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Determinants of Senior High School Students' Performance in the Physical Sciences in the Twifo – Hemang Lower Denkyira District: The Interplay of Ambition and Effort as Mediating Variables

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Abstract:

The study aims to find out whether the family, peers, teachers, gender, students' perception, students' ambition, and the academic effort of students do influence students' performance in the physical sciences in the Twifo-Hemang Lower Denkyira District. There has been wide speculation as to why the performance of students in the physical sciences continues to fall and what could be done to remedy this poor trend. On the one hand, performance has been attributed to environmental factors. In Ghana, research on factors influencing students' academic performance especially in the physical sciences at the Senior High level appears to be relatively limited. Specifically speaking, such research in the Twifo-Hemang Lower-Denkyira District is virtually nonexistent. The research designs for this study were descriptive and correlational research designs with quantitative methods of data collection. The population of the study was three hundred and eighty (380) physical science students in the Twifo-Hemang Lower Denkyira District. The population for the study included all the senior high schools in the Twifo-Hemang Lower Denkyira District. Purposive sampling technique was used in selecting a sample for the study which was 194, thus 114 (58.8%) male students and 80 (41.2%) female students. Questionnaire and test items were used in collecting data for this study. Analysis of the data was done through the use of the SPSS version 22. The study revealed that there is a strong and positive relationship between family influence, teachers' influence, peer influence, gender, academic effort and students' performance in Physics, Chemistry and Elective Mathematics.

Keywords: Students' performance, Physical Sciences, Students' effort, and Significant Others

1. Introduction

Education is an essential need in this time of globalization. Education gives understanding, however it additionally grooms the character, teaches virtues and information and gives essential abilities. This suggests in each field, profoundly qualified individuals are required (Azhar, Nadeem, Naz and Sameen, 2013). There is expanding exact proof that education matters for economic development and advancement (Karlson & Karlson, 2019). Education matters, not just for the self-awareness, wellbeing status, social consideration, and work advertise possibilities of individual students yet additionally for the more extensive economic performance of nations (Fleming, 2019). A sound, quality education in science, especially is seen as a top priority (National Research Council, 2006). Despite the numerous benefits from the study of science, it is unfortunate that many students have a mistaken impression of science and tend to dislike science activities. There has been wide speculation as to why the performance of students in the physical sciences continues to fall and what could be done to remedy this poor trend. On the one hand, performance has been attributed to environmental factors and the role of teachers (Makori, Maobe, & Nyangeri, 2019). Factors such as socialization, expectation effects, the absence of appropriate role models, bias in textbooks, bias in the teaching and counseling process, and the absence of support systems for students, peer influence, parental influence, teachers attitudes towards students have been cited as either discouraging or not encouraging students to choose and perform well in the physical sciences (Fox, Brody & Tobin, 2012).

2. Background

Statistics from the District Education Office (Twifo-Hemang Lower-Denkyira District) reveals that in 2011/2012 out of 345 physical science students who sat for WASSCE examination, only 103 (30%) passed in physics, chemistry, and elective mathematics. In 2012/2013, out of the 357 physical science students who sat for the WASSCE examination, only

89(25%) passed in physics, chemistry and elective mathematics. The 2013/2014 year further revealed a decrease in performance, which is only 44(18%) out of 245 passed in physics, chemistry, and elective mathematics (District Education Office, HLDD). The District Education office over the years has been flooded with concerns from parents, school administrators, students and even teachers on the need to improve upon science education in the district. Despite their efforts of organizing workshops, seminars, attending public lectures at the University of Cape Coast and other workshops for teachers on the current trends of teaching, the performance of students in the physical science subjects in the district keep dwindling which has become a social concern for all in the district. In some cases, parents with students reading physical science courses prefer registering them in private schools or as private candidates. This has also raised concerns on general enrollment especially in the physical sciences. In Ghana, research on factors affecting students' academic performance, especially in the physical sciences at the Senior High level appears to be relatively limited (Opere & Dramanu, 2002; Adetunde & Asare, 2009). Specifically speaking, such research in the Twifo-Hemang Lower-Denkyira District is virtually nonexistent. There is a need to address this lacuna. The aim of this study was to find out whether the family, gender, peers, teachers, students' perception (Somers et al., 2019), students' ambition, and the academic effort of students do influence students' performance in the physical sciences in the Twifo-Hemang Lower Denkyira District.

