International Journal of Latest Research in Humanities and Social Science (IJLRHSS)
Volume 06 - Issue 12, 2023
www.ijlrhss.com || PP. 52-59

Parental Involvement as a Predictor of Upper Basic Education Students' Academic Achievement in Basic Science in Enugu State

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Abstract: The study investigated parental involvement as a predictor of upper basic education students' academic achievement in basic science in Enugu state. Two research questions and two null hypotheses guided the study. The design adopted for the study was predictive correlation design. The population of the study was 6,673 JS2 students in Enugu state. The sample size for the study was 500 students drawn using multistage sampling procedure involving purposive and random sampling technique. The instrument for data collection was Parental Involvement Rating Scale (PIRS)adopted from Naseema and Gafoor (2001). The students' achievement scores in Basic science were obtained from the teachers' score folder. Data obtained from the study was analysed using simple and multiple linear regressions. The findings of the study revealed among others that 1.7% of the variance in achievement in Basic science was predicted by parental involvement. Also, achievement scores in Basic science was significantly predicted by parental involvement. It was recommended that parents should spend more time with the students and be involved in every aspect of their academic endeavours while providing them with necessary encouragement, emotional and physical needs.

Keywords: Involvement, Basic-Science, achievement, predictor

Introduction

Basic science which was formerly known as Integrated science is an early form of science that adolescents come across at the upper basic level of education. It is regarded as a core compulsory subject in the National curriculum at the upper basic education level. Basic science is considered the foundation of all science subjects at the Senior Secondary School (SSS) level. The subject aims at preparing students at the upper basic education level (junior secondary) for the study of core science subjects (biology, chemistry and physics) at the senior secondary school level. The upper basic education level is the level of education after the basic education level that involves primary one to six and it sometimes referred to as the junior secondary level of education. According to Agbidye (2015), for students to be able to study any single science subject at the senior secondary level of education successfully, they have to be well grounded in Basic science at the upper basic level.

Trustees of Princeton University (2013) defined Basic Science as a revolutionary new introductory science curriculum established for students looking at taking up a career in science. Bajah (1983) as cited in Nwankwo and Okoli (2019) described Basic science as a science in which principles and concepts are presented in order to express the fundamental unity of scientific thought and avoiding premature or undue emphasis on the distinction existing in various scientific disciplines. Basic science therefore, is a science in single form which emphasizes the foundational unity of science. Consequently, Basic science entails the study of elementary Physics, Biology and Chemistry as a single science subject in the upper basic level of education. Thus, among the important objectives of Basic science teaching according to Federal Republic of Nigeria (FRN, 2014) is to provide students at the upper basic level a sound basis for continuing science education in single science subjects and to also serve as unifying factors for the various science subjects. The problems arising from the unifying nature of the subject shows that it requires more than the teachers effort to learn the subject as the basic foundation for science learning. Thus, the need for parental involvement in the learning of Basic science is all the more necessary if students must attain mastery over the concepts taught.

Parental involvement simply means the participation of parents in the academic activities of their children in a meaningful communication which may involve their academic learning and other school activities (Amponsah, Milledzi, Ampofo and Gyambrah, 2018). It is the process through which families and communities play active roles in creating an enabling environment for children's school learning experience. Family is considered to be the initial place of contact for many children as soon as they are born into the world. Parents also exert a wide range of influence on their children by giving them the initial training that is needed to help them live life effectively. As a result, the family serves as source from where most learning begins and parents as Bakar, Mamat and Ibrahim (2017) puts it, are the first and important educators of their children. This is

perhaps why parental involvement in a child's formal education has continued to gain significant interests in the field of childhood education and beyond.

