

A Path Analysis of Parental Socio-Economic Status and Home Education Environment on Students' Academic Achievement in the Secondary Schools in Benue State, Nigeria

Madu, B. C. PhD

&

Akobi, Thomas Ogbeche

Department of Science Education

Faculty of Education

University of Nigeria

Nsukka

Abstract

The main purpose of this study was to examine the influence of parental socio-economic status and home education environment on students' academic achievement using path analytic approach. The study adopted an ex-post-facto research design. The sample of the study was 360 respondents drawn using proportionate stratified random sampling technique from the population of Senior Secondary School II students from Zone B Education zone of Benue State.. The instrument for data collection was a 15 item structured questionnaire titled: Parental Socioeconomic Status and Home Education Environment Questionnaire (PSESHEEQ), modeled on a four (4) point rating scale. A data collection format of students' academic achievement was used by the researchers to collect the existing three consecutive ends of term's examination results of the sampled students. Cronbach Alpha was used to determine the internal consistency of the questionnaire items. The reliability index of the instrument was 0.68. Data collected was analyzed using Pearson Product moment correlation coefficient to answer the research questions. Also, Analysis of Moment Structure (AMOS) was used to estimate the paths coefficients which measured the magnitude of the relationship between the predictor variables and the criterion variable. Results showed that there was a significant relationship between parental socioeconomic status and students' academic achievement; there was also a significant relationship between home education environment and students' academic achievement. It was recommended among other things that parents should provide adequate fund for their children, which will help in obtaining the necessary reading materials that may enhance students' academic achievement.

Keywords: Socio-Economic Status, Home Education Environment, Students Academic Achievement, Path Analysis

Introduction

In recent years, there has been an increasing awareness on the interrelated nature of various variables on humans such as socioeconomic status and home education environment. It is a general believe that parental socioeconomic status has much to contribute to the students' academic achievement. But the assumption that the higher the socioeconomic status of parents, the higher the students' academic achievement is questionable, debatable and arguable, because students whose parents did not attend any level of education, have no reasonable income and have no good occupation equally have high academic achievement. This contradicts the findings of the numerous researchers that socioeconomic status and education environment of the home have high positive correlation with the students' academic achievement (Chikwelu, 2005; Obosedo, 2009). There are a significant number of studies that look at both the qualities of the home environment, as well as the parental behavior on child academic outcomes. Many of these studies use the home scale to assess the physical as well as the social environment of the home (Gottfried and Gottfried, 1984; Richter and Grier, 1991; Crane, 2001). A number of studies conducted in the various countries using the home scale found significant relationships between the home environment and cognitive development of children's reading and the growth of vocabulary which led to later academic achievement.

This has necessitated a gradual shift away from single variable study to studies that investigate the combined effect of related variables. Most of the studies carried out on socioeconomic status used only two variables, that is, one predictor and one criterion. Other statistics such as the mean, frequency count, percentages were used in data analysis but with the introduction of path analysis, at least two predictor variables and one criterion variable can be studied which is the focus of the present study. Thus there is need to investigate these variables collectively and not just looking at individual influence of these variables on students' performance and achievement. This study therefore, seeks to investigate the direct and indirect influence of parental socioeconomic status and home education environment on students' academic achievement using path analytic approach.

