



Agreeableness of STEM Students to the Indicators of Academic Performance

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ABSTRACT

The objective of this study is to determine the significant difference between the demographic profile and the indicators of academic performance of the Nueva Vizcaya General Comprehensive Highschool Grade 12 Science, Technology, Engineering, and Mathematics students. The indicators are considered: Test Anxiety, Academic Competence, Test Competence, Time Management and Study Habits. The researcher used descriptive – comparative design for the study. A total of 40 students surveyed using a survey questionnaire. The results were treated using the SPSS program. Weighted means were computed and analyzed, while T – test for Independent Sample, one – way ANOVA, Brown – Forsythe and Tamhane Test were used to determine and interpret the significance of the variables used in the study. Result shows that age and sex have significant difference in academic performance particularly in taking examination where students are experiencing test anxiety. Result shows that male students were less distracted and do not have anxiety when taking exams than the female students and 19 years old students are calmer in taking an exam than 16, 17 and 18 years old. Thus, the researcher recommends the teachers to come up with assessment strategies that will develop students' confidence in taking tests. Guide the students and start communication session regarding on why the students specially the males, feel pressured whenever taking the exams.

Keywords: Academic Performance, Test Anxiety, STEM, Predictor, Student Success

Introduction

As the world conquers the modern and digital era, the needs in science technology engineering and mathematics workforce are continuously increasing. According to the United States of America Department of Labour, the number of STEM jobs will increase 8% higher than those jobs that are not in line with STEM between the years 2017 and 2029. STEM education is an approach that supports student participation using engineering and technology that improves students' learning in science and mathematics (William, 2011). This is why the department of education around the world is setting upfront the development and improvement of the K-12 program particularly in Senior High School STEM majors. There is a high demand of STEM graduates globally. Hill, Corbett & St. Rose (2010) mentioned that many countries in the world continue to execute tasks in recruiting people into STEM industries.

Thus, it is very important to take in consideration and focus into the academic performance of STEM students to produce graduates that will be future workforce of science, technology, engineering, and mathematics in our country that paves a way in improving the economy and building the nation's productivity. Here in the Philippines, the graduates of STEM are insufficient and according to Anito, Morales & Palisoc (2019) the country does not have sufficient scientist. Based on the 5-year data until the school year 2016-2017 there is only 21.10% of completion rate in STEM areas (Commission on Higher Education report). There is a scenario that was further validated by EduTECH (2016) that supports the claim that the Philippines is experiencing shortages in the workforce in the field of STEM the lack of completion rate in STEM. The area in science has completion rate of 25.52%, mathematics has 21.20%, information and technology have 19.56%, and an 18.97% completion rate in engineering and technology.

Completion rate of STEM students is highly influence by the academic performance of the students. The student's academic performance is important in producing graduates and increasing completion rates of STEM students that will be the future manpower of the country. Through the years of studies about the academic performance of students, there were numerous indicators that was determine that hinders the students to perform well and some of it is test anxiety, academic competence, test competence, study habits and time management. These indicators are stressors of the students resulting to poor academic performance. This is why the researcher would like to conduct the study. The researcher aims to determine the level of agreeableness of the Grade 12 STEM Senior High School Students in the Nueva Vizcaya General Comprehensive High School towards test anxiety, academic competence, test competence, study habits and time management as a basis of making a STEM student handbook in improving their academic performance that will paves the way in further increasing graduation rates of STEM the will lead to the increase of manpower workforce of the country in the science, technology, engineering and mathematics industry to develop the economy of the country in the future. Specifically, this study aimed to

1. Determine the level of agreeableness of the respondents to the following indicators of academic performance, (1) Test Anxiety, (2) Academic Competence, (3) Test Competence, (4) Time Management, and (5) Study Habits.

2. Determine if there is a significant difference between the level of agreeableness of the respondents to the indicators of academic performance when grouped according to, (1) Age, (2) Sex, (3) Parents Monthly Income, and (4) Ethnicity.

Methodology

The method that will be used in this study is a quantitative approach and descriptive-comparative design to determine if there is a significant difference to the demographic profile and the following indicator of academic performance, test anxiety, academic competence, test competence, time management, and study habits.

