FACTORS AFFECTING STUDENTS' INTEREST IN LEARNING SCIENCE

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ABSTRACT

This study aimed to determine the factors that affect students' interest in learning science. A survey using a self-report questionnaire was conducted among 100 junior high school students in the public and private school settings. The survey questionnaire included a science interest scale consisted of three domains: values and attitude development, scientific skills acquisition, and concept formation. Aligned to the new thrust of the K-12 Science Curriculum and the 21st century learners, the science interest scale was developed, adapted, and validated by the researcher. The collected data were treated and analyzed using descriptive statistics and Pearson correlation coefficient. The findings of the study revealed that most of the students showed favorable perception and interest in learning science. There is also a significant relationship between the science interest and students' age, monthly income, school type, and the number of siblings. However, no significant relationship exists between science interest and students' sex. Among the abovementioned variables, age and sex variables were revealed as good predictors of students' interest in learning science.

Keywords: Values and Attitude Development; Scientific Skills Acquisition; Concept Formation; Science Interest; 21st Century Learners

INTRODUCTION

With the emergence of social media as part of the daily routine of teenagers nowadays, students and teachers need to engage and lean towards the significance of learning and interest in science education. The science curriculum in the Philippines is strengthened in the K to 12 Basic Education program to allow the students to compete and follow the standards of education's performance and competency in the neighboring countries in Asia and the world.

Globally, the Philippines aimed to join the international assessment in major subjects in education to know and track to where it is right now. Based on the international assessment of Trends in International Mathematics and Science Study (TIMSS) conducted in 2003, the Philippines ranked 23 out of 25 in primary science and 43 out of 46 in secondary science. Also, data from the Programme for International Student Assessment (PISA) conducted in 2018 showed that the Philippines ranked 77 out of 79 countries in science and mathematics subjects (Paris, 2019).

On the national assessment, the 2018 National Achievement Test (NAT) from the Department of Education (DepEd) showed that the performance of Grade 6 students declined consistently for three years in a row. Both Grades 6 and 10 students were consistently low in proficiency in information literacy, problem-solving, and critical thinking (Estanislao, 2019). Due to these insistent issues, intervention and thorough observations are deemed to raise and improve the field of education.

Locally, there were studies on science interest combined with academic performance and attitude. Morales (2016) integrated the use of local language in teaching and learning science concepts in physics. It was revealed that students were stimulated to learn and become interested in science after the intervention. Through this, students established positive interest in deep processing in physics ideas which led to positive attitude in science and better performance in the subject. Moreover, Arellano (2004) as cited by Ebora (2016) found out that academic performance of students in physics class has shown a positive increase when different sequences of activities in science were used.

Most educators focus on the assessment and behavior to gauge the learning of students. In most private and public schools, notable observations were observed that students from primary levels are motivated to learn in science as compared to secondary levels. According to Martin et al. (2008) as cited by Krapp and Prenzel (2011), elementary students have high regard in scientific lessons and science subjects. Subsequently, students became uninterested in science subject as they entered secondary and tertiary level. There were studies indicated the declining of students were uninvolved and lack of motivation to learn science (Krapp and Prenzel, 2011; Renninger and Hidi, 2011).

Some studies showed significant influences of interest and achievement in learning science including gender difference. The study of Chiu (2010) revealed in the study that boys have positive effect of science interest on science achievement as compared to girls. Also, Morgan et al. (2001) as mentioned in Chiu (2010) found that there is a positive inclination for both male and female college students to pursue science-related careers when they are interested in science.

Science interest denotes to the preference in science subject as individual feels enjoyment and thoroughly engaged to the subject as well as to any related fields of science (Chiu, 2010). There were different views and analyses on interest development among individuals. One is from Hidi's interest theory and the other from Dewey's theory. The interest theory as proposed by Hidi (1990) analyzed two types of developmental interests. One type is the individual interest which is developed moderately and lifelong. Second is the situational interest which is triggered by environmental factors. On the other hand, Dewey (1933) has four types of educative interest. First is the interest in physical activity with the inclination learning of mental use. Second is the interest in constructive work with the main goal of reaching and finishing the product. The third is a cognitive interest as an essential part of constructive work. Fourth is the interest of social interaction for tasking and making activities. It also links with the three interests combined. In conclusion, through engagement in the activity, the child's interest develops and deepens as the activity becomes complex.