Concept of Path Analysis

Path analysis was originally developed by geneticist Sewell Wright in the 1920s to examine the effects of hypothesized models in phylogenetic studies. Wright's analysis involved writing a system of equations based on the correlations among variables influencing the outcome and then solving for the unknown parameters in the model (Land, 1969). According to Wright, the path analytic method was intended to measure the direct effect along each separate path in such a system and finding the degree to which variation of a given effect is determined by each particular cause. Wright also acknowledged the fact that often causal relations were uncertain and cautioned that this method was not intended to deduce causal relations simply from correlation coefficients. Rather, the method utilized information provided by the statistical correlations in conjunction with qualitative information regarding the causal relationships to find the consequences of hypothesized structures (Scheiner, 2000). Path analysis is a statistical technique used primarily to examine the comparative strength of direct and indirect relationship among variables. Path analysis consists of a family of models that depicts the influence of a set of variables on one another. It is considered closely related to multiple regression analysis. It is an extension of the regression models, which researchers use to test the fit of a correlation matrix with a causal model that they test (Alwin, 1975). The aim of path analysis is to provide estimate of the magnitude and significance of hypothesized causal connections among sets of variables displayed through the use of path diagram. Since path analysis assesses the comparative strength of different effects on an outcome, the relationship between variables in the path model are expressed in terms of correlations and represent hypotheses proposed by the researcher. However, path models do reflect theories about causation and can inform the researcher as to which hypothesized causal model best fit the pattern of correlations found within the data set. One of the advantages of path analysis is that it forces researcher to explicitly specify how the variables relate to one another and thus encourages the development of clear and logical theories about the process influencing a particular outcome (McWayne, 2004). Path analysis is a subset of structural equation modeling. A multivariate method for establishing the magnitude of influence of multiple presumed independent variables on one dependent variable is structural equation modeling, (Heise, 1975). This method of analysis is particularly powerful and appropriate when considering non-experimental research. Non-experimental research does not demonstrate causality, but causal inferences can be made if non-experimental data are analyzed properly. Path analysis is a sub-type of structural equation modeling that uses only measured variables. Path analysis allows for the investigation of indirect and direct predictors of a dependent variable

The concept of path analysis can best be explained with the help of a path model (path diagram). Figure one (1) as shown below is a sample of a path model containing three variables

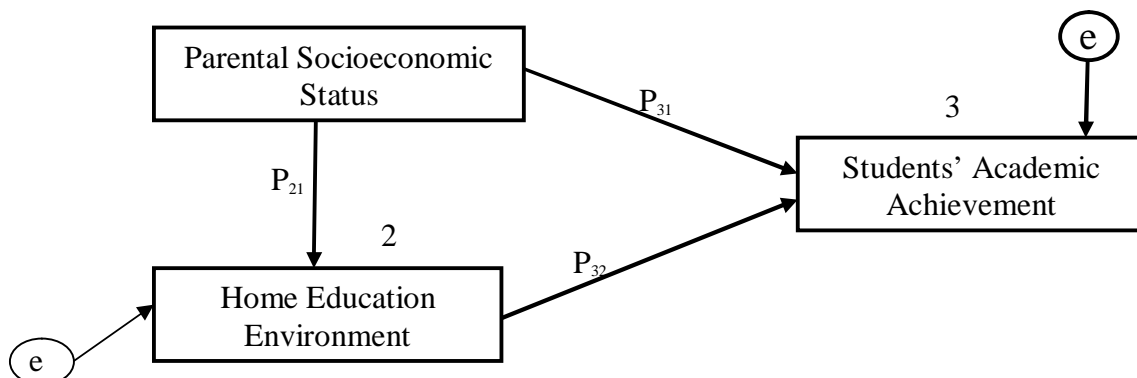


Fig.1: A hypothesized causal model of the influence of parental socioeconomic status and home educational environment on the students' academic achievement.

The path model shown in figure one is a recursive model in which the direction of the causal flow is one way. The model as indicated by the direction of the arrows shows that parental socioeconomic status has direct effect on home educational environment of the child and the dependent variable – students’ academic achievement. The model also shows that education environment of the home has direct effect on students’ academic achievement. The circles with letter ‘e’ represent error variables not included in the work but assume to be present. The letter ‘p’ with two subscripts as indicated in the model is a symbol for path coefficients. The first subscripts represent the dependent (criterion) variable while the second subscripts represent the independent (predictor) variables. Path diagram shows the presumed causal relationships between three or more variables. An example of a path diagram is further presented in Figure two. The variables are usually ordered from left to right or from top to bottom in terms of their causal sequence, a unidirectional causal relationship being indicated by a straight, single right-pointing arrow. So variables to the left of other variables are assumed to influence variables to their right.