3. Literature Review

Past studies propose that the poor performance of students in the sciences result from inner abilities (Linn & Hyde, 1999). This contention has been refuted in the light of the fact that the developing proof shows that innate ability is certifiably not a solid factor deciding for the academic performance of students. Right now, there are no biological, neurological or hereditary variables at work that clarify the poor academic performance of students. The social cognitive theory was dependent on the possibility that learning and performance of any conduct results from the proportional communication between an individual, the earth and the effectively learned behavioural patterns. However, various combinable factors, for example, institutional bias, parental encouragement, students' efforts, and attitudes towards studies, social connectedness, home environment, gender, and the network community which one discovers oneself can affect students' performance in the physical sciences (Knight and Wood, 2005).

Instructors, mentors, and researchers have for quite some time been keen on investigating factors influencing the academic performance of students. Various investigations have been done to discover the components that record for students' academic performance. Notwithstanding, discoveries from such investigations uncover that the variables can be seen from three points of view, that is the job of guardians (family causal factors), educators (academic causal factors), and the demeanor of students themselves (personal factors) (Diaz, 2003; Farooq, 2011). The interplay of these factors influencing academic performance includes gender, age, geographical setting, religious affiliation, socioeconomic status, parent' education, parental occupation and income. (Farooq, Chaudhry, Shafiq & Berhanu, 2011). Hazari, Tai and Saddler (2007) conducted a study to look at what impacts the achievement of students in physics courses specifically for males and females. Secondary school physics science coursework (content, pedagogy and evaluation) and trust in physics science courses were analyzed to decide their job in anticipating basic college physical science performance. Results uncovered that secondary school physics science and full of feeling experience distinctively anticipated female and male performance. The measure of time spent covering explicit topics in physics science was a positive indicator for the two males and females while absence of consolation at home to seek after science-related courses negatively affected college students' performance in physics science. At the senior high level, factors affecting academic performance have been investigated altogether (Head, 1990).

In Ghana, a several factors have been delineated as adding to the poor performance of students in the West African Secondary School Certificate Examination (Adetunde & Asare, 2009). Persistent failure of students in examinations results from several factors: home-related aspects (parental involvement, type of discipline, number of siblings, parental education, positive attitudes parents have towards education); organizational- related factors (poor supervision, poor teaching approaches and methodologies, lack of experience, poor salaries and allowances); student-related factors (students cults, excessive sporting, romantic relationship, class attendance percentage, study hours, peer relationship and poor study habits (Ajayi, 2006; Sommai Po-on, 2008; Mlambo, 2011). Social connectedness is a steady individual distinction that mirrors the mindfulness and Internalized understanding of relational closeness involved with family, companions, outsiders, network, and society (Leithwood, Sun & McCullough, 2019). It is therefore important to examine the role of family members, the peer group, teachers, the perception students have about physical science, ambition and effort of students as well as their performance in the physical sciences in the Twifo-Hemang Lower – Denkyira District.

4. Methodology

A research design is an arrangement demonstrating how the issue under scrutiny can be understood (Orodho, 2003). The research designs for this study were descriptive and correlational research designs with quantitative methods of data collection. The researchers' studied the connection between the predictor variables in the study and students' performance in physical sciences. The study explicitly looked to see if there was a solid, moderate or weak relationship between the predictor variables and the criterion variable. The above reason informed the researcher to include correlation research design due to its ability to establish relationships. The researchers used multiple regression analysis for testing the hypothesis Fraenkel and Wallen (2000) likewise accept that correlation research portrays a current connection between variables. The population of the study was 300 and eighty (380) physical science students in the Twifo-Hemang Lower Denkyira District. The objective populace for the study involved all the senior high schools in the

Twifo-Hemang Lower Denkyira District. Purposive sampling technique was used in selecting a sample for the study which was 194, thus 114 (58.8%) male students and 80 (41.2%) female students.