This study was anchored on the following theories: operant conditioning and social learning theory. The operant conditioning focuses on the belief that learning has been reinforced by reward or discouraged through punishment. In the classroom setting, students will show a good attitude towards science or even in other disciplines when the teacher will reward good behavior. Also, students will most likely to behave if they like the teacher and its style of teaching (McLeod, 2015). Social learning is another theory. It focuses on the learning behavior that is controlled by the influence of environmental factors. It is often called modeling where the learner watches others and later, acquires the exhibited behavior. On such, Mcleod (2015) explained social learning as a complex progression. It follows certain stages such as respondent's feedback while observing the behavior of others; gain of behavior; and the acceptance of the modeled acts.

With the reviewed studies, the researcher decided to conduct this research to look deeper into the significance and effect of some variables in the interest of the students in learning science. Thus, the researcher led to investigate the student's learning in science by considering the new thrust of the K-12 Science Curriculum and the 21st century learners. This study aimed to determine the different factors of the demographic profile of junior high school students that could affect their interest in learning science.

Shown below is the framework of the research.

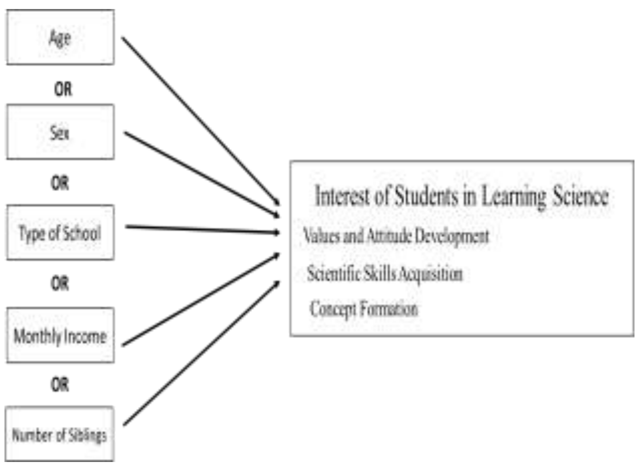

Figure 1: Research Paradigm

The framework consists of independent variables and one dependent variable. The independent variables namely: age, sex, school type, monthly income, and the number of siblings are the possible factors that affect the students' science interest. On the other hand, the dependent variable is the science interest of students. The five above-mentioned independent variables are sufficient to be the factors to determine achievement in the science of students. But, the aforementioned independent variables are not necessary that they both affect the students' interest in science.

The arrows show the relationship between the two variables of the study. The independent variables are non-recursive with science interest because appropriate age in learning science results in positive interest in learning science, so as sex, school type, monthly income, and the number of siblings that make students have a favorable attitude towards science.

Moreover, this study aimed to predict the best factor that affects the interest of students in learning science. The difference and relationships of the independent variable and the dependent variable were determined through a descriptive survey in a causal-comparative approach.

OBJECTIVES OF THE STUDY

The purpose of this study was to determine the factors affecting the engagement and interest of high school students in learning science in the selected public and private schools in the Philippines. Specific aims include the following: (1) to assess if the students have varying science interests when they are categorized according to values and attitude development, scientific skills acquisition, and concept formation; (2) to determine if there is a significant relationship between the science interest of students based on the following independent variables such as age, sex, school type, monthly income, and the number of siblings; and (3) to investigate if there exists an independent variable that serves as the predictor.

METHODOLOGY

This study utilized the descriptive method including causal-comparative. This was used to determine the factor that could address the interest of students in learning science. It is descriptive, in the sense that it sought to describe the profile of the respondents in terms of their scientific attitude. The causal-comparative refers to exploring the cause of an event as revealed in interest in learning science as its effect. There were different variables in this study—the personal demographic profile of the students from different schools and the interest in learning science as the dependent variable. The interest in learning science was pre-determined by the thrust of the K-12 curriculum.

The respondents of this study were 100 students from three different schools within Manila: one private school and two public schools of different grade levels of junior high school. The age group ranges from 12-18 years old of male and female. The number of siblings and family income were also consolidated. The researcher only considered the sample population under the random sampling technique.