According to Milstead, Walters and Poats (2018) parents get involved in their children's educational learning experience through: direct involvement in school management and decisions; getting involved in special or unique parenting programmes or activities and giving other support programmes. In the view of Han (2017) however, parental involvement in a child's education can occur in two major ways: school-based parental involvement and home-based parental involvement. While home-based parental involvement includes such activities as checking or helping a child with homework, the latter suggests that parents could get involved at school by participating in school events for their child (example coming for inter-house-sport, open days and Parent Teacher Association [PTA] meetings) (Han, 2017). Several researches have also consistently demonstrated the importance of parental involvement in facilitating academic achievement of children (Khajehpour and Ghazvini, 2011; Mahuro and Hungi, 2016; Shute, Hansen and Underwood, 2007). Porumbu and Necşoi's (2013) systematic review of 26 articles, meta-analyses, and other scholarly works also highlight the significance of parental influence on students' academic achievement. Nonetheless, how parental home-based involvement and school-based involvement affect students' academic achievement might differ based on certain characteristics, hence the need to look at the contributions of each type. In addition to the significance of parental involvement in students' academic achievement, the predictive association between the two variables in basic science is not widely known.

Purpose of the Study

The purpose of this study was to investigate parental involvement as predictors of upper basic two students' academic achievement in Enugu State. Specifically, the study sought to determine the:

1. Extent to which parental involvement predict upper basic two students' academic achievement in Basic science.
2. Relative contribution of the dimensions of parental involvement (parental acceptance, aspiration, encouragement, guidance, influence, decision-making and parental care for physical fitness) to upper basic two students' academic achievement in Basic science.

Research Questions

1. To what extent does parental involvement predict upper basic two students' academic achievement in Basic science?
2. What is the relative contribution of the dimensions of parental involvement (parental acceptance, aspiration, encouragement, guidance, influence, decision-making and parental care for physical fitness) to upper basic two students' academic achievement in Basic science

Hypotheses

1. Parental involvement is not a significant predictor of upper basic two students' academic achievement in Basic science.
2. The relative contributions of the dimensions of parental involvement (parental acceptance, aspiration, encouragement, guidance, influence, decision-making and parental care for physical fitness) to upper basic two students' academic achievement in Basic science is not significant.

Method

The design of the study is predictive correlation. Correlation design studies according Nworgu (2015) attempts to establish relationships between two or more variables and generally cover studies concerned with the relatedness of two or more variables. The correlation design indicates the direction and size of the relationship between the variables and may employ a group of statistics known as regression analysis. Regression analysis reveal the coefficient of determination, which is the percentage variable in the target variable that is explained by the predictor variable, and the prediction power which shows the increase or decrease in the target variable when the predictor variable increases by one unit.

The area of this study was Enugu Education Zone of Enugu state. Enugu Education Zone comprises of three local government areas, namely: Enugu East local government area, Enugu North local government area and Isiuzo local government area. Enugu Education zone is bothered in the North by Nsukka education zone and Ohaukwu education zone of Ebonyi state. It is bothered in the east by Nkanu education zone, in the South by Udi education zone and in the West by part of Udi and Nsukka education zones. Enugu education zone is made up of the urban and rural settlements and therefore, the schools are located in the urban and rural areas

The population of the study comprises all the junior secondary school two (JSS2) students in the three local government areas that make up Enugu education zone of Enugu State. Based on the 2022/2023 available

annual school census report, the population is 6,673 JSS2 students. The sample for this study consisted of 500 JSS2 students obtained using multi-faceted sampling procedure involving random and purposive sampling techniques. The instrument for data collection Parental Involvement Rating Scale (PIRS), and secondary school basic science teachers' folders.

PIRS is a 76 item questionnaire adopted from Naseema and Gafoor (2001) who developed the instrument for measuring the involvement of parents in their children's education. PIRS has nine components of parental involvement namely, parental acceptance, parental aspiration, attention, encouragement, guidance, influence, decision-making, provision of physical facilities and parental care to the physical fitness of the child. Parental acceptance measures the extent or degree to which the parents accept, agree to, approve, tolerate and co-operate with the child and his/her educative activities. The statements under this category measures the child's perception of the extent to which his parents agree with the schooling and related activities. Parental aspiration denotes the desires, higher aims, hopes, intentions, purposes among others, keenly pursued by the parents through the education and related activities of the child. The statements under this category measure the desire or ambition expressed by parents, as perceived by the child in connection with child's education.

