Science-Related Attitudes and Academic Achievements of Students with Varied Learning Styles

Peter Mark A. Babaylo
Tiglawigan National High School–Senior High
Cadiz City, Negros Occidental, Philippines

ABSTRACT

This descriptive-correlational study examines the substantial connection of Science-Related Attitudes (SRA) to the Academic Achievements (AA) of students with varied Learning Styles (LS). Using Yamane's formula, 382 samples were drawn and stratified into five selected schools in one of the Department of Education (DepEd) Schools Divisions in Central Philippines. A standardized test of Science-Related Attitudes (TOSRA) by Fraser and Visual-Auditory-Kinesthetic (VAK) Learning style test by Chislett and Chapman were administered. Salient findings of the study revealed that females exceeded males in terms of Academic Achievements and Science-Related Attitudes. Additionally, learners from the family with the highest income attained the highest Academic Achievements and positive Science-Related Attitudes. Kinesthetic students also have positive science attitudes towards science compared to Visual and Auditory learners. Furthermore, there is a significant relationship between Science-Related Attitudes and Academic Achievements. This implies that Science-Related Attitudes along with its seven scales have a significant impact to elevate academic achievements among learners.

Keywords: *Descriptive-Correlational Study, Science-Related Attitudes, Students' Academic Achievement, Varied Learning Styles, Philippines*

INTRODUCTION

Science education is very important to the development of any nation (Omosewo, 2013). Hence, many of the developed countries were able to achieve so much in science and technology because of science education (Kola, 2013). Moreover, the level of development of any country is largely based on the level of scientific knowledge (Singh, 2016). According to Dreifus (2013), people need to create opportunities to excite students about how science connects to real life. That is why many countries have taken so many measures in improving science, because of the apparent results on nations' economies.

Teachers have an array of methodologies to choose from which are responsive to both teaching and learning. Aside from these methods, there are avenues that teachers can use outside the classroom setting like institute days, team meetings, seminars, and the media but all these have little or no empirical data to support their effectiveness (Fenton, 2015). Educational sectors never fail to find any means possible to upgrade educational status by providing activities such as seminars. However, sometimes they fell short because of losing clear sights on what to target in a vast spectrum of education. This has prompted researchers and educationists to find out what factors or reasons can be attributed to these variations in academic performance among students at all levels of education (Haolader, 2017).

According to Gbollie and Keamu (2017), the nature of motivation and learning strategy used is vital to improving student learning outcomes. Students who are motivated to improve on their past or upcoming performance tend to perform better academically than peers with lower

motivation (Friedman & Mandel, 2011). Hence, motivation plays a vital role as a driving force of the students to learn from basic to complex. Students with a higher need for achievement have greater academic performance (Downes, 2015). Aside from motivation, other factors may influence learning like personality and learning styles which play significant roles in shaping academic achievements (Komarraju, Karan, Schmeck, & Ardic, 2011 as cited in Noe, Clarke, & Klein, 2014; Vedel 2014).

Socioeconomic status appears to have the strongest impact on whether secondary school students like to study Science and Technology, Engineering, and Mathematics (STEM) sciences (Taylor & Francis, 2020). High school and college students from low socioeconomic status are much less motivated to overcome academic hardships. Furthermore, low socioeconomic status means low access to science materials (Science Daily, 2017). According to Betancur, Vortruba-Drzal, and Schunn (2018), socioeconomic disparities in science achievement emerge early, and that programs and policies aimed at addressing these gaps should be implemented early.

Howard Gardner distinguished two broad categories in Science: *attitude towards science* that includes an interest in science, attitudes towards scientists, attitudes towards social responsibility in science, and *scientific attitudes* like honesty, open-mindedness, and skepticism (cited in Gauld & Hukins 2008; Blalock, Lichenstein, Owen, Pruski, Marshall, &Toepperwein, 2008; Coll, Taylor & Lay, 2009). Scientific attitudes play an integral role in achievement in science (Singh 2016). Hence, one of the goals of science teaching is to encourage students to have a positive attitude towards science for positive effects on students learning (Singh, Singh, & Giri, 2016). These suggest that to improve learning, one should have its full grasp of the essence of science education. Positive attitudes towards science bring a positive result to the learner's academic achievement.