5. Instrument

Two instruments were used in gathering information for this study. They are questionnaires and test items based on the physics, chemistry and elective mathematics SHS two syllabus. The questionnaire was created based on the research questions got from the related literature. The questions were the Likert kind of scales. The researcher also used questionnaires in light of the fact that the whole populace was proficient (Fraenkel and Wallen, 2000). The validity of the questionnaire was acquired by introducing it to the researcher's principal and co-supervisors. The principal and co-supervisors helped with remedying indistinct, one-sided and insufficient things, and assessed the appropriateness of items in the different areas. The Cronbach alpha was used to quantify the internal consistency and to decide the reliability of the questionnaire. This statistics gives a thought of the average correlation among the entirety of the items that make up the scale of the instrument. The Cronbach Alpha coefficient was 0.812. The reliability of the test items was obtained by introducing it to three raters to score a respondent script. Analysis of the data was done using SPSS version 22. Data gathered from the respondents were analyzed using descriptive and inferential statistics. Information for explore question one was dissected utilizing The Independent Samples t-test. Data for research questions were analyzed using the independent samples t-test and Pearson bivariate correlation.

6. Results and Discussion

6.1. Descriptive Statistics

An area of equal importance was the family influence on students' performance in the physical sciences. This variable was measured in terms of the amount of influence family members or parents devote to students in their study. In all, four individual items were used to gather this information using a 6 point Likert scale. Table 1 below provides a summary of how the students' responded to those questions.

Statement	Freq.	Mean	Std. Dt.
My parents often discuss the benefits of higher education with me	194	5.25	1.069
My parents exhort me to study hard and become well educated man or woman	194	5.29	.858
My parents often try to convince me that I can't succeed in education, unless I do well in the physical sciences	194	4.50	1.444
I am convinced that my prospects in school will be bright	194	5.05	.940

Table 1: Family Influence and Performance in Physical Sciences
Source: Author's Construct, 2019

The means of the various items as presented in Table 1 imply that family members matter a lot in the education of their children. The magnitude of the standard deviations further confirms this. The Influence of peers was also of interest to this study. Five different items were used to elicit the respondents' views on the subject matter. This was also measured on a 6 point Likert scale. Table 2 below gives the distribution of the respondents regarding the extent to which their peers influence them in their study.

Statements	Freq.	Mean	Std. Dt.
My high school companions urge me to buckle down in school	194	5.19	1.326
I invest the majority of my time in class with companions talking about academic issues	194	4.76	1.424
I find it interesting to be with my high school friends when Studying	194	4.94	1.363
Most of my high school friends have study groups	194	5.14	1.199
I am free to discuss my academic problems with my friends	194	4.76	1.460

Table 2: Peer Influence and Performance in Physical Science
Source: Author's Construct, 2019

The data in Table (2) above indicate that the means of the various items suggest that peer influence was quite high. This is further supported by the standard deviation figures which do not show much variation in the students' observations. This suggests that the respondents' peer connectedness and influence were significant. The influence of teachers was also examined in the study. A set of items were designed to gather information on the influence of instructors. All the six items were estimated on a 6 point Likert scale. The outcome is exhibited in Table 6 beneath.

Statements	Freq.	Mean	Std. Dt.
My science teachers draw my attention to the fact that success in science is a necessary condition for my chance of entering higher education	194	5.26	.942
My science teachers are always willing to explain to me those science problems that I don't understand	194	5.15	.920
The teacher does not give me much help in difficult topics	194	3.05	1.598
My teachers care about me and expect me to succeed in school	194	5.01	1.183
I am allowed to consult educators after class in the event that I don't understand any concept	194	5.02	1.106
I am allowed to consult an instructor whenever I have an issue in the subject	194	5.30	1.080

Table 3: Teacher Influence and Performance in Physical Science
Source: Author's Construct, 2019

The means of the various items in Table 3 indicate that the influence of teachers was relatively high. This is affirmed by the different standard deviation figures which show little varieties in the respondents' perceptions. It also implies that the influence of teachers is very crucial in students learning. The effort of students devoted to their studies especially in normal class and during weekends was also of particular interest. As a result, two items were designed for the respondents to come out with their views on the amount of time they spent after normal classes and during weekends. This variable was measured on a 6 point Likert scale. Table 4 gives a detailed summary of respondents' effort they devote to their studies.