The extent of attentiveness, consideration and vigilance of pupils 'education, concern, regard, etc. for the child exhibited by parents is denoted as parental attention. The statements under this category measure whether the pupil is obtaining the normal benefits to be derived from adequate contact with and attention from the parents. Parental encouragement is the quantity of encouragement, inspiration, stimulation, etc. given by the parents, to rouse or promote the educative activities of the pupil, as perceived by the child. The statements under this category give a measure of inspiration given by the parents for the child in his/her education through material and non-material rewards and communication. Parental guidance is the direct educative or instructive activities of the parents on the child through various activities such as teaching and training at home, helping and supervising in homework, regulating and controlling child's behaviours, advising and counselling. are involved. The statements under this category measure such direct helps given by parents in pupil's learning. Parental influence deals with the parents' acts as moral power, agents working invisibly, instrumental in effecting and promoting the education of the child. Parental Decision-making is the impact of the decisions of parents, concerning the child's education as perceived by the child is included here. The dimension of parental provision of physical facilities measures how far parents are providing physical facilities conducive to learning. Parental care to the physical fitness of child examines the care taken by parents in physical health of the child, is a condition influencing learning. This category measures the extent to which parents take special attention to the physical health of the child.

PIRS was designed as a scale with three responses viz: 'always true', 'sometimes' and 'never true'. For each positive statement a score of '2', '1' or '0' is to be given, respectively for the responses always true, sometimes and never true. For negative statements scoring is reversed. The score obtained on the items belonging to each component will give a measure of that component of Parental involvement. The teachers' folder is a score book where the Basic science teachers record the students' achievement in Basic science. The students' Basic science results of the students in JSS 1 annual result and JS2 first and second terms were obtained and average was determined and used as the students' academic achievement in Basic science.

The validity of PIRS was done by the researcher by preparing a parallel Parental Involvement Rating Scale meant for parents, with the same content and components as in the original scale. The parallel scale was administered to parents and scores were derived for the total scale and its components. The validity of PIRS and its components were found out by correlating the scores obtained by PIRS with the score obtained on the parallel scale. The coefficients of criterion-related validity thus obtained for the PIRS and its components indicated high validity. The reliability of PIRS was established by the Naseema and Gafoor (2001) using test retest method and estimation of internal consistency via Cronbach's Alpha. The reliability coefficient for the entire instrument using test retest was 0.92 and 0.91 when Cronbach's Alpha was used.

The researcher with the help of 10 research assistants who are subject teachers in the sampled schools administered the instrument directly to the respondents. The researcher briefly instructed the research assistants on the objectives of the study and how to administer the instrument and collect the data, having obtained the necessary permission from the school authority. The instruments were administer and collected on the spot to reduce sample mortality. The data generated from the instrument were collected by the research assistants and was inspected by the researcher and taken for analysis. A total of 510 questionnaires was administered but a total of 500 completely filled instrument was returned and used in the study.The data for the study were analysed using simple linear and multiple regressions. The criteria for rejecting or not rejecting any null hypothesis which were tested at 0.05 level of significance was that whenever Pvalue is less than or equal to 0.05 ($P \leq 0.05$) the null hypothesis was rejected and whenever Pvalue is greater than 0.05 ($P > 0.05$) was not rejected.

Results

Research Question 1: To what extent does parental involvement predict upper basic two students' academic achievement in Basic Science?

Table 1: Prediction of Upper Basic Students' Achievement score in Basic Science by Parental Involvement

Model	R	R^2	Adjusted R^2	Unstandardized coefficients (b)	Std. Error
Constant	.131[a]	.017	.015	85.612	11.874
Parental Involv.				.095	

a. Predictors: (Constant), Parental Involvement

Table 1 shows that a positive correlation (R = 0.131) exists between upper basic students' parental involvement and their achievement score in Basic Science. The R-Square value of 0.017 indicates that 1.7percent of the variance in Basic Science scores is predicted by parental involvement. The unstandardized coefficient $\beta$of 0.095 shows that a unit rise in parental involvement increases academic achievement score in Basic science by 0.095.