To identify the interest of students in learning science, a survey form was utilized. The instrument was adapted and developed by the researcher to assess the science interest of junior high school students. A self-report survey questionnaire was measured and considered as a variable in this study. The initial portion of the instrument included demographic profile such as sex, age, type of school (public/private), number of siblings, and family's monthly income. The survey form assessed the three variables in the research hypotheses: values and attitude development, scientific skills acquisition, and concept formation.

Values refer to the significance of the actions of a person. It serves as a guide to motivate the attitudes or actions of an individual towards worthwhile behavior. Meanwhile, attitude is a sentiment expressed by human behavior. It radiates to optimistic instincts and skills if acquired positively and later become essential to learning. Attitude is associated with science if it covers the value of the impact, endeavor, or related to science as a subject (Akcay et al., 2010).

The concept formation is part of the cognitive domain proposed by psychologist Bruner, Goodnow and Austin. Bruner et al. (1967) described the idea as the listing of attributes to easily distinguish the content in various categories. Concepts are the mental categories that serve as a guide in classifying and understanding the commonalities of attributes such as events or ideas. It is a learning strategy that allows the learner to compare or contrast the ideas.

These variables were measured by identifying the frequency (always, often, sometimes, never) of student activities related to each variable. The survey was modified and adapted from the study of Mubeen and Reid (2008) and Bernardo et al. (2008). Students' responses to the survey form to determine the interest of students in learning science were tabulated.

Before the administration of the study, the research problem was identified. The researcher made an instrument which is the Science Interest Scale to know the interest of students in learning science. The first phase of the study involved the "validation" of the instrument to be used in the study. The instrument was validated by an expert in the field of research based on face validity and content validity. The instrument was assumed as reliable and valid.

On the other hand, the second phase of the study was data gathering. These included the administration of the validated instrument to the research sample group – purely the students. These data were then subjected to appropriate statistical analyses. From these data, conclusions were established and implications and recommendations were subsequently formulated.

In the administration of the instrument to the students, the researcher emphasized that the instrument was not a test, but only a survey. The survey lasted for 30 minutes. The survey form was retrieved the same day after which it was given out to the students. A personal data sheet alongside each survey was also collected. The responses in the accomplished forms were tabulated. The dominant response of every student was based on their modal responses to the survey.

The data collected were treated and analyzed using the Statistical Package for the Social Sciences (SPSS) software. The Science Interest Scale was determined with the use of percentage frequency distribution and the usual descriptive statistical measures, namely: arithmetic mean, standard deviation (SD), and percentage frequency distribution.

The significant relationship between the science interest and the aforementioned variables was established using the Pearson r. Finally, to determine or predict the factor that influences the science interest of the students, simple rectilinear regression was used.

RESULTS AND DISCUSSION

1. Respondents' Science interest survey

The first problem was answered using descriptive statistical measures. For each of the statement, the arithmetic mean, and standard deviation were calculated using SPSS software. The first problem was answered using descriptive statistical measures. For each of the statement, the arithmetic mean, and standard deviation were calculated using SPSS software.

Table 1
Summary of Science Interest of Respondents

Domain	Mean	SD	Remark
Values and Attitude Development	2.89	0.843	Favorable
Scientific Skills Acquisition	2.65	0.899	Favorable
Concept Formation	2.54	0.930	Favorable
Total Composite	2.69	0.622	Favorable

Based on Table 2, the third domain, Concept Formation (M=2.54, SD=0.930), has the greatest value of standard deviation though there was closeness of value among the Scientific Skills Acquisition domain (M=2.65, SD=0.899) and the Values and Attitude Development domain (M=2.89, SD=0.843). This simply implies that the responses of the students in the Concept Formation domain were more varied compared to the responses in the other domains. In general, the responses of the students were more concentrated around the mean, due to the small value of standard deviation.

Overall, the result manifests that most of the students have a favorable interest in science. With this interest, respondents perceived science subjects positively and helped them develop in understanding and critical thinking. This is consistent with the findings of Ucar and Sungur (2017) which maintained that students who are self-efficient and cognitively-engaged have high level of interest in science. Moreover, lesson engagement and motivation in class brought out students' successes in science achievement (Lee et al., 2016). However, the study of Krapp and Prenzel (2011) revealed that studying science becomes less appealing to most students over time.