Statements	Freq.	Mean	Std. Dt.
For how long a week do you ordinarily contemplate after typical classes	194	4.32	1.235
For how long a week do you typically contemplate during weekends	194	2.40	1.153

Table 4: Academic Effort and Performance in Physical Science
Source: Author's Construct, 2019

The results in Table 4 show that the mean hour students spend studying after normal classes and the hours they devote to their studies during weekends are above average. Perceptions students hold about physical science was also of interest to the researcher. A set of items was carefully designed to gather information on this variable. The five items designed were estimated on a 6 point Likert scale. The outcome is displayed underneath in Table 5.

Statements	Freq.	Mean	Std. Dt.
The physical sciences are difficult subjects	194	3.24	1.540
The physical sciences are mainly meant for boys	194	2.41	1.522
The physical sciences are usually meant for brilliant students	194	3.53	1.100
The physical science subjects are more related to my career ambitions	194	5.04	1.128
The physical sciences are as job-oriented as other subjects	194	5.05	1.014

Table 5: Perception of Students and Performance in Physical Science
Source: Author's Construct, 2019

The means of the various items in Table 5 show that the respondents hold a positive view of the study of physical science. This is supported by the standard deviation figures which show that irrespective of the views students form about physical science, they still strive to perform well. Students' academic ambition was one of the mediating variables considered in this study. In this regard, three questions measured on a 6 point Likert scale were used to evaluate the respondents' academic ambition. Below is the distribution of the respondents' by their academic ambition is seen in Table 5.

Statements	Freq.	Mean	Std. Dt.
What aggregate do you aim to get in your WASSCE examination	194	5.00	1.068
What level of educational attainment do you aspire for	194	5.11	.884
What is the main motivation for aiming at the level of education you have selected	194	5.48	.324

Table 6: Students' Academic Ambition
Source: Author's Construct, 2019

The outcomes in Table 6 demonstrate that the respondents' had very high academic ambitions for their study. As it is seen, all the means are far above average which goes on to confirm the fact that respondents had relatively high academic ambitions for their study. Concerning the standard deviation figures, one can simply say that only a small proportion of the respondents is less academically ambitious. Measuring students' academic performance was also paramount to the study. However, the students' performance was estimated by the scores on Physics, Chemistry and Elective Mathematics test planned by the researchers with the assistance of subject instructors. The essential fundamental of assessing is to plainly express what it is you are endeavoring to quantify (Terenzini & Reason, 2005). The items of the test were therefore selected for an approved GES syllabus for SHS two students. The test instruments were made to cover subjects that were accepted to have been as of now instructed. Taking all things together, three separate tests were designed in Physics, Chemistry and Elective Mathematics. Each test contained 25 multiple-choice items. The scores from the test items were estimated on a 6 point Likert scale. Every one of the outcomes are introduced underneath in Table 7.

6.2. Test Scores

Statements	Freq.	Mean	Std. Dt.
Physics	194	4.82	.884
Chemistry	194	4.72	.913
Elective Mathematics	194	4.60	.014

Table 7: Students' Test Scores in Physics, Chemistry, and Elective Maths
Source: Author's Construct, 2019

Table 7 provides a summary on students' performance in Physics, Chemistry and Elective Mathematics tests. The results indicate that the majority of the participants performed above average in all three subjects. This indicates that most of the respondents performed very well in physics, chemistry, and elective mathematics.

6.3. Inferential Statistics

To what extent do male and female students differ in academic performance in Physics, Chemistry, and Elective Mathematics?

Subject	Gender	N	M	SD	df	t	Sig
Physics	Male	114	4.737	1.022	192	1.037	0.301
	Female	80	4.575	1.134			
Chemistry	Male	114	4.798	0.952	192	-1.455	0.649
	Female	80	4.862	0.990			
E-Mathematics	Male	114	4.781	0.938	192	1.440	0.151
	Female	80	4.563	1.168			

Table 8: Gender Differences in Performance of Students

From Table 8, the Levene's test was conducted to investigate whether there is fairness of differences. The outcomes showed that there was no significant difference in performance for males ($M=4.737$, $SD=1.022$) and females ($M=4.575$, $SD=1.134$; $t(192)=1.037$, $p=0.301$). This finding implies that the level of males that improved in physics was not considerably not quite the same as their female partners. Levene's test was led to examine whether there is equality of variances. The outcomes showed that there was no statistically significant difference in performance for males ($M=4.798$, $SD=0.952$) and females ($M=4.862$, $SD=0.990$; $t(192)=-1.455$, $p=0.649$). The outcomes affirm that the level of males that improved in science was not measurably unique in relation to their female partners. Levene's test was directed to explore whether there is correspondence of changes. The outcomes showed that there was no statistically significant difference in performance for males ($M=4.781$, $SD=0.938$) and females ($M=4.563$, $SD=1.168$; $t(192)=1.440$, $p=0.151$).