Research Question 2: What is the relative contribution of the dimensions of parental involvement (parental acceptance, aspiration, encouragement, guidance, influence, decision-making and parental care for physical fitness) to upper basic two students' academic achievement in Basic science?

Table 2: Contributions of the Dimensions of Parental Involvement in the Prediction of Achievement scores in Basic Science

Model		Unstandardized Coefficients		Standardized Coefficients	t	Pvalue
		β	Std. Error	β		
1	(Constant)	78.002	10.377		7.517	.000
	Parental Acceptance	.224	.147	.069	1.523	.028
	Parental Aspiration	.172	.282	.028	.610	.542
	Parental Attention	.126	.069	.082	1.817	.070
	Parental Encouragement	.151	.090	.075	1.675	.005
	Parental Guidance	.731	.299	.110	2.442	.015
	Parental Influence	.001	.065	.001	.012	.990
	Parental Decision-making	.099	.073	.061	1.356	.176
	Parental Provision of Physical Facilities	.503	.296	.076	1.702	.009
	Parental Care for Physical Fitness	.292	.678	.019	.430	.047

a. Dependent Variable: Basic Science Achievement score

Table 2 shows the standardized beta coefficient which indicates predictive correlation between variables. The unstandardized beta coefficient shows the predictive value of each dimension of parental involvement which indicates their relative contribution to achievement score in Basic Science. The table shows that parental acceptance has a positive predictive correlation (R = 0.069) with students' achievement score in Basic Science, parental aspiration has a positive predictive correlation (R = 0.028) with achievement score in Basic science, parental attention has a positive predictive correlation (R = -0.082) with achievement score in Basic science, parental encouragement has a positive predictive correlation (R = 0.075) with students' achievement score in Basic Science, parental guidance has a positive predictive correlation (R = 0.110) with students' achievement score in Basic Science, parental influence has a positive predictive correlation (R = 0.001) with students' achievement score in Basic Science, parental decision-making has a positive predictive correlation (R = 0.061) with students' achievement score in Basic Science, parental provision of physical facilities has a positive predictive correlation (R = 0.076) with students' achievement score in Basic Science and parental care for physical fitness has a positive predictive correlation (R = 0.019) with achievement score in Basic science. Table 2 also shows that, with a unit increase; parental acceptance increases achievement score in Basic science increases by 0.224, parental aspiration increases achievement score in Basic science increases by 0.172, parental attention increases achievement score in Basic science increases by 0.126, parental encouragement increases achievement score in Basic science increases by 0.151, parental guidance increases achievement score in Basic science increases by 0.731, parental influence increases achievement score in Basic science increases by 0.001, parental decision-making increases achievement score in Basic science increases by 0.099, parental provision of

physical facilities increases achievement score in Basic science increases by 0.503, and parental care of physical fitness increases achievement score in Basic science by 0.292. Thus, the order of relative contribution to achievement score in Basic Science from the highest to lowest by each dimension of parental involvement therefore is; parental guidance (0.731), followed by parental provision of physical facilities (0.503), parental care for physical fitness (0.292), parental acceptance (0.224), parental aspiration (0.172), parental encouragement (0.151), parental attention (0.126) parental decision-making (0.099) and then parental influence (0.001).

Hypothesis 1: Parental involvement is not a significant predictor of upper basic two students' academic achievement in Basic science.

Table 3: Significance of Prediction of Achievement score in Basic Science by Parental Involvement

Model		Sum of Squares	df	Mean Square	F	Pvalue
1	Regression	1225.745	1	1225.745	8.693	.003[b]
	Residual	70219.055	498	141.002		
	Total	71444.800	499			

a. Dependent Variable: Achievement score

b. Predictors: (Constant), Parental involvement

Table 3 shows that parental involvement is a significant predictor of achievement scores in Basic Science, $F(1, 498) = 8.693$, $p < 0.05$. The null hypothesis was therefore rejected meaning that parental involvement is not a significant predictor of upper basic two students' academic achievement in Basic science.