1.1 In terms of Values and Attitude Development Domain

In the Values and Attitude Development domain, the overall aspects showed a favorable result. The highly favorable response was in Facet 3 which obtained the highest mean value of 3.36 and a standard deviation value of 0.823 (see Appendix A). This means that the responses of the students were more concentrated around the mean. This implies that most of the students were always looking forward to their science classes. The favorable responses indicated that students find the science subject as interesting and fun to study; science activities were meaningful and significant; and participating in science-related activities motivated the students to be confident and aimed to perform well. On the other hand, the responses of the students in Facet 11 were the most varied in this domain for it obtained the highest standard deviation value of 0.936 (see Appendix A). The least favorable response was directed towards the anxiety on the upcoming science test and science as the preferred subject to study. This implies that students become worried about the coming examinations in science and preferred other subjects to study.

1.2 Scientific Skills Domain

In the Scientific Skills Acquisition domain, Facet 12 obtained the highest mean value of 3.04 (see Appendix B). It means that the students have a highly favorable interest or attitude that science can help them in their future careers. The favorable responses leaned towards the use of factual knowledge as a basis and solving science-related problems; care to share scientific knowledge with other people and when explaining phenomenon; and tend to study harder when the result is good in the science test. On the other hand, the students slightly favored Facet 14 and this was determined by their mean value of 1.92 (see Appendix B). This means that majority of the students have not yet experienced participating in science-related competitions.

1.3 Concept Formation Domain

In the Concept Formation domain, 7 out of 12 facets obtained a remark of favorable response (see Appendix C). This implies that most students see science as a relevant subject in integrating the application of concepts; solving science-related problems; and conducting an experiment. However, 5 out of the 12 facets obtained a remark of slightly favorable. In connection, Facet 34 obtained a mean value of 2.36 (see Appendix C). This implies that most of the students do not believe that they were becoming critical problem solvers in light of their science subjects. Also, responses in Facet 27 obtained the highest standard deviation value of 1.058 (see Appendix C). This means that the responses on this facet were more dispersed compared to the other facets.

2. Relationship between the science interests of students in terms of age, school type, monthly income, sex, and the number of siblings

2.1 In terms of Age

Table 3
Correlation between Science Interest and Age of Students

r-value	r2	N	p-level	Remark
-0.449	0.20	100	p<0.01	moderately negative correlation; highly significant

This table presents the relationship between science interest and the age of students. Based on Table 3, a moderately negative and significant correlation between the variable (r= -0.449, n=100, p<0.01) was calculated. Furthermore, it obtained a coefficient of determination value of 0.20, which means that only 20 percent of the science interest of students can be explained by their age and 80 percent of it may be accounted for other factors.

The result implies that as the students get older, their interest in science decreases. This contradicts the concept of the Matthew Effect which stated that 'initial advantages led to further cumulative advantages' (wrightslaw.com). Also, it disagrees with Dewey's concept of interest in which he maintained that interest grows as the time of exposure and complexity increases.

2.2 In terms of School Type

Table 4
Correlation between Science Interest and the School Type of Students

r-value	r2	N	p-level	Remark
0.407	0.165	100	p<0.01	Moderate positive correlation; significant

This table presents that there was a positive but moderate relationship between the school type and the science interest of students. Besides, the r2 value indicates that 16.5 percent of the science interest of the students was determined by their school type. Goodrum and Rennie (2007) as cited by Logan and Skamp (2013) specified the combination of activities in school and out-of-school experiences which enhances the learning of students and appreciates the science subject. Moreover, as long as the environment has comprehensive textbooks, competitive teachers, and guided science curricula integrated with non-school science such as field trips and experiences with science activities, students' interest will boost and increase (Bulunuz & Jarrett, 2010). Also, the study of Cheung (2018) on descriptive analysis indicated that all the 60 students interviewed were interested in science regardless of school group and type.

2.3 In terms of Monthly Income

To assess the relationship between the family monthly income and the science interest of students, a Pearson product-moment correlation coefficient was used for computation. Based on the result, there was a negligible positive significant correlation between the two variables (r= 0.166, n=100, p=0.05). Moreover, this obtained a coefficient of determination value of 0.03. This implies that only three percent of the science interest can be explained by the family monthly income of the students and 97 percent of the science interest can be explained by other variables or factors.