The study employed a purposive sampling method to identify the research respondents, hence all the respondents are from the Grade 12 STEM strand in Nueva Vizcaya General Comprehensive High School. There are a total of 40 STEM students that were purposely chosen, the researcher only chose 40 students from one section.

Responses to the questionnaire by the senior high school grade 12 STEM students were statistically analyzed with the data requirements of the study. Descriptive statistics as frequency count, mean and percent distribution were considered. SPSS was used to analyze the study data. Weighted means are computed. T-test for Independent Sample, One Way ANOVA, Brown – Forsythe and Tamhane Test were used to determine the significance difference among the study variables.

Results

Objective 1

Determine the level of agreeableness of the respondents to the following indicators of academic performance, (1) Test Anxiety, (2) Academic Competence, (3) Test Competence, (4) Time Management, and (5) Study Habits.

Table 1. Level of Agreeableness of the respondents to the indicators of Academic Performance.

Academic Performance	Frequency	Percent
Test Anxiety		
Strongly Agree	3	7.5
Agree	16	40.0
Disagree	21	52.5
Mean: 2.55 (Agree)	Standard deviation: 0.639	
Academic Competence		
Strongly Agree	10	25.0
Agree	30	75.0
Mean: 3.25 (Agree)	Standard deviation: 0.439	
Test Competence		
Strongly Agree	7	17.5
Agree	33	82.5
Mean: 3.18 (Agree)	Standard deviation: 0.385	
Time Management		
Strongly Agree	11	27.5
Agree	28	70.0
Disagree	1	2.5
Mean: 3.25 (Agree)	Standard deviation: 0.494	
Study Habits		
Strongly Agree	20	50.0
Agree	17	42.5
Disagree	3	7.5
Mean: 3.43 (Strongly Agree)	Standard deviation: 0.636	

Table 1 shows that the students “Agreed” to the following items of test anxiety with an average weighted mean of 2.55. Majority of the respondents “Disagreed” with 52.5% (21) followed by “Agreed” with 40.0% (16) of the respondents and 7.5% (3) of the respondents “Strongly Agreed”. In general, respondents were less distracted and do not have anxiety when taking exams.

As shown in Table 1, the average weighted mean of the students in terms of academic competence is 3.25 which means that the respondents "Agreed" to the following items of academic competence. Majority of the respondents "Agreed" with 75.0% (30) followed by "Strongly Agreed" with 25.0% (10) of the respondents. This implies that the students are competent, and they can pass the examinations.

The table also shows that the students "Agreed" to the following items of test competence with an average weighted mean of 3.18. Majority of the respondents "Agreed" with 82.5% (33) followed by "Strongly Agreed" with 17.5% (7) of the respondents. This means that the students are competent enough in examinations.

Table 1 also presents that the students "Agreed" to the following items of time management with an average weighted mean of 3.25. Majority of the respondents "Agreed" with 70.0% (28) followed by "Strongly Agreed" with 27.5% (11) of the respondents. Around 2.5% (1) of the respondents "Disagreed". This implies that the students know how to manage and organize their time in leisure and studies, and they can prepare in advance before the examination.

Table 1 also reveals that the students "Strongly Agreed" to the following items of study habits with an average weighted mean of 3.43. Majority of the respondents "Strongly Agreed" with 50.0% (20) followed by "Agreed" with 42.5% (17) of the respondents. Around 7.5% (3) of the respondents "Disagreed". This implies that the students are doing a good study habit.

Objective 2

Determine if there is a significant difference between the level of agreeableness of the respondents to the indicators of academic performance when grouped according to, (1) Age, (2) Sex, (3) Parents Monthly Income, and (4) Ethnicity.

One – way ANOVA and Brown – Forsythe results in Age

Table 2. Significant Difference in One way ANOVA based on Age.

		Sum of Squares	df	Mean Square	F	Sig.
Academic Competence	Between Groups	.566	3	.189	2.956	.055
	Within Groups	2.299	36	.064		
	Total	2.865	39			
Test Competence	Between Groups	.120	3	.040	.752	.529
	Within Groups	1.922	36	.053		
	Total	2.043	39			
Time Management	Between Groups	.574	3	.191	1.414	.255
	Within Groups	4.869	36	.135		
	Total	5.443	39			
Study Habits	Between Groups	.289	3	.096	.629	.601
	Within Groups	5.519	36	.153		
	Total	5.809	39			

As shown in Table 2, there is no significant difference between the level of agreeableness of the respondents in the Academic Competence, Test Competence, Time Management and Study Habits when grouped by Age, $p > 0.05$. This implies that the level of agreeableness of the respondents in academic competence, test competence, time management and study habits are the same regardless of their age.