At present, the Test of Science Related Attitudes (TOSRA) becomes the most popular and widely accepted instrument that determines the attitude of students towards science (Fraser & Lee 2015). Many countries abroad were already utilizing this tool for their research and teaching purposes in either original or in its modified forms (Fraser, 1981; Fraser & Lee 2015).

The World Competitiveness Yearbook in 2016, ranked the Philippines in terms of Education at 59th out of 61 countries (DOST, 2017). Weaknesses in the areas are manifested in the performance of high school students in several standardized tests that include the National Achievement Test (NAT). Even the Department of Education (DepEd) reports that the NAT percentage rate in high school for the School Year 2012-2013 had not able to meet the minimum target of 75 percent scoring only 51.41 percent (Dela Cruz, 2017). The Philippines should find ways to upgrade the country's performance in science and technology.

Hence, this study investigates the current status of the students with different learning styles in one of the DepEd Schools Divisions in Central Philippines in terms of academic achievement and science attitudes. It determined the significant difference in science-related attitudes when grouped according to sex, socioeconomic status, and types of learners. This investigation helps educators to probe the relationship between science attitudes and academic achievements as the bases of their educational agenda to improve the quality of science in a curriculum.

This investigation aimed to answer the following questions: (1) What is the academic achievement of learners when taken as a whole and grouped according to sex, socioeconomic status, and learning styles? (2) What are the science-related attitudes of students when taken as a whole and grouped according to sex, socioeconomic status, and learning styles? (3) Is there a significant difference in academic achievement when grouped according to sex, socioeconomic status, and learning styles? (4) Is there a significant difference in science-related attitudes when

grouped according to sex, socioeconomic status, and learning styles? (5) Is there a significant relationship between Science-related attitudes and academic performance of the students?

Framework of the Study

Academic achievements are always influenced by various intervening factors operating within and outside the individual. The 'outside factors' describe the relationship between instructional designs and learning, and 'within-individual factors' signifies learner's metacognition and self-regulated learning (Winnie & Nesbit (2010) as cited in Sha, Looi, Chon, Seow &Wong, 2012; Mega et al. 2014). According to Bronfenbrenner (1979) supported by Bertolini (2012), student achievement is impacted on numerous levels including students' factors, their interactions with others such as parents, teachers, and administrators, and lastly, the large systems that surround the student e.g. school districts, neighborhoods, local economy, political policy, and multicultural relations.

Since the publication of an article describing the Test of Science-Related Attitudes (TOSRA), many have been able to quantify the attitudes of students towards learning science. Requests for copies of the test have been received from researchers and teachers in different developed and developing countries (Fraser, 1978 cited in Johnston 2005; Barmby et al. 2008; Bressler 2013). This has been used as an evaluation tool for educators to determine students' science-related attitudes.

The seven scales of TOSRA by Fraser (1981) are as follows: Social Implications of Science, Normality of Scientists, Attitude to scientific Inquiry, Adoption of Scientific Attitudes, Enjoyment of Science Lessons, Leisure Interest in Science, and Career Interest in Science. The first scale which is Social Implications of Science evaluates students' attitudes towards science contributions to the development of our society at present and in the future. It includes whether they agree to the belief that money should go to science projects and research and if the money spent on these is worth spending. Second, the Normality of Scientist tests students' attitudes towards scientists as normal people or asocial. The scale measures how students perceive scientists of having a normal family life and lifestyle. Third, Attitudes towards scientific Inquiry measures how students believe that experiment and inquiry apply all the time for learning. It tests a student's innate desire for investigation or experiments to find out the answers and not only by asking experts for an immediate solution. Fourth, Adoption to scientific attitudes measures whether the students are open to knowledge that is against their long-held belief, and willingness to change and reverse ideas from the evidence observed. It also measures how they handle and look up things differently when the strong opposite result comes out after the experiment. Fifth, the Enjoyment of science lessons evaluates students' motivation to classroom science lessons, their desire to learn scientific facts, and their interest to experiment in science laboratories. Sixth, Leisure time in science measures students' interest in science even outside the school and in their vacant time, e.g. watching or reading science discoveries at home during the weekend. It also measures their interest to engage in extracurricular that are related to science activities. While Career interest in science measures students' deep desire to get involve in science-related careers in the future. It measures how they value science professions and how they enjoy research activities in their lives after they finish their school.