The path diagram in figure two shows how the parental socioeconomic status and home education environment influence the achievement level of students. However, parental socioeconomic status is made up of three variables namely; parents’ education, parents’ occupation and parents’ income. These variables also influence academic achievement separately either directly or indirectly as shown in fig. 2.

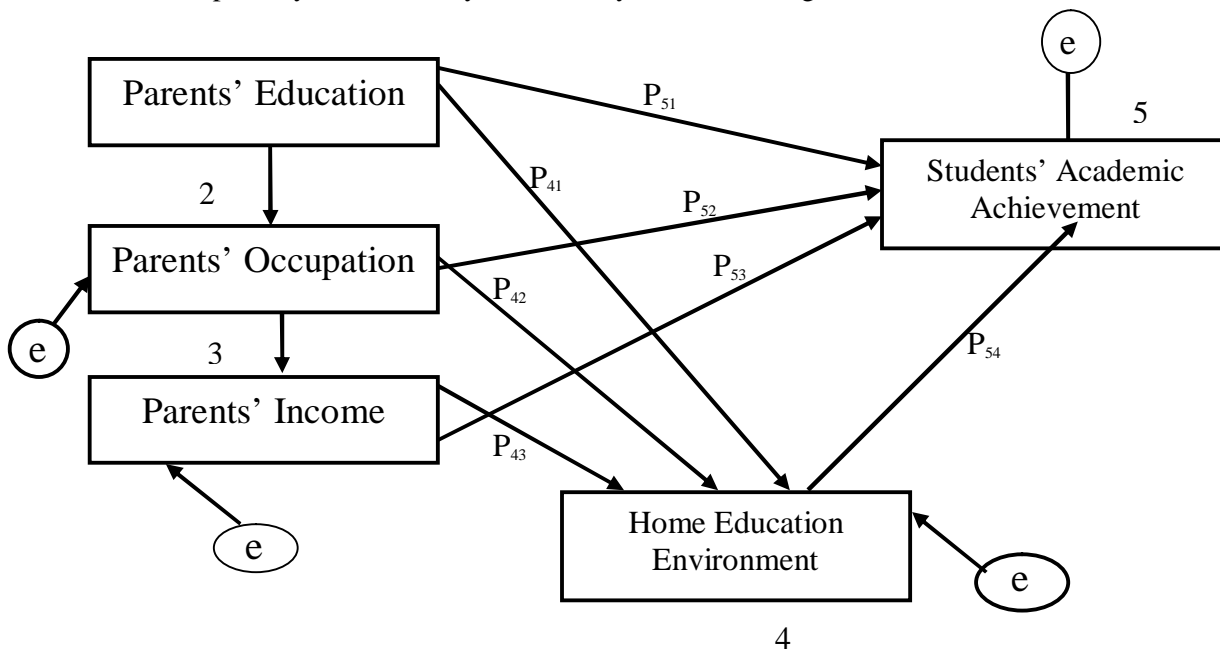


Fig. 2: Input Model of the Hypothesized Relationship between Parents’ Education, Occupation, Income, Home Education Environment and Academic Achievement of Students

The path diagram in fig.2 shows that parent’s education, occupation and income influence achievement of students separately either directly or indirectly. From the path diagrams in fig. 2, the researchers intend to estimate the influence of father’s education, occupation and income and home education environment on academic achievement of students. The same thing will be done to mother’s education, occupation and income. These three variables constitute parental socioeconomic status that the researchers intend to investigate.

Purpose of the Study

The main purpose of this study is to determine the influence of parental socioeconomic status and home educational environment on students’ academic achievement using path analytic approach.