Table 3. Significant Difference in Brown - Forsythe based on Age.

Test Anxiety	Statistic	df1	df2	Sig.
Brown-Forsythe	16.087	3	29.222	.000

a. Asymptotically F distributed.

Table 3 shows that there is a significant difference between the level of agreeableness of the respondents in the Test Anxiety when grouped by Age, $p < 0.05$.

Table 4. Post Hoc Tamhane Multiple Comparisons in Test Anxiety

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.
16	17	-.47333	.19716	.162
	18	-.37750	.19184	.356
	19	-1.08400*	.14390	.002
17	16	.47333	.19716	.162
	18	.09583	.20884	.998
	19	-.61067*	.16589	.008
18	16	.37750	.19184	.356
	17	-.09583	.20884	.998
	19	-.70650*	.15952	.003
19	16	1.08400*	.14390	.002
	17	.61067*	.16589	.008
	18	.70650*	.15952	.003

*. The mean difference is significant at the 0.05 level.

Table 4 also shows that there is a significant difference when we compare 19 years old to 16 years old ($p = 0.002$), 19 years old to 17 years old ($p = 0.008$) and 19 years old to 18 years old ($p = 0.003$). This implies that the level of agreeableness of the respondents in Test Anxiety are significantly higher to those who are 19 years old than those who are 16, 17 and 18 years old.

This corroborates with Torrano et al. (2020) who also found that the older adolescents present higher level of test anxiety indicating that there is a positive relationship between Test Anxiety and Age. Similarly, study was also conducted by DordiNejad (2016) states that there is a positive correlation between age and test anxiety. Hence, based on the findings and the support from the related studies, as students' progress in age, they may experience elevated exam-related stress due to heightened academic expectations, underscoring the necessity for enhanced supportive measures to effectively mitigate this heightened anxiety.

Table 5. Significant Difference in T – Test based on Sex.

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Test Anxiety	Equal variances assumed	.584	.449	-11.348	38	.000
Academic Competence	Equal variances not assumed	4.953	.032	.014	35.229	.989
Test Competence	Equal variances assumed	1.032	.316	-.034	38	.973
Time Management	Equal variances not assumed	10.791	.002	-.698	27.312	.491
Study Habits	Equal variances assumed	.003	.957	.954	38	.346

Among the different indicators of academic performance, only Test Anxiety shows significant difference in the level of agreeableness of the respondents when grouped by Sex.

Table 6. Descriptive based on Sex and Test Anxiety

	Demographic Profile	N	Mean
Test Anxiety	Sex		
	Male	21	2.0410
	Female	19	3.0532

Table 6 shows that there is a significant difference in the level of agreeableness of the respondents in the Test Anxiety when grouped by Sex, $p < 0.05$. This implies that male respondents were less distracted and do not have anxiety when taking exams than the female respondents.

The findings also supported by Núñez et al. (2016) who found that on the anxiety measures, female students were found to report higher levels of math anxiety, trait anxiety, and test anxiety, as compared with their male peers. Similarly, study was also conducted by Numan et al. (2017) states that male and female significantly differ regarding their experience of test anxiety. Female considerably experience higher level of test anxiety as compared to male. Hence, based on the findings and the support from the related studies, female students had greater levels of test anxiety compared to male students. The findings indicate a need for targeted support and gender-inclusive strategies to help female students cope with higher levels of test anxiety in educational settings.