These seven scales offer benefits to the improvement of our present education. Science-related attitudes have long been recognized and tested to determine its relation to science and academic achievement. Previous studies show that a positive attitude towards science

(Papanastasiou & Zembylas, 2002; Narmadha & Chamundeswari, 2013) is correlated to students' academic achievement.

The individualized learning styles became so popular in the 1970s (Coffield, Moseley, Hall & Ecclestone, 2004; Cherry, 2018). There are many different learning styles models; one literature review identified 71 different models (Coffield et al. 2016). Fleming and Baume (2006) explain that students preferred learning modes have a significant influence on their behavior and learning; and Information that is accessed through students' use of their modality preferences shows an increase in their levels of comprehension, motivation, and metacognition (as cited in Murray, 2013).

The Visual-Auditory-Kinesthetic learning styles model or abbreviated as VAK provides a simpler way to identify learners in their most favorable learning style preference. The original VAK concepts were first developed by psychologist and early childhood specialists such as Fernald, Keller, Orton, Gillingham, Stillman, and Montessori in the early 1920s (Gholami and Bagheri, 2013).

Learning styles have confronted several issues of its capability with promoting academic performance. There were many types of research related to it. Some researchers would say that there is no derived evidence to show its efficacy like the study of Gappi (2013) that says there was no significant statistical correlation between the academic achievement and learning style preferences of the students which were conducted among first-year college students. Other researchers would oppose the said study by proving the relevance of learning styles like Nzesie (2015) showing the strong positive significant relationship between learning styles and academic achievement for the tri-modal learners, and among male and female students. This is the reason why many attempts to run their research and see for themselves the purity of the said learning styles.

Hence, the researcher will determine the level of science-related attitudes and academic achievements of Grade 7 to 10 students, and the relationship among three independent variables which include sex, socio-economic status, and learning styles.

METHODOLOGY

The study employed a descriptive-correlational research design. The investigation was conducted in selected secondary schools in one of the Department of Education (DepEd) Schools Divisions in Central Philippines. DepEd is a federal executive division responsible for carrying out government education programs and policies through 'Divisions' which are composed of schools headed by Public Schools Divisions Superintendents(PSDS).

The selected schools are the top five big schools that are recorded as having high students' population. The respondents of the study were the public grade 7 to 10 students enrolled in five big schools in one of the DepEd Divisions in Central Philippines for the school year 2018-2019. The population was then subjected to proportional stratified random sampling by the school using a Yamane's formula. After computing the proportionate number of samples by the school, simple random sampling is utilized to determine the respondents. Table 1 next page shows the detailed population and the sample size extracted.

Table 1. Sample Student-Respondents of the Five Selected Schools

School	Total Population				Proportionate Sample		
	Male	Female	Population Size	Proportion (%)	Male	Female	Sample Size
School A	938	220	1158	13.92	43	10	53
School B	2222	2356	4578	55.04	102	108	210
School C	361	364	725	8.72	16	17	33
School D	352	513	865	10.40	16	24	40
School E	344	647	991	11.92	16	30	46
Total	4217	4100	8317	100	193	189	382

Tools used for this investigation are the TOSRA (Test of Skills-Related Attitudes in Science) and VAK (Visual, Auditory, and Kinesthetic) tests. TOSRA was developed by Barry Fraser (Fraser, 1981; Fraser and Lee 2015) to determine the science-attitude skills of the learners. On the other hand, the VAK test by Chislett and Chapman was used to determine the specific learning style of the learners.

TOSRA has been used due to reasons that the Test of Science-Related Attitudes provides a separate score for several distinct categories. This is the advantage of TOSRA over other attitude measuring instruments (Eccles, 2007; Ali, 2013); According to Fraser (1981), it is specially designed for secondary school science students to measure their attitudes towards science; and teachers and researchers have found TOSRA to be a useful and easy-to-use instrument for the measurement of students attitude towards science (Adolphe 2002; Ali, 2013). The seven scales of TOSRA by Fraser (1981) are Social Implications of Science, Normality of Scientists, Attitude to Scientific Inquiry, Adoption of Scientific Attitudes, Enjoyment of Science Lessons, Leisure Interest in Science, and Career Interest in Science. The 70-item test has ten items to calibrate each scale. Likert scale of 5 was utilized to determine students' attitudes: Strongly Agree (SA), Agree (A), Not Sure (N), Disagree (D), and Strongly Disagree (SD). The overall mean is also computed giving another scale for interpretation to learners considering grouped variables such as sex, socioeconomic status, and learning styles. Science-related attitudes (SRA) Mean score range and interpretations were given below:

Mean Score Range	**Interpretation**
4.50-5.00	Highly Positive SRA
3.50-4.49	Positive SRA
2.50-3.49	Average SRA
1.50-2.49	Negative SRA
1.0-1.49	Highly Negative SRA

The VAK test was taken from the crafted instrument of Chislett and Chapman. It is composed of 30 items with three letter-choices, a, b and c. The frequency is used for computation to determine what specific learning style the students opt to behave in their learning environment. All answers in the letter "a" are for visual learners, "b" for Auditory and "c" for Kinesthetic learners, hence the most score that they have from each style will determine most of their learning style.

For the socioeconomic status, the basis for this scale is by subtracting the highest monthly income by the lowest income that the respondents identified in the survey-questionnaire, divided by three (3) to get the range. It was then grouped into three types based on the higher income and the lower-income students as appeared in the survey. On the other hand, the grades of the students were based on the K to12 grading system interpreted as follows:

Grading scale	**Description**
90-100	Outstanding
85-89	Very Satisfactory
80-84	Satisfactory
75-79	Fairly satisfactory
Below 75	Did not meet expectations

RESULTS AND DISCUSSIONS

The descriptive findings showed the level of Academic Achievements of the students as a whole and when grouped according to variables such as sex, socioeconomic status, and learning styles.

Table 2. Academic Achievement When Taken as a Whole and When Grouped According to Sex, Socioeconomic Status and Learning Styles.

Variables	Categories	Mean	SD	Interpretation
Sex	Male	85	5.84	Very Satisfactory
	Female	88	4.71	Very Satisfactory
Socioeconomic	Low	84	5.20	Satisfactory
Status	Average	88	4.23	Very satisfactory
	High	90	11.50	Outstanding
Learning Styles	Visual	86	5.35	Very Satisfactory
	Auditory	85	5.99	Very Satisfactory
	Kinesthetic	86	5.27	Very Satisfactory
Taken Collectively		87	5.97	Very Satisfactory

The results affirmed the study conducted by Melkonian and Lerokipiotis (2006) when they analyzed the secondary learners' results in Greek language grade, mathematics, and the overall "high School grade" wherein females got higher grades than male. Also, studies of Wallace (2007); Sarvottam, Kumar, Ranjan, & Sharma (2018) Kolster and Kaiser (2015) revealed that female students attained significantly higher grades than their male counterparts.

It also illustrates that students in a family with high income exhibit good academic achievements. On the other hand, learners who belong to the least family income has the lowest grade of satisfactory. These results confirmed the study of Morrissey, Hutchison, and Winsler (2013) that low family income is associated with poor academic achievement among children. It reflects the observation of Wiggins (2018) that the poorer the family, the less likely the child is ready in terms of schooling-related enablers: habits, vocabulary, thinking, and experience.

In terms of Learning Styles, Visual, Auditory, and Kinesthetic learners got almost the same academic achievement which is interpreted as very satisfactory. The result in learning styles defied

the study of Chermahini, Ghanbari, and Talab (2013) indicated a significant relationship between the different learning styles and the performance in the English test, and the performance resulted differently in four groups with different preferred learning styles.

Table 3 shows that the highest registered score among the seven scales of both sexes is in Enjoyment of Science lessons where the female has the highest positive Science-related attitude whereas the lowest is in the Normality of Scientist with just an average SRA. As a whole, both sexes do have average science-related attitudes. This is affirmed by the study of Sofiani, Maulida, Fadhillah, and Sihite, (2017) where students' positive attitude towards science was at medium level and there was no significant difference in attitude towards science between male and female. This is in contrast with the findings of Lin and Crawley (2019) where Boys more than girls recorded high scores on Leisure Interest in Science and Career Interest in Science. There were clear gender differences regarding the interest and preferences of science subjects, as well as their relationship towards future career perspectives (Kang, Hense, Scheersoi & Keinonen, 2018).

Table 3. Science-Related Attitudes When Grouped as a Whole and According to Sex.