6.4. To What Degree Does The Influence of Family Identify with Students' Performance in Physics, Chemistry, And Elective Mathematics?

		Perf. (Phys.)	Perf. (Chem)	Perf. (E-Math)
Family Influence	Pearson Correlation	.639**	.602**	.650**
	Sig. (2-tailed)	.000	.000	.000
	N	194	194	194

Table 9: Family Influence and Students' Performance in Physics, Chemistry and Elective Mathematics

From the results above we find that the Pearson bivariate correlation coefficients obtained on Physics, Chemistry, and Elective Mathematics were $r = 0.639^{**}$, $r = 0.602^{**}$ and $r = 0.650^{**}$ respectively. They are all positive with p-value = 0.000 which is not exactly the alpha worth = 0.01, suggesting that family influence was fundamentally identified with students' performance in Physics, Chemistry, and Elective Mathematics. The findings propose that the higher the influence of family, the more probable that the performance of students in Physics, Chemistry and Elective Mathematics will be high.

6.5. To What Degree Does Peer Influence Identify with Students' Performance in Physics, Chemistry, and Elective Mathematics?

		Perf. (Phys.)	Perf. (Chem)	Perf. (E-Math)
Peer Influence	Pearson Correlation	.520**	.629**	.402**
	Sig. (2-tailed)	.000	.000	.000
	N	194	194	194

Table 10: Peer Influence and Students' Performance in Physics, Chemistry, and Elective Mathematics

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

The degree to which friend influence identifies with students' performance in Physics, Chemistry, and Elective Mathematics as introduced in Table 10 shows that the Pearson bivariate correlation coefficients got for Physics, Chemistry, and Elective Mathematics are $r = 0.520^{**}$, $r = 0.629^{**}$ and $r = 0.402^{**}$ respectively. The coefficients are positive with p-value = 0.000 which is not exactly the alpha worth = 0.01. The suggestion from the findings remains that peer influence was significantly identified with the student's performance in Physics, Chemistry, and Elective Mathematics.

6.6. To What Degree Does Teachers' Influence Identify with Students' Performance in Physics, Chemistry, and Elective Mathematics?

		Perf. (Phys.)	Perf. (Chem)	Perf. (E-Math)
Teacher Influence	Pearson Correlation	.384**	.333**	.339**
	Sig. (2-tailed)	.000	.000	.000
	N	194	194	194

Table 11: Teacher Influence and Students' Performance in Physics, Chemistry, and Elective Mathematics

** Correlation Is Significant at the 0.01 Level (2-Tailed)

Concerning the outcome in Table 11, the Pearson bivariate correlation coefficients for Physics, Chemistry, and Elective Mathematics are $r = 0.384^{**}$, $r = 0.333^{**}$ and $r = 0.339$ correspondingly. The coefficients are for the most part positive with p-value = 0.000 which is not exactly alpha = 0.01 meaning that teachers' influence was significantly identified with students' performance in Physics, Chemistry, and Elective Mathematics. Despite the fact that the coefficients will in general be low, it remains that teachers' influence related to the performance of students.

6.7. To What Degree Does Students' Academic Effort Identify with Their Performance in Physics, Chemistry, and Elective Mathematics?

		Perf. (Phys.)	Perf. (Chem)	Perf. (E-Math)
Academic Effort	Pearson Correlation	.674**	.571**	.658**
	Sig. (2-tailed)	.000	.000	.000
	N	194	194	194

Table 12: Academic Effort and Students' Performance in Physics, Chemistry, and Elective Mathematics

** Correlation Is Significant at the 0.01 Level (2-Tailed)

From table 12 we find that the Pearson correlation coefficients acquired in Physics, Chemistry, and Elective Mathematics are $r=0.558^{**}$, $r=0.571^{**}$ and $r=0.658^{**}$ individually. The coefficients are for the most part positive with p-

value =0.000 which is under alpha=0.01. This suggests there is a positive and solid connection between students' academic effort and their performance in Physics, Chemistry, and Elective Mathematics.

