Predictive Validity of School and Student Factors on Secondary School Students' Academic Performance in Physics

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__Abstract:__ The study investigated the predictive validity of school and students' factors on secondary school students' academic performance in physics. The result reveals that four of the school and students' factors (availability of instructional materials, teachers' qualification, background in mathematics and parental socioeconomic status) have positive influence on students' performance in physics while the remaining two factors (school environment and parental motivation) have negative correlation on students' performance in physics. The result also revealed that students' background in mathematics significantly predicts students' academic performance in physics. The study concluded that, physics teachers should teach prerequisite mathematics concepts in physics before engaging them in real physics teaching as this will allow for meaningful understanding and integration of mathematics concept embedded in physics.
__Keywords:__ Predictive Validity, School Factors, Students' Factors, Academic Performance, Physics

I.   Introduction

Science education system occupies an enviable position in the world. Science is the bedrock on which modern day technological advancement is built on. Nigeria, like other nations in the world depends on what Science, Technology and Mathematics (STM) could offer for her national development (Ajewole 2005). The above statement has been internationally recognized, which has made science and in particular physics to assume its prime position in the world today. Within the context of science education, physics is an important subject and its importance to scientific and technological development cannot be overemphasized. The inclusion of physics as a core subject in science in the secondary school calls for the need to teach it effectively (Musyoki 2011).

A school is an institution established to provide learning spacesand environment for the teaching and learning with the aim of inculcating morals into the learners under the auspices of teachers.A student is a learner or someone who attends an educational institution under the guidance and supervision of a teacher. In this study, secondary school settings will be considered. Secondary education, as specified in the National Policy on Education, is to prepare students for useful living in the society and for higher education (FGN, 2004). The school factors discussed in this study includes; school environment, availability of instructional materials in schools and teachers' qualification. Science students was the focus in this study, since all of them offered physics in public examinations.Students' factors in this study are divided into students' background in mathematics, parental motivation, and parental socioeconomic status.

Physics is the branch of science concerned with the nature and propertiesof matter through careful observation,measurement and experiment which attempts to establish general laws or principles to describe the happenings in the universe. It is the study of matter, energy and the relationships between them, and find applications throughout the universe, since matter and energy constitutes our natural world. Physics is one of the basic sciences that touches our lives daily**.**

Academic performance has been described as the scholastic standing of a student at a given moment (Daniels and Schouten 1970). This scholastic standing could be explained in terms of the grades obtained in a course or groups of courses. (Mallory 2004) argued that performance is a measure of output and that the main outputs in education are expressed in terms of learning, that is, changes in knowledge, skills and attitudes of individuals as a result of their experiences within the school's system. Academic performance is regarded a student's performance in an examination as being depended on his cumulative grade point average (Al-Shorayye 1995). Jansen (2004) defined academic performance as the process of developing the capacities and potentials of the individual student so as to prepare that individual to be successful in a specific society or culture.

Despite the importance of physics in nations building and the concerted efforts of researchers to improve on its teaching and learning, the achievement of students in the in the subject appears to be very poor

(Okpe, 2018).Among the factors that have been identified by the researcher as factors contributing to the poor performances of students in physics are school environment; availability of instructional materials for the teaching of physics and teacher; and teachers' qualification and experience, students' background in mathematics, parental motivation and parent socioeconomic status.

According to stoops and Johnson (1989) cited in Adeyemo (2010), the schoolenvironment affects students' education, their conduct. School environment plays major role inthe life of every student. Udoh (1980) in his article "The Environmental Health Problems inNigeria Schools" identified some unhealthy practices in our schools (as cited in Orlu 2013).These include the location of the schools, inadequate facilities, poor ventilation, large class size, to mention but few.

Instructional materials are the tools used in educational institutions for teaching and learning in order to promote teachers 'efficiency and improve students' performance. The importance of instructional materials is to make learning catchy, more appealing, real and interesting. Itimproves students' knowledge of the subject matter, skills, ability and comprehension of information. It is also a tool used to clarify importantconcepts, in order to arouse and sustain students' interest. Ikerionwu (2000) posits that instructional materials are objects or devices that assist the teacher to present a lesson to the learners in a logical and manner.