Seven Scales of TOSRA	Male	Interpretation	Female	Interpretation
Social Implications of Science	3.35	Average SRA	3.49	Average SRA
Normality of Scientist	3.15	Average SRA	3.08	Average SRA
Attitude to Scientific Inquiry	3.17	Average SRA	3.25	Average SRA
Adoption of Scientific Attitudes	3.29	Average SRA	3.50	Positive SRA
Enjoyment of Science Lessons	3.51	Positive SRA	3.66	Highly Positive SRA
Leisure Interest in Science	3.29	Average SRA	3.47	Average SRA
Career Interest in Science	3.26	Average SRA	3.33	Average SRA
Taken collectively	3.29	Average SRA	3.40	Average SRA

The table on the next page illustrates that students belong to the family with high monthly income shows positive Science-related attitudes than low and average groups which only got average Science-Related Attitudes. The highest points obtained by three types of learners are found in the Enjoyment of Science lessons. This study affirmed the study of Hacieminoglu (2015) that parents' income and education level had a significant effect on students' attitudes towards science. Student interest in science is a substantially stronger predictor of science achievement in higher socioeconomic contexts and higher gross domestic product (GDP) nations (Drob, Cheung, & Briley, 2014). Many of the scientists had an interest and curiosity in science and the natural world in early childhood and 12 percent of them happened to spark their curiosity from their parents and family members who exposed them to scientists, science labs, nature or science and technology museums (Funk & Hefferon, 2016). Unfortunately, people living in poverty struggle to afford ISE (Informal Science Education) Institutions such as science centers and museums (Dawson, 2014).

Table 4. Science-Related Attitudes When Grouped According to Socioeconomic Status.

Seven Scales of TOSRA	Low Income	Interpretation	Average Income	Interpretation	High Income	Interpretation
Social Implications of Science	3.34	Average SRA	3.46	Average SRA	3.56	Positive SRA
Normality of Scientist	3.11	Average SRA	3.08	Average SRA	3.18	Average SRA
Attitude to Scientific Inquiry	3.15	Average SRA	3.19	Average SRA	3.43	Average SRA
Adoption of Scientific Attitudes	3.29	Average SRA	3.41	Average SRA	3.66	Positive SRA
Enjoyment of Science Lessons	3.44	Positive SRA	3.67	Positive SRA	3.82	Positive SRA
Leisure Interest in Science	3.28	Average SRA	3.40	Average SRA	3.63	Positive SRA
Career Interest in Science	3.25	Average SRA	3.28	Average SRA	3.43	Average SRA
Taken collectively	3.26	Average SRA	3.35	Average SRA	3.53	Positive SRA

Table 5 (next page) illustrates that the highest registered total mean score of SRA is found in Kinesthetic learners. A study by Herring (2004) reveals that the kinesthetic teaching of science is more fun for teachers and students. Also, a certain study affirms that activity-based approaches enhanced students' scientific attitudes with the guided discovery approach being most facilitative (Akporehwe & Onwioduokit, 2018). Meanwhile, the lowest registered scores are found in TOSRA scales: Normality of Science and Attitude to Scientific Inquiry. In contrast with the study of Astalini, Kurniawan, and Sari (2019), the Normality of Scientist and attitude towards investigation in Physics was found to be categorically ‘good’. This affirmed the study conducted by Kant (2015) that science students have different learning styles and students having more and less scientific attitudes of different categories of learning styles were not significant overall, but in some cases, they were significantly different.

The significant difference (Table 6, also next page) in students’ academic achievements validated the study of Aina and Philip (2017) that there was a difference in the academic achievement of the students in the theory and Practical Physics based on gender. In addition, the study of Melkonian and Lerokipiotis (2006) suggest that female students attained significantly higher academic grades than male. In fact, on average, middle school girls are more likely to get interested in going to school and value higher grades, thus more likely to study more (Grasgreen, 2013)

Table 5. Science-Related Attitudes When Grouped According to Students' Learning Styles.

Seven Scales of TOSRA	Visual	Int	Auditory	Int	Kinesthetic	Int
Social Implications of Science	3.42	Average SRA	3.31	Average SRA	3.49	Average SRA
Normality of Scientist	3.11	Average SRA	3.12	Average SRA	3.12	Average SRA
Attitude to Scientific Inquiry	3.23	Average SRA	3.11	Average SRA	3.26	Average SRA
Adoption of Scientific Attitudes	3.40	Average SRA	3.26	Average SRA	3.48	Average SRA
Enjoyment of Science Lessons	3.57	Positive SRA	3.42	Average SRA	3.73	Positive SRA
Leisure Interest in Science	3.39	Average SRA	3.22	Average SRA	3.49	Average SRA
Career Interest in Science	3.30	Average SRA	3.19	Average SRA	3.35	Average SRA
Taken collectively	3.35	Average SRA	3.23	Average SRA	3.42	Average SRA

Table 6. Significance of the Difference in Academic Achievement When Grouped According to Sex.