6.8. To What Degree Does Students' Ambition Relate to Their Academic Effort?

Academic Effort		
Academic Ambition	Pearson Correlation	.501**
	Sig. (2-tailed)	.000
	N	194

Table 13: Students' Ambition and Academic Effort
 **. Correlation Is Significant at the 0.01 Level (2-Tailed)

The outcome in Table 13 shows the zero-order correlation coefficient got between students' ambition and academic effort is $r=0.501^{**}$ with $p\text{-value}=0.000$ which is under $\alpha=0.01$. This infers students' ambition in science is significantly identified with their academic effort. This finding gives a clear signal that academically eager children are quicker in committing a sizeable proportion of their time to their studies. Most students are of the view that their high expectations and efforts are the main reasons for high school success (Ashby & Schoon, 2010).

6.9. To What Extent Does Students' Perception of The Nature of the Physical Sciences Relate to Their Academic Efforts?

Academic Effort		
Students' Perception	Pearson Correlation	-.542
	Sig. (2-tailed)	.000
	N	194

Table 14: Students' Perception of Physical Science and Academic Efforts
 **. Correlation Is Significant at the 0.01 Level (2-Tailed)

From the results above, we find that the Pearson bivariate correlation coefficient is $r = -0.542$. The correlation coefficient is negative with significance or $p\text{-value} = 0.000$ which is less than the $\alpha = 0.01$. This implies that there is a negative and strong relationship between perceptions students have about physical science and their academic efforts.

6.10. Testing the Hypothesis

Predictors	Physics Test Scores		
	Model 1	Model 2	Model 3
	β	β	β
Family Influence	.451(.000)*	.404(.000)*	.320(.000)*
Peer Influence	.230(.000)*	.201(.000)*	.128(.000)*
Teacher Influence	.097(.094)	.110(.049)*	.076(.165)
Gender	-.064(.210)	-.054(.277)	-.056(.239)
Students' Perception	-.178(.001)*	-.154(.003)*	-.048(.403)
Academic Ambition		.210(.000)*	.158(.003)*
Academic Effort			.294(.000)*
Constant	.191	-.962	-.878
R	.717	.744	.765
R ²	.514	.553	.586
AR ²	.501	.539	.570

Table 15: Multiple Regressions Of The Physics Test Score On The Independent And Intervening Variables
 * $p < 0.05$

Table 15 shows the results of the multiple regression analysis. Model 1, Model 2 and Model 3 gives the coefficients of the predictor variables, the standard error, the degree of importance, the correlation (R), the R-square (R²) and the adjusted R² (AR²). In model 1, when the Physics test score was regressed on the independent variables, two predictor variables, along these lines teacher influence and the gender of the students were seen not as significant predictors of performance in the Physical Sciences. In Model 2 and 3, when academic ambition and effort were separately presented, teacher influence and gender were as yet seen not as significant predictors of performance in Physics. Especially, in model

3, when the mediating variable was presented, accordingly academic effort, students' perception was likewise seen not as a significant predictor of performance in Physics apart from teacher influence and gender in the previous models. This indicates the independent variables share their predictive power with the intervening variables. This infers the independent variables determine performance in Physics except if the intervening variable is present. In the nutshell, the independent variable makes an impact just when it goes through the mediating variables. Though family influence and peer influence consistently remained significant predictors, their coefficients reduced when the intervening variables were presented in Models 2 and 3. For example, when academic ambition was brought into Model 2, all but one of the constantly significant independent variables shrank. That is to say, family influence, peer influence and students' perception shrank by 10%, 13%, and 14% respectively while the influence of teachers appreciated by 13%. This implies that the values lost by the shrinkages establish the commitment of the intervening variables to the independent variables. Lastly when the academic effort was injected into Model 3, both family influence and peer influence still shrank by 21% and 36%. The findings reveal that academic ambition stimulates hard work, that is, the academic effort will eventually raise the performance in Physics.