Research Questions

The following research questions guided the study

- What is the relationship between Parental Socioeconomic Status and Students’ academic achievement
- What is the proportion of variation in the students’ achievement that is attributed to the predictor variables.
- What are the magnitudes and directions of the correlation coefficient among the variables in the path model

Method

The study adopted an ex-post-facto research design. Ex-post-facto research design is the type of design that is similar to experimental study in the sense that it also seeks to establish cause-effect relationships, but differs from it in that the researcher usually has no control over the variables of interest and therefore cannot manipulate them. The researchers only attempt to link some already existing variables as causative agents. At the commencement of this study, the researchers find that the subjects are already assigned to or classified into various levels of the variables whose influences are being investigated. This design is appropriate because, the researchers did not manipulate independent variables. Instead, the influences of the independent variables on dependent variable were determined.

The area of study was 'ZONE B' education Zone of Benue State, Nigeria. The Zone comprises of seven (7) local government areas namely; Buruku, Gboko, Guma, Gwer, Gwer West, Tarka and Makurdi local government areas. The inhabitants of the Zone are predominantly farmers, traders, Artisans, civil and public servants. The Zone was selected for the study because all the various levels of socioeconomic status can be found within these towns. The population of the study comprised all the 7,636 SSII students from the 91 secondary schools in the seven local government areas of Zone B education Zone of Benue State. (Source: Benue State Examination Board as at February, 2013).

A sample of 360 SSII students was used for the study. A multi-stage sampling procedure was adopted for this study. In the first stage, two local government areas Gboko and Makurdi were selected from seven local government areas using purposive random sampling technique. These local governments were selected because Gboko is the largest commercial town in the Zone while Makurdi is the administrative centre. In the second stage, ten secondary schools were sampled from Gboko local government and eight secondary schools were sampled from Makurdi local government area using simple random sampling technique., Proportionate sampling technique was used to sample 208 students and 152 students from Gboko and Makurdi LGAs respectively using the formula (*Number of students in a local government divided by the total number of students in the two local government areas times the sample size. i.e. $n \div N \times \text{sample size}$, where n = number of students in a local government while N = total number of students in the two local government areas*). Proportionate sampling technique was used in the third stage because the numbers of students in the two local government areas were not the same.

The researchers used structured questionnaire titled "Parental Socioeconomic Status and Home Education Environment Questionnaire" (PSESHEEQ) to collect data for the study. Section 'A' of the Questionnaire sought information on students' demographic data such as: Students' class, name of school, parents' highest qualification, parents' occupation and parents' highest income per month while section 'B' sought information on home education environment. The questionnaire has a total of 15 items modeled on a four (4) point rating scale. The response options for items were - Strongly Agree (SA); Agree (A); Disagree (D) and Strongly Disagree (SD) with numerical values of 4,3 2, and 1 points assigned to each of the responses respectively. A data collection format of students' academic achievement was used by the researchers to collect the existing three consecutive ends of term's examination results of the sampled students. The educational qualification and occupational classification of parents were used to classify students under high and low socioeconomic status. The scoring of parents' education and occupation is according to Programme for International Students Assessment (PISA, 2000). To establish the validity of the research instrument developed by the researcher to collect data on parental socioeconomic status and home education environment, the questionnaire was given to two experts in measurement and evaluation, one expert in mathematics education and one expert in biology education, all in the Department of Science Education, University of Nigeria, Nsukka, and one expert in measurement and evaluation from Michael Okpara University of Agriculture, Umudike, Abia State. A data collection format designed by the researchers to collect data on students' three consecutive end of term examination results which **was** used to measure students' achievement was also validated by the experts. In all, five experts validated the instrument.

The experts were requested to assess the instrument with regard to the clarity of items, simplicity of vocabulary and relevance of items to the study. Based on the observations of these experts, the research instrument was modified appropriately. The reliability of the items was ascertained using Cronbach Alpha Statistics and the reliability coefficient of the items of home education environment was 0.68. The researcher used direct delivery method in the administration and retrieval of the questionnaire from the students. Students' performances in all the subjects they offer were used for the study. The coefficients of the output path diagram were analyzed using AMOS (Analysis of Moment Structure).