Since parental involvement is a significant predictor of achievement scores in Basic Science, the regression model ($Y= a + bX$) for the prediction of achievement score in Basic Science as derived from Table 1, where constant = 85.612 and b value = 0.095 is:

AABS = 85.612 + 0.095(PI)

Where, AABS = Academic Achievement in Basic Science and PI = Parental involvement.

Hypothesis 2: The relative contributions of the dimensions of parental involvement (parental acceptance, aspiration, encouragement, guidance, influence, decision-making and parental care for physical fitness) to upper basic two students' academic achievement in Basic science is not significant.

Table 4: Significance of Prediction of Achievement score in Basic Science by the Dimensions of Parental Involvement

Model		Sum of Squares	df	Mean Square	F	Pvalue
1	Regression	3256.835	9	361.871	2.600	.006[b]
	Residual	68187.965	490	139.159		
	Total	71444.800	499			

a. Dependent Variable: Basic Science Achievement score

b. Predictors: (Constant), Parental Care for Physical Fitness, Parental Provision of Physical Facilities, Parental Encouragement, Parental Influence, Parental Decision-making, Parental Guidance, Parental Aspiration, Parental Acceptance, Parental Attention

Table 4 shows that the dimensions of parental involvement jointly predicted the students' achievement scores in Basic Science significantly, $F(9, 490) = 1.413$, $p < 0.05$. However, data contained in Table 2 shows the significance of the contributions of the individual dimensions of parental involvement to the prediction of achievement scores in Basic Science.

Table 2 shows that parental acceptance is a significant predictor of achievement scores in Basic Science, $t(9, 490) = 1.523$, $p < 0.05$, parental aspiration is not a significant predictor of achievement scores in Basic Science, $t(9, 490) = 0.610$, $p > 0.05$, parental attention is not a significant predictor of achievement scores in Basic Science, $t(9, 490) = 1.817$, $p > 0.05$, parental encouragement is a significant predictor of achievement scores in Basic Science, $t(9, 490) = 1.675$, $p < 0.05$, parental guidance is a significant predictor of achievement scores in Basic Science, $t(9, 490) = 2.442$, $p < 0.05$, parental influence is not a significant predictor of achievement scores in Basic Science, $t(9, 490) = 0.012$, $p > 0.05$, parental decision-making is not a significant predictor of achievement scores in Basic Science, $t(9, 490) = 1.356$, $p < 0.05$, parental provision of physical facilities is a significant predictor of achievement scores in Basic Science, $t(9, 490) = 1.702$, $p < 0.05$ and parental care for physical fitness is a significant predictor of achievement scores in Basic Science, $t(9, 490) = 0.430$, $p < 0.05$. Thus, the significant contributors to the achievement score of students in Basic Science in order of significance are parental guidance, parental provision of physical facilities, parental care for physical fitness,

parental acceptance and parental encouragement. However, since the joint prediction of all the dimensions of parental involvement in the prediction of achievement score in Basic Science is significant, the regression model ($Y= a + bX_1 +cX_2 + dX_3 + eX_4 + fX_5 + gX_6 + iX_7 + jX_8 + kX_9$) for the prediction of achievement score in Basic Science as can be derived from Table 2 is:

AABS = 98.002 + 0.224(PA) + 0.172(PAS) + 0.126(PAT) + 0.151(PEN) + 0.731(PGU) + 0.001(PIN) + 0.099(PDE) + 0.503(PPPF) + 0.292(PCPF)

Where, AABS = Academic Achievement in Basic Science and PA = parental acceptance, PAS = parental aspiration, PAT = parental attention, PEN = parental encouragement, PGU = parental guidance, PIN = parental influence, PDE = parental decision making, PPPF = parental provision of physical facilities, PCPF = parental care for physical fitness.