One-way ANOVA results in Parents Monthly Income

Table 7. Significant Difference in One way ANOVA based on Parents' Monthly Income

		Sum of Squares	df	Mean Square	F	Sig.
Test Anxiety	Between Groups	.602	3	.201	.572	.637
	Within Groups	12.633	36	.351		
	Total	13.236	39			
Academic Competence	Between Groups	.069	3	.023	.298	.826
	Within Groups	2.795	36	.078		
	Total	2.865	39			
Test Competence	Between Groups	.133	3	.044	.834	.484
	Within Groups	1.910	36	.053		
	Total	2.043	39			
Time Management	Between Groups	.208	3	.069	.478	.700
	Within Groups	5.234	36	.145		
	Total	5.443	39			
Study Habits	Between Groups	.073	3	.024	.153	.927
	Within Groups	5.736	36	.159		
	Total	5.809	39			

As shown in Table 7, there is no significant difference between the level of agreeableness of the respondents to the indicators of academic performance when grouped by Parents' Monthly Income, $p > 0.05$. This implies that the level of agreeableness of the respondents to the indicators of academic performance are the same regardless of their parents' monthly income.

The results also supported by Donnelly (2017) who also found that there is no significant difference between family income and academic achievement outcome. Hence, based on the findings and the support from the related studies, respondents' levels of agreeableness with academic achievement measures are the same regardless of the monthly income of their parents.

One – way ANOVA results in Ethnicity

Table 8. Significant Difference in One way ANOVA based on Ethnicity.

		Sum of Squares	df	Mean Square	F	Sig.
Test Anxiety	Between Groups	.791	4	.198	.556	.696
	Within Groups	12.444	35	.356		
	Total	13.236	39			
Academic Competence	Between Groups	.033	4	.008	.102	.981
	Within Groups	2.832	35	.081		
	Total	2.865	39			
Test Competence	Between Groups	.429	4	.107	2.323	.076
	Within Groups	1.614	35	.046		
	Total	2.043	39			
Time Management	Between Groups	.321	4	.080	.548	.702
	Within Groups	5.122	35	.146		
	Total	5.443	39			
Study Habits	Between Groups	.470	4	.117	.770	.552
	Within Groups	5.339	35	.153		
	Total	5.809	39			

As shown in Table 8, there is no significant difference between the level of agreeableness of the respondents to the indicators of academic performance when grouped by Ethnicity, $p > 0.05$. This implies that the level of agreeableness of the respondents to the indicators of academic performance are the same regardless of their Ethnicity.

This corroborates with Borg (2015) who also found that there is no significant difference between ethnicity and academic achievement. Hence, based on the findings and the support from the related studies, respondents' levels of agreeableness with academic achievement measures are the same regardless of their ethnicity.

Summary of Findings

1. The data gathered and treated showed that the level of agreeableness of the respondents to the test anxiety indicator of academic performance is generally "Agreed", in academic competence is "Agreed", test competence is "Agreed", time management "Agreed" and study habits "Strongly agreed".
2. There was a significant difference between the level of agreeableness of the respondents to the Test Anxiety indicators of academic performance and Age since the p values of these variables are less than 0.05.
3. There was a significant difference between the level of agreeableness of the respondents to the Test Anxiety indicators of academic performance and Sex since the p values of these variables are less than 0.05.
4. There was no significant difference between the level of agreeableness of the respondents to the indicators of academic performance and Parents' Monthly Income since the p values of these variables are greater than 0.05.
5. There was no significant difference between the level of agreeableness of the respondents to the indicators of academic performance and Ethnicity since the p values of these variables are greater than 0.05.

Conclusion

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

1. Test Anxiety indicators of academic performance are significant to Age.

2. Test Anxiety indicator of academic performance are significant to Sex.
3. Male students were less distracted and do not have anxiety when taking exams than the female students.
4. 19 years old students are calmer in taking an exam than 16, 17 and 18 years old.

Recommendations

In the light of this study, the researcher recommends the following:

Future researcher. The researcher recommends that future researchers conduct similar studies using other instruments and to consider additional variables that would affect the level of agreeableness of the respondents.

Teachers. The researcher recommends the teachers to come up with assessment strategies that will develop students' confidence in taking tests. Guide the students and start communication session regarding on why the students specially the males, feel pressured whenever taking the exams.

Parents. The researcher recommends the parents to monitor their children and talk to them about the difficulties that they are facing during exams.

School Administrator. The researcher recommends the school administrator to conduct symposiums regarding test anxiety of the STEM students, which in long term will help in the completion and increase of STEM graduates.

Department of Education. The researcher recommends DEPED to come up with programs and develop modules or assessment guides for STEM students that aim to develop the students' coping mechanisms in their test anxiety.

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