AMOS is software that is designed specifically for path analysis. Correlation coefficient of .80 and above was regarded as high relationship, .30 to .79 was regarded as moderate relationship, .01 to .29 was regarded as low relationship and a correlation coefficient of .00 was regarded as no relationship, (Dowine and Heath, 1974 as cited Nworgu, 2006).

Results

The results for this study are as presented on tables below

Research Question

- What is the relationship between the variables of Parental Socioeconomic Status and Students' academic achievement?

Table 1: Correlation Coefficients Matrix among the Predictor Variables

	Student Academic Achievement	Parents' Education	Parents' Occupation	Parents' Income	Home Education Environment
Student Academic Achievement	1	.450(.20)	.455(.21)	.600(.36)	.451(.20)
Parents' Education		1	.791(.63)	.569(.32)	.721(.52)
Parents' Occupation			1	.600(.36)	.678(.46)
Parents' Income				1	.539(.29)
Home Education Environment					1

Results in the table 1 revealed that the correlation between parents' education and students' academic achievement was 0.450. This means there was a moderate positive relationship between parents' education and students' academic achievement. The coefficient of determination associated with 0.450 is 0.20. The coefficient of determination (0.20) also known as the predictive value means that 20% of parents' education accounted for the variation in student's academic achievement in school. This is an indication that 80% of variation in students' academic achievement is attributed to other factors.

- What is the proportion of variation in the students' achievement that is attributed to the predictor variables?

Table 2: Model Summary

model	R	R square	Adjusted R Square	Std. Error of the Estimate
1	.621	.386	.379	0.613

- a. Predictors: (Constant), Home Education Environment, Parents' Income, Parents' Occupation, Parents' Education

Result on table 2 seeks to find how much of the overall variance of students' academic achievement is explained by the variables in the path model. Results showed that the relationship of the predictor variables and the criterion variable was .621 and the coefficient of determination (R Square) was .386, this means that the model as a whole explained 38.6% of the total variance of students' academic achievement. This also means that 38.6% of students' academic achievement is accounted for by the predictor variables – parents' education, parents' occupation, parents' income and home education environment. This is an indication that 61.4% of the variation in students' academic achievement is attributed to other factors not included in the model.

- What are the magnitudes and directions of the correlation coefficient among the variables in the path model?

The diagram below is an output path model.