On teachers' qualification and experience, Usman (2012) cited in Musau et al., (2015) established that a qualified teacher is one who holds a teaching certificate that is licensed by the state and well competent in her area of specialization.Teachers' year of experience is one of the teachers' qualifications indicators that is believed to be a significant determinant of students' academic performance. Greater teaching experience will produce students with higher achievement (Boyd et al., 2008). Studies have shown that inexperienced teachers are typically less efficient thanthe experienced teacher (Darling-Hammond, 2000).

Background knowledge is often referred to as prior knowledge. According to Schallert2002 cited in ReLeah (2012), background knowledge is a collection of "abstracted residue" thathas been formed from all of life's experiences. Human being brings diverse bits of background knowledge, consciously or subconsciously to every subsequentexperience, and use them to connect or glue new information to old.One way to enhance students' high quality learning may be the use ofbackground knowledge assessment as a tool for evaluating the level of support a student will need (Sharif et al, 2007).

Parental motivation is another student factor that influences the academic achievement ofstudents. Students that are motivated by either their parents or guardians exhibits purposeful behaviour aimed at achievingacademic set goals. Eamon (2005) affirmed that supportive and attentive parenting practicespositively affect academic achievement. Also, high parental aspirations have been associated with increasing students' interest in education (Majoribanks, 2005). Thestudy of Domina (2005) revealed that the effect of parentalmotivation and involvement in their children's school has on academic achievement is less clear.

Similarly, socioeconomic status of parents is another factor that influences academicperformance of students. Such factors as parental education level, occupation, income, socialclass and type of parenthood are all embedded in socioeconomic status. These factors have abearing also on the duration of the staying and achievement of the student at school. The type offamily and level of parents education influence the choice of school they place their children.

Hill & Craft, (2003) pointed out that socio economic status of parents has some influence on theacademic performance of children. It is believed that factors such as malnutrition, lack of motivation inhomes, spousal violence, and single parents as well as impoverished home environment affectsthe development of children's intellectual ability negatively (Mario, 2006).

1.1 Statement of the Problem
It is generally believed that Physics is abstract and difficult to understand. This belief is passed down from one generation to another and creates fear in students. Apart from this, many students have poor background in mathematics. Many students were taught by teachers that lacked adequate knowledge of mathematics subject matterdespite the fact that they studied mathematics, while some teachers were forced to teach mathematics which was not their discipline. In spite of the enormous role that physics provides for national development, the result has not been satisfactory.

In a situation where the students will be blamed for the poor performance, emphasis is only placed on the student's cognitive or intellectual ability. Little or no attention is given to the fact that the student's background in mathematics, school environment and other environmental factors can affect their performance in physics.

Therefore, the study sought to establish determinants of low achievement in Physics despite concerted efforts by stakeholders to provide resources and other components aimed at enhancing its achievement.

1.2 Research Questions

  i. What is the pattern of relationship among school related factors (school environment, availability of instructional materials and teacher qualification), student related factors (background knowledge in mathematics, parental motivation and parental socioeconomicstatus) and students' performance in physics in Ekiti State?

 ii. What is the composite contribution of school related factors ((school environment, availability of instructional materials and teacher qualification) and student related factors (background knowledge in mathematics, parental motivation and parental socioeconomicstatus) in the prediction of students' performance in physics in Ekiti State?

iii. What is the relative contribution of school related factors ((school environment, availability of instructional materials and teacher qualification) and student related factors (background knowledge in mathematics, parental motivation and parental socioeconomicstatus) in the prediction of students' performance in physics in Ekiti State?

 iv. Which of the predictor variables best predict students' performance in physics?