Predictors	Chemistry Test Scores		
	Model 1	Model 2	Model 3
	β	β	β
Family Influence	.362(.000)*	.371(.000)*	.320(.000)*
Peer Influence	.441(.000)*	.447(.000)*	.402(.000)*
Teacher Influence	.007(.903)	.005(.937)	-.016(.775)
Gender	.060(.236)	.058(.253)	.056(.261)
Students' Perception	-.099(.063)	-.104(.054)*	-.039(.516)
Academic Ambition		-.039(.461)	-.071(.196)
Academic Effort			.179(.028)*
Constant	.216	.412	.458
R	.726	.727	.735
R ²	.527	.528	.540
AR ²	.735	.540	.523

Table 16: Multiple Regression of the Chemistry Test Score on the Independent and Intervening Variables

* $p < 0.05$

The results from Table 16 illustrate the results of the regression analysis. All three models were involved. Model 1, 2 and 3 gives the coefficients of the predictor variables, the standard error, the degree of significance, the correlation (R), the R-square (R²) and the adjusted R² (AR²). In model 1, when the Chemistry test score was regressed on the predictor variables, thus family influence, peer influence, teacher influence, the gender of the child and students' perception, three predictor variables teacher influence, gender, and student's perception were found not to be significant predictors of performance in chemistry. The findings suggest that most of the respondents indicated that the influence of teachers is very crucial in their performance in Chemistry. Apart from that, irrespective of the views students form about Physical Science, they still strive to perform well in chemistry, hence there were no variations and for that matter the non-significant of the coefficients in Table 20. In model 2, when the Chemistry test score was regressed on the same independent variables and one intervening variable, teacher influence, gender, and students' perception were still found not to be significant predictors of performance in Chemistry. This suggests that these independent variables share their predictive power with the intervening variable. The implication is that the independent variables did not determine students' performance unless the intervening variable was there. That is to say, the independent variables made an effect when it passed through the mediating variable. Lastly, when the academic effort was introduced in Model 3, the same independent variables were still not significant predictors. This confirms that the independent variables did not directly determine performance in Chemistry. They did so through the intervening variables. Moreover, in Table 16, when the intervening variables, thus academic ambition and academic effort were introduced in Models 2 and 3, the coefficients of the majority of the independent variables shrank while others appreciated. For example, when academic ambition was introduced into Model 2, teacher influence and gender shrank by 29% and 3% respectively and lost their significance too. Family and peer influence on the other hand appreciated by 3% and 1% respectively. Again, with the introduction of academic effort in Model 3, family and peer influence shrank by 14% and 10% respectively yet there were still significant. This suggests that the values lost by the shrinkages constitute the contribution of the intervening variable to the independent variables themselves.

These revelations imply that most of the predictor variables for example family influence and peer influence, though significant predictors in Model 1, when the mediating variables were introduced, they appreciated. The other predictor variables, that is, teacher influence and gender were still not significant when the intervening variables were

introduced into the equation. This suggests that they shared their predictive power with the intervening variables, hence they cannot be major predictors of students' performance in chemistry. This implies that the introduction of the intervening variables indicates the inadequacy of the predictor variables to determine performance in the Physical Sciences. The results from Table 15 reveal that family influence and peer influence were consistent predictors of performance in chemistry even though they both shrunk in Model 3. In this regard, family influence and peer influence were the major independent predictors of performance in chemistry. The researcher, therefore, theorizes that when family members are involved in different roles throughout the school, the performance of all children in the schools tend to improve, not just the children of those who are actively involved, because children whose families may not be active see parents of their peers just like their own (Kahle, 2002).

Predictors	Chemistry Test Scores		
	Model 1	Model 2	Model 3
	β	β	β
Family Influence	.543(.000)*	.498(.000)*	.396(.000)*
Peer Influence	.069(.273)	.042(.497)	-.047(.446)
Teacher Influence	.091(.126)	.104(.074)	.062(.265)
Gender	-.106(.046)*	-.096(.053)*	-.099(.044)*
Students' Perception	-.170(.002)*	-.147(.007)*	-.019(.744)
Academic Ambition		.199(.000)*	.136(.012)*
Academic Effort			.356(.028)*
Constant	.655	-.410	-.311
R	.694	.719	.752
R ²	.482	.517	.565
AR ²	.468	.502	.549