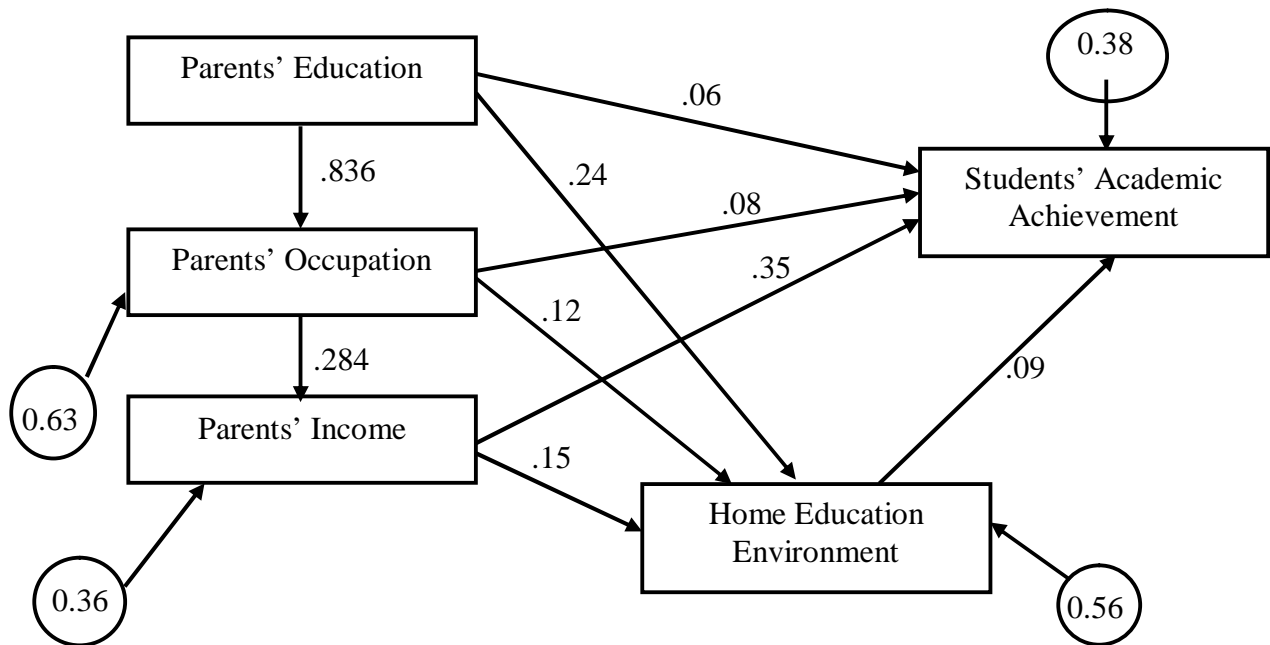


Fig. 3: An Output Path Diagram Showing the Direction and Magnitude of the Path Coefficients

The coefficients in the output path diagram as shown on figure 3 suggested strong causal effects among the predictor variables and with criterion variable. The directions of the pathways in the model are positive since there is no negative path coefficient, this means that there is no inverse relationship among the variables. The result as presented in the output path diagram indicated a positive direction among all the causal variables. It is a common practice in path analysis that paths whose coefficients are below 0.05 or which do not reach some significant level should be deleted from the output path diagram as recommended by Kerlinger & Pedhazur, (2009) and Garson, (2011). All the Path coefficients in the output path diagram are more than 0.05, therefore no path was deleted in the output diagram which means that all paths are important. This implies that all the predictor variables positively predict either directly and indirectly students' academic achievement. That is, socio-economic status of parents and home education environment influenced students' achievement in school.

Discussions of the Results

The correlation matrix of the variables of the study as shown on table 1 provided the input data for assessing the predictive ability of the predictor variables of students' academic achievement. The path coefficients of the model suggested the suitability of the predictor variables in predicting students' academic achievement since no path coefficient between two variables was less than 0.05. In view of the result, the predictor variables in the model were all retained as predictors of students' academic achievement.

Result on table 1 showed that the correlation coefficient between parents' education and students' academic achievement was 0.450 and the coefficient of determination associated with it was 0.20 indicating that 20% of students' achievement is accounted for by parents' education. The path coefficient between parents' education and students' academic achievement as shown on figure 3 was 0.06 which means that parents' education positively influence students' achievement. This is an indication that parents' education is a predictor of students' academic achievement ($\beta > 0.05$). This finding is in agreement with Chikwelu (2005) who found out that parents' education to some extent predicts students achievement in school. The magnitude of the path coefficient suggested a moderate causal effect of parents' education on students' academic achievement. Also, the path coefficient between parents' education and their occupation was high. This implies that to some extent, the education of parents contribute to the achievement of students academically through their occupation since the correlation between them was positive and high.

The correlation coefficient between parents' occupation and students' academic achievement was 0.455 and the coefficient of determination associated with the coefficient was 0.21.

Also, the path coefficient between parent's occupation and achievement of students was 0.08 indicating that parents' occupation positively influences students' academic achievement. The path coefficient also showed a moderate causal effect of parents' occupation on students' academic achievement. This also shows that there is a significant relationship between parents' occupation and students' academic achievement. The finding of the study is consistent with Chikwelu (2005) who found that, parents, irrespective of their occupational background give affordable support to their adolescent wards in school and guide them toward attaining higher educational standards which they see as a sure means of improving the socioeconomic status of the family. This finding also implies that the type of job parents do some extent influence their children's academic outcome. This is because the path coefficient has direct and positive effect of 0.08 on students' academic achievement.