Discussion

The findings of the study revealed that parental involvement significantly predicted academic achievement in basic science. The observed findings of the study can be explained from the fact that students whose parents are involved in their school affairs have better attendance and behaviour, get better grades, demonstrate better social skills and adapt better to school. Parental involvement also more securely sets these students up to develop a lifelong love of learning, which is known to be the key to long-term success. Parental Involvement is the first step towards parental engagement in students' school activities. It includes participation in school events or activities, with teachers providing learning resources and information about their student's grades. With involvement, teachers hold the primary responsibility to set educational goals. But while teachers can offer advice, families and caregivers have important information about their children that teachers may not know. So a student's learning experience is enriched when both bring their perspectives to the table.

Parental guidance as shown in the findings of the study is a significant contributing factor in parental involvement's positive effects on academic achievement in basic science. The family is the primary social institution one is born into. Primary knowledge of what is right and what is wrong are learnt through the parent's instructions and advice from a very young age. It is through constant parental guidance that the students' life is shaped and it also defines what they become. The parental guidance could be through constant advice and instructions or by setting themselves as an example for the children. To set in the right track, students may need constant guidance from parental to steer them in the right academic track. Further involvement may include the provision of physical facilities which has been shown in this study to significantly improve academic achievement in basic science.

Physical activity has an impact on cognitive skills such as concentration and attention, and it also enhances classroom attitudes and behaviours, all of which are important components of improved academic performance. Thus, parents' provision and care of physical fitness is also important for students' learning as well. Physical activity has a direct impact on the behaviour and development of the brain. The more physically fit students are not only often better at reading, but they were also better at reading passages with several that demands cognitive tasks. Students who are physically active tend to have better grades, school attendance, cognitive performance (e.g., memory), and classroom behaviours (e.g., on-task behaviour). Higher physical activity and physical fitness levels are associated with improved cognitive performance (e.g., concentration, memory) among students. Physical Development brings a child into contact with new challenges that affirm or tests their self-esteem. Supporting young students' physical development through provisions of physical fitness supports their overall achievement just like when their provide encouragement.

Parental encouragement is a process which is undertaken by the parents to direct the child's behaviour towards higher academic progress. Encouraging words and actions are often internalized by students and have the power to motivate them to succeed. Encouragement can even be the difference between students completing school and giving up on themselves. When we praise children for their effort and help them see falling short as an opportunity to learn and improve (rather than simply focus on the outcome), they will be more motivated to work hard and more likely to believe that they can achieve what they put their mind to. The path to student confidence begins by creating a culture of encouragement. Keeping students on the right track once they demonstrate progress is vital to helping them achieve their goals. Providing verbal praise is a great way to offer encouragement to students who show progress throughout the learning journey. Tangible forms of encouragement give students a visual reminder that they have the power to learn and succeed. They are especially effective when used sparingly or in moderation after students achieve learning milestones in the classroom.

The findings of the study collaborates with the findings of Rogers, Theule, Ryan, Adams and Keating (2009) that mothers' encouragement and support predicted higher achievement. The findings this study support the findings of Mutodi and Ngirande (2014) that three parental involvement constructs, that is, parenting, parent –teacher communication and home and family support were found to be positively related to performance. The

findings of Mahuro and Hungi (2016) that parental participation through parenting and communication significantly increases students' numeracy scores by 6 and 15 percentage points, respectively, supports the findings of this study. The findings of Lara and Saracostti (2019) and Amponsah et al. (2018) that there is a significant positive relationship between parental involvement in education and students' academic performance, is in line with the findings of this study.

Conclusion

Parental involvement has the capacity to motivate students and help them mitigate negative peer influences that may be detrimental to their academic achievements. Parental involvement positively and significantly influences students' towards attaining higher academic achievement in Basic science.

Recommendations

1. Parents should spend more time with the students and be involved in every aspect of their academic endeavours while providing them with necessary encouragement, emotional and physical needs.
2. Parents should discuss with their children and wards their academic challenges with a view to help them in the best possible ways to reach a better solution to such challenges.

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