Table 5
Correlation between Science Interest and Family Monthly Income of Students

r-value	r2	N	p-level	Remark
0.166	0.03	100	p=0.05	Negligible positive correlation; significant

This result is consistent with the concept of the Matthew Effect or 'richer-get-richer effect' in which the primary enhancement is projected increasingly. This implies that as the family monthly income of students' increases, science interest will also increase because of the positive correlation, however, it is negligible. Though negligible, the relationship is statistically significant.

2.4 In terms of Sex

Table 6
Correlation between Science Interest and Sex of Students

rs-value	r2	N	p-level	Remark
-0.128	0.016	100	p>0.05	Negligible/Very weak positive correlation; not significant

There was a positive but negligible correlation between sex and the science interest of students however the relationship was not statistically significant. The coefficient of determination is 0.016. This means that only 1.6 percent of the science interest of students can be explained by sex. The other 98.4 percent can be accounted for other factors.

This result affirms the study of Osborne et al. (2003) as cited by Logan and Skamp (2013) that the comparison between the science interest of boys and girls is narrowing and has minimal variation. Chiu (2010) discovered that science interest has weak positive effect on science achievement for boys compared to girls. Also, Bennett and Hogarth (2009) as cited by Logan and Skamp (2013) indicated that boys are more interested in science as compared to girls. However, the findings of Cheung (2018) showed that both male and female participants were interested in science.

2.5 In terms of Number of Siblings

Table 7
Correlation between Science Interest and Number of Siblings of Students

r-value	r2	N	p-level	Remark
-0.201	0.04	100	p<0.05	Low negative correlation; significant

This table presents the relationship between science interest and the number of the sibling of students. There was a low negative and significant correlation between the variable (r= -0.201, n=100, p<0.05). Also, the value of r2 indicates that only four percent of science interest can be explained by the number of siblings of the students. This implies that an increase in the number of siblings of the students would mean a decrease in the students' science interest. Though the correlation was low, it was statistically significant.

3. Factor could predict the interest of students in learning science

Table 8
Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	Fobs	Fcrit	p level	Remark
Regression	6992.115	5	1398.423	6.636	4.42	p<0.05	Significant
Residual	19809.245	94	210.737				
Total	26801.360	99					

Since the observed value of F was greater than the critical value of F, there was a statistical significance and the null hypothesis was rejected. This suggests that there was a possible predictor of science interest among the independent variable mentioned.

Table 9
Coefficients

Regression	Beta	t	tcrit	p - level	Remark
Age	-4.132	-2.251	1.99	p<0.05	Significant
Sex	-7.235	-2.375	1.99	p<0.05	Significant
School Type	0.741	0.218	1.99	p>0.05	Not Significant
Monthly Income	0.337	0.202	1.99	p>0.05	Not Significant
Number of Siblings	-0.771	-0.970	1.99	p>0.05	Not Significant

Dependent Variable: Science Interest

As revealed in Table 9, age and sex were the variables that can predict the science interest of students. This means that only these two variables have a high percentage of contributing to and predicting the science interest of students. This finding is consistent with the study of Falk (2002) as cited by Bulunuz and Jarrett (2010) who found that experiences on a wide variety of materials at an early age contribute to one's interest in science. In terms of sex and gender, Logan and Skamp (2013) indicated that boys and girls were almost in the same tract to aspire and pursue careers in science. Additionally, this result affirms the study of Krapp and Prenzel (2011) where they surveyed a large population of boys and girls and the study yielded a leaning positive relationship between science interest and school performance among boys and girls.

CONCLUSIONS

Based on the results and analyses of the study, the following conclusions were drawn:

Most of the students have favorable responses and interest in learning science in the three domains of values and attitude development, scientific skills acquisition, and concept formation. The respondents perceive positively that science subject helps them develop critical thinking.

There is a significant relationship between the age, monthly income, school type, and the number of siblings of students and their interest of students in science.

The age and sex variables are good predictors in predicting the interest of students in science subjects.

RECOMMENDATIONS

Based on the conclusions from this study, the following recommendations were recognized:

The Science Program may be further enhanced by curriculum developers by highlighting the topics in the science curriculum which tackles critical thinking. Through this, students may boost their motivation in the subject, confidence, and become more proficient in learning.

An assessment tool or instrument may be enhanced to test the lower grade level in both public and private schools.

Future researchers may conduct a comparative study between the students from primary and secondary schools with the alignment of the K-12 curriculum.

Additionally, future research may conduct an experimental approach to science interest between public and private schools.

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