (2024, February 10). *Pearson Correlation Coefficient (r) | Guide & Examples*. Scribbr. https://www.scribbr.com/statistics/pearson-correlation-coefficient/

Tyler-Wood, T., Knezek, G., & Christensen, R. (2010). Instruments for assessing interest in STEM content and careers. *The Journal of Technology and Teacher Education*, *18*(2), 345–368. http://stelar.edc.org/sites/stelar.edc.org/files/STEMInstruments.pdf

Vooren, M., Haelermans, C., Groot, W., & Van Den Brink, H. M. (2022). Comparing success of female students to their male counterparts in the STEM fields: an empirical analysis from enrollment until graduation using longitudinal register data. *International Journal of STEM Education*, *9*(1). https://doi.org/10.1186/s40594-021-00318-8

Wigfield, A., & Eccles, J. S. (2000). Expectancy–Value Theory of achievement motivation. *Contemporary Educational Psychology*, *25*(1), 68–81. https://doi.org/10.1006/ceps.1999.1015

Zhang, Q., Chia, H. M., & Chen, K. (2022). Examining Students' Perceptions of STEM Subjects and Career Interests: An Exploratory Study among Secondary Students in Hong Kong. *Journal of Technology Education*, *33*(2), 4. https://doi.org/10.21061/jte.v33i2.a.1

Zhao, J., Wijaya, T. T., Mailizar, M., & Habibi, A. (2022). Factors Influencing Student Satisfaction toward STEM Education: Exploratory Study Using Structural Equation Modeling. *Applied Sciences*, *12*(19), 9717. https://doi.org/10.3390/app12199717