Variables	Categories	Mean	SD	*p* - value	Decision	Significance at α= 0.05
Sex	Male	84.69	5.84	0.00	Reject H_o	Significant
	Female	87.56	4.71			

The results in Table 7 affirmed Willingham's (2012) socioeconomic status/Achievement correlation that on average, students from wealthy families do significantly better than kids from low-income families. The significant difference confirmed the idea that household wealth is related to IQ and school achievement, hence the strongest evidence points to the causal relationship between income and cognitive gains (Kant, 2015). When kids grow up poor, financial barriers prevent them from fully participating in schools – such as the cost of uniforms, school trips, meals, after-school activities, and many more (Garnham, 2020).

Table 7. Significance of the Difference in Academic Achievement when Grouped According to Socioeconomic Status.

Source of Variation	SS	Df	MS	F	*p*-value	Decision	Significance at a=0.05
Between Groups	2601.321	2.00	1300.661	55.528	0.000**	Reject Ho	Significant
Within Groups	8807.243	376	23.424				
Total	11408.565	378					

**Post Hoc tests using Scheffe's test show that significant differences lie in all pairs.

While others are opposed to the result above like the study of Munir (2018) and Katowa-Mukwato (2017) that there is simply no association between learning styles and academic achievements of students, the study of Abidin, Rezaee, Abdullah and Singh (2011) and Manalo (2017) says otherwise, that there is a positive significant relationship between the two variables. There is an improvement in both the students' performance and participation in mathematics and basic science activities using a hands-on approach in teaching mathematics and science to students (Ekwueme, Ekon, & Nebife, 2015).

Table 8. Significance of the Difference in Academic Achievement When Grouped According to Learning Styles.

Source of Variation	SS	Df	MS	F	*p* -value	Decision	Significance at α=0.05
Between Groups	99.936	2.00	49.968	1.661	0.191	Do not reject Ho	Not Significant
Within Groups	11308.629	376	30.076				
Total	11408.565	378					

High range SRA of scales in Social Implications of Science, Adoption of Scientific Attitudes, Enjoyment of Science Lessons, and Leisure Interest in Science is found in the female group. There are numerous pieces of evidence showing gender differences regarding their interest and future career perspectives like female preferred Biology and male preferred Physics and Chemistry (Kang, Hense, Scheersoi, & Keinonen, 2017). In addition, girls usually prefer more family-friendly and interpersonal-oriented occupations than boys (Konrad, Ritchie. Lieb & Corrigal, 2000 as cited in Kang et al, 2017). Nevertheless, both males and females score the lowest in the normality of the scientist, this shows that they believe that scientists tend not to be normal and even their family time and relationship with other people are compromised because of their research and other works related to science. This is further attested by the study of Lips (1992) supported by Lent, Brown, Sheu, and Schmidt (2005) when he studied the relationship between gender and SRA and found that both sexes agree that scientists are asocial, males even disagreed more than females that women can combine scientific careers and family.

Table 9. Significance of the Difference in Science-Related Attitudes When Grouped According to Sex.

Variables	Categories	Mean	SD	*p - value*	Decision	Significance at α = 0.05
Sex	Male	3.29	.35671	0.003	Reject H_o	Significant

There is a significant difference in the Science-related attitudes for the three types of socioeconomic status. The family contributes to the development of their children's attitudes towards science and science courses (Turkoz, Alkan, Akkus, and Yurok, 2016). The findings confirm the idea of Hacieminoglu (2015) that parents' income had a significant effect on student's attitudes towards science. Family income influences a child's academic development through investments in children and by alleviating the levels of family stress (Duncan, Magnuson, & Vortruba-Drzal, 2017).