Table 17: Multiple Regression of the Elective Mathematics Test Score on the Independent and Intervening Variables
* $p < 0.05$

The results from Table 17 illustrate the results of the regression analysis. The analysis was run in Models. Model 1, Model 2 and Model 3 gives the coefficients of the predictor variables, the standard error, the level of significance, the correlation (R), the R-square (R²) and the adjusted R² (AR²). In model 1, when the Elective Mathematics test score was regressed on the independent variables, thus family influence, peer influence, teacher influence, the gender of the child and perception of students, two predictor variables, peer influence, and teacher influence were found not to be significant predictors of performance in Elective Mathematics. In these tables, there was almost no variation in the magnitude of peer influence and teacher influence. From the table, it indicates that most of the respondents indicated that they spend most of their time in class with their peers discussing academic-related issues. They also indicated that they are free to consult teachers anytime they have problems with the subject. In Models 2 and 3, when academic ambition and effort were respectively introduced, peer influence and teacher influence were still found not to be significant predictors of performance in Elective mathematics. This suggests that the independent variables share their predictive power with the mediating variables. This implies that the independent variables do not determine performance in Elective Mathematics unless the intervening variables are present. In the nutshell, the independent variable makes an effect only when it passes through the intervening variables. For instance, when academic ambition was introduced in Model 2, family and peer influence shrunk by 8% and 39% respectively. The gender of the students on the other hand shrunk by 9%, yet it was still significant. Perception of students also shrunk by 14%. Again, with the introduction of academic effort in Model 3, family and teacher influence as well as students' perception shrunk by 20%, 40%, and 87% respectively. Surprisingly, peer influence appreciated by 11% though it was still not significant. The findings indicate that the values lost by the shrinkages constitute the contribution of the mediating variables to the independent variables.

The results from Table 16 eventually reveal that family influence and the sex of the child were consistent predictors of performance in Elective Mathematics even though they both shrunk in Models 2 whilst the sex of the child appreciated in Model 3. Given this, the researcher is of the view that, when family members encourage learning and voice out high expectations for the future, they are promoting attitudes in their children that are keys to achievement. The evidence from the analysis of the data in the table shows that the independent variables cannot directly predict performance in Physics, Chemistry, and Elective Mathematics. In reality, the intervening variables, thus academic ambition and academic effort share their predictive power with the independent variables. The researcher failed to reject the null hypothesis which states that "The independent variables will not directly determine students' performance in the Physical Sciences".

7. Findings

The study found no significant difference in performance for males and females in Physics, Chemistry, and Elective Mathematics. The study revealed that there is a strong and positive relationship between family influence and students' performance in Physics, Chemistry and Elective Mathematics ($r = 0.639$, $r = 0.602$ and $r = 0.650$, $p < .01$). The study established that there is a strong and positive relationship between peer influence and students' performance in Physics, Chemistry and Elective Mathematics ($r = 0.520$, $r = 0.629$ and $r = 0.402$, $p < .01$). The study showed that there is a positive relationship between teachers' influence and students' performance in Physics, Chemistry and Elective Mathematics ($r = 0.384$, $r = 0.333$ and $r = 0.339$, $p < .01$). The findings from the study showed that there is a strong and positive relationship between academic effort and performance of students Physics, Chemistry and Elective Mathematics ($r = 0.674$, $r = 0.571$ and $r = 0.658$, $p < .01$). The study found that there is a positive relationship between students' academic ambition and academic effort ($r = 0.501$, $p < .01$). This study discovered that there is a negative relationship between perceptions students have about the physical sciences and their academic effort ($r = -0.542$, $p < .01$). The researcher failed to reject the null hypothesis because it was found that the independent variables by themselves did not predict students' performance in Physics, Chemistry, and Elective Mathematics.

8. Conclusions

The family or parents provide a congenial environment for learning, motivate their children to study hard, emphasize high expectations for their children and the need to earn an honorable place in society. They also encourage their children to be academically ambitious and when the children do so, this emboldens them to study hard to succeed in their ambition. No matter how much family members and parents motivate their children to study, become actively involved in school-related activities, talk to them about the benefits of education, students would not excel academically unless they develop positive attitudes toward learning and translate their educational ambitions into the effort.

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