The finding of this study as presented on table 1 also showed that the correlation between parents' income and students' academic achievement was positive and moderate. The coefficient of determination indicated that 36% of students' academic achievement is accounted for by parents' income. The path coefficient also showed that parental income has direct and significant positive effect ($\beta=0.35$) on students' academic achievement. This finding is in agreement with the earlier findings by Bryman and Crammer (1990) who found that parents' income to a greater extent determines students' academic achievement. This accounts for the reason why most poor children are educationally disadvantaged because of the poor condition of their parents. This also showed why most children from poor homes are not able to attend good schools because of the financial condition of their parents. No doubt, most children do not attend school at all and some dropout because of financial difficulty. No wonder, the path coefficient between parents' income and students' academic achievement is the highest on the output path diagram in figure 3. This finding showed that parents with high income have greater chance of giving their children the best education and that students from rich homes have greater chance of performing better than their counterparts from poor families.

The finding of the study showed that there was a significant relationship between home education environment and students' academic achievement. The coefficient of determination of 0.20 indicated that 20% of students' academic achievement is accounted for by home education environment. This finding is consistent with the earlier findings by Morgan (2005), Odebunmi (1980) and Masud, (1994) who both found that the environmental factors and the home have significant influences on students' academic development. Gottfried, Fleming and Gottfried (1998) also found that children whose homes had a greater emphasis on learning opportunities and activities were more academically intrinsically motivated. This implies that the home environment of the child affects or influences his/her academic achievement. This result demonstrated the importance of having educational and developmental resources in the home as well as the importance of parents talking to, playing with and reading to their children. The path coefficient also showed that as home education goes up by 1 standard deviation, students' academic achievement goes up by 0.09 which means that to some extent, home education environment predicts students' academic achievement.

Results on figure 3 indicated the magnitude of the path coefficient of each predictor variable and all the predictor variables made a statistically significant contribution to the determination of students' academic achievement, since all the significant values on figure 3 are greater than 0.05. In the order of rank, parental income has the highest contribution to students' academic achievement with a path coefficient of .349 followed by Home education environment with a path coefficient of .087. Parental occupation made the third contribution with a path coefficient of .083 and lastly parental education with a path coefficient of .061. This finding revealed that parents with high income have greater chance of giving their wards/children the best education than parents who have high level of education or have high qualification. This is because the coefficients of the output path diagram showed that parents' income has the highest direct and significant positive effect on students' academic achievement.

The unidirectional arrows (without origin) pointing to the latent factors of Parents' occupation, Parents' income, Home education environment and students' academic achievement represent unexplained (residual) variances for these four factors. Result on figure 3 showed that 38% of the variation in students' academic achievement is unexplained while 62% of the variation in students' academic achievement is explained by Parents' education, parents' occupation, parents' income and Home education environment (its predictors). Also 56% of the variation in home education environment is unexplained and only 44% is explained by the predictors of home education environment.

Result also showed that 36% of the variation in parents' income is unexplained while 64% of the variation in parents' income is explained by parents' occupation and finally, 63% of the variation in parents' occupation is unexplained by the model while 37% of the variation in parents' occupation is explained by parents' education.

Conclusion

The findings of the study revealed that there was a significant relationship between students' academic achievement and parental education, parental income and parental occupation. The finding also showed that home education environment had significant relationship with students' academic achievement. The output path diagram showed the path coefficients ranging from 0.06 to 0.35 which indicated that no path was deleted in the output path diagram this indicates that all paths are significant predictors of students' academic achievement. However, the variations in the magnitude of the path coefficients indicated the relative important of each variable to the prediction of students' academic achievement.

Recommendation

The following recommendations are made according to the findings of the study. Result of the study showed that there was a positive correlation between parents' income and students' academic achievement. Parents should therefore provide adequate fund for their children while in school. This will help in providing the necessary reading materials that may enhance students' academic achievement. Parents should take part in the education of their children at home in order to enhance the education environment of the home as well.

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