ANOVA

Source of Variation	SS	Df	MS	F	*p* -value	decision	Significance at α = 0.05
Between Groups	3.799	2.00	1.900	16.568	0.000**	Reject Ho	Significant
Within Groups	43.108	376	115				
Total	46.907	378					

**Post Hoc tests using Scheffe's test show that significant differences lie between average and high-income group (*p*-value = 0.003) and low- and high-income group (*p*-value = 0.000)

The findings validate the study of Caliskan and Kilinc(2012) that reveals an average significant relationship between the learning styles of students and their attitudes towards social science course. Table 7 supports this result and shows that Kinesthetic types of Learners have higher SRA, followed by Visual and Auditory, respectively. Furthermore, the findings of Dhanapal and Shan (2014) indicate that the number of students obtained a positive result as they learned and remembered better through a hands-on experiment. Through several projects, science teachers have tried to involve students in science activities to increase motivation in learning science and science-oriented careers (Bolte Holbrook, Mamlok-Naaman & Rauch, 2014). Moreover, students in a traditional lecture course are 1.5 times more likely to fail when compared to students with active learning (Bhatia, 2014).

Source of Variation	SS	Df	MS	F	*p* - value	Decision	Significance at α = 0.05
Between Groups	1.713	2.00	.856	7.125	0.001**	Reject Ho	Significant
Within Groups	45.194	376	.120				
Total	46.907	378					

**Post Hoc tests using Scheffe's test show that significant differences lie between Visual and Auditory learners (*p*-value = 0.041) and Auditory and Kinesthetic group (*p*-value = 0.001)

For the final hypothesis that wants to determine the relationship existing between two variables, the result shows that higher scores in science-related attitudes would mean an increase in the students' academic achievement. Previous studies prove that a positive attitude towards science (Papanastasiou & Zembylas, 2002; Narmadha & Chamundeswari, 2013) is correlated to students' academic achievement. There are findings by Betancur, Vortruba-Drazal, and Schunn (2018) that suggest that elementary instructional approaches addressing science instruction will likely benefit students in improving overall science outcomes.

Table 12. Significance of the Relationship between Science-Related Attitudes and Academic Achievement

Variables	Pearson Correlation	*p* - value	Decision	Significance @ α= 0.05
Science-Related Attitudes and Academic Performance	.778**	0.000	Reject H_o	Significant

**Correlation is significant at the 0.01 level (2-tailed)

Furthermore, it was also determined that the scientific process skills education increased the students' achievements and scientific creativities (Aktamis, 2008).

CONCLUSIONS

Female learners outperform their male counterparts in academic achievements. They tend to lead to academic excellence. The family's financial capacity also affects the academic standing of the students in school. Financially-able learners tend to excel academically when compared to their fellow learners having low and average parents' income. Also, the higher the parents' income, the better the students perform academically in school. However, types of learners do not necessarily affect the grades of students in the school; visual, auditory, or kinesthetic learners are alike in pacing academic grades. Generally, the academic achievements of students when taken as a whole is very satisfactory.

Female also has a more positive attitude towards science than their male counterparts, though both agree that scientists do not have a normal life compensating the family and social life because of laboratory works and researches. Also, both sexes enjoy science lessons and science still has its place in the hearts of Filipino students. Positive attitudes to science are more likely manifested in learners with higher family income, followed by average and low family income learners. Hence, the higher the family's financial capacity, the higher the students' Science-related attitudes. When it comes to Learning styles, Kinesthetic learners tend to have positive science-related attitudes. Kinesthetic learners are enjoying the movement, crafting, and hands-on experiences which are common in science-related experiments. When taken collectively, students have an average science-related attitude.

There is a significant difference in academic achievements when group according to sex and socioeconomic status but no significant difference in learning styles. Females tend to have higher academic achievements than males. On the other hand, financially-challenged students are outranked by financially-fortunate learners.

Meanwhile, there is a significant difference in science-related attitudes when group according to sex, socioeconomic status, and learning styles. Female is observed to possess more positive attitudes towards science than male counterparts. Further, Kinesthetic learners are seen to engross themselves in scientific endeavors. While financially-fortunate learners are seen to be much interested in science because parents could afford to send them to scientific activities and laboratories. Parents could also provide them scientific materials that result in positive science-related attitudes.

Hence, there is a significant relationship between science-related attitudes and learners' academic achievements. The higher the positive science-related attitudes, the most likely the students perform better academically in schools.

Science education to progress needs to start with the students. Students should possess positive science-related attitudes. Hence, science-related attitudes should set in as an integral part of learning in the educational platform to enhance positive science-related attitudes and will end up positive results to students' academic achievements.

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