1.3 Significance of the Study

This study is important to all stakeholders in education as it provides a better understanding on the relationship between students' variables in several ways. The result of the study will provide a basis for development and improvement of students' performance in physics.This study will bring relief to concerned parents that have children with consistent low performance in Physics.

Furthermore, the study will serve as an eye-opener to the government to see another avenue to improve the lot of so many students that could bring our nation to an enviable position in the committee of developed nations. Government will see the reason to be more proactive and committed to the needs of our students by employing more teachers and developing them professionally so that they will not write students off even if they have challenges with Physics.

Curriculum developers will also see the need to introduce basic mathematical concepts for science students to aid as many that will delve into physics related discipline in the future.

Lastly, teachers will be well-positioned to erase the erroneous belief in students mind and encourage them to develop positive attitude towards the learning of Physics.

II.   Theoretical Review

The following theories are adopted for the study:
  i. Skinnerian Environmental Theory
 ii. Constructivism Learning Theory

2.1 Skinnerian Environmental Theory

This section is based on the fact that environment is vital for the achievement ofeducational goal. This becomes necessary since one of the variables under school factorsin this study is school environment.

Skinner postulated that experience and learning are basic and very essential to understanding of human behaviour. The environmental approaches conceive human behaviour as something that is acquired through the process of interaction with the environment, rather than inherited. According to this model, behavioural development is controlled by and is a function of the physical and psycho-social environment (Eze, 2010). Students' development isbelieved to be shaped by the pattern of reinforcement it receives from the environment. Skinner(1948) contributed in shaping the views expressed by environmental approach.

2.2 Constructivism Learning Theory

Constructivism is a learning theory Bruner (1960), explains how people might acquire knowledge and learn. The theory suggests that human construct knowledge and meaning from their experience. The fulcrum of constructivism is that human learning is constructed, that is, learners build new knowledge upon the foundation of previous learning. The learner selects and transforms information, constructs hypotheses, and makes inferences, relying on a cognitive structure to do so. This theory applies to the present study since one of the variables under student related factors is students' background in mathematics.

III.   Methodology

3.1 Research Design

The study adopted an ex post facto research design of survey research method becausethe researcher does not have control over the variables as their manipulation has already occurred.

3.2 Research Variables

The independent variables of the study includes; school environment, availability of instructional materials, teachers' qualification and experience, students' background in mathematics, parental motivation and parental socioeconomic status. The dependent variable of the study is students' academic performance in physics.

3.3 Population

The target population for this study comprised all public senior secondary school two students offering mathematics and physics; and their teachers in Ekiti State, Nigeria.

3.4 Sampling Technique and Sample

There are sixteen local government areas in Ekiti State, Nigeria. Simple random sampling technique was used to select four Local Government areas out of the sixteen Local Government areas. From the four local government areas, twelve schools were randomly selected. Also, simple random sampling technique was used to select all the physics students and their teachers in each of the selected schools. The total sample size for the study was four hundred and fifty students and twelve physics teachers.

3.5 Research Instruments

Five instruments were used for the study:
1. Students' Parental Influence Questionnaire (SPIQ)
2. School Environment Questionnaire (SEQ)
3. Physics Instructional Materials Checklist (PIMC)
4. Mathematics Achievement Test (MAT)
5. Physics Achievement Test (PAT)

3.5.1 Students' Parental Influence Questionnaire (SPIQ)

The instrument was developed by researcher to elicit information on how parental motivation and influence affects students' performance in physics. The instrument was divided into three sections. Section A captured the biographic data of the respondents, while second section B elicits information on the socioeconomic status of the respondents' parents and section C was for questionnaire items and it captured information on parental influence and motivation of parents on their wards. Section A was designed to elicit information about the participant's school and class. Section B elicits information about the socioeconomic status of the respondents' parents. The parents' occupation and average monthly income items were an open-ended item; hence all sorts of occupations were allowed. SPIQ was drawn on a four-point Likert scale response format: Strongly Agree, Agree, Disagree and Strongly Disagree. The reliability of the instrument was established using Cronbach Alpha, which gives 0.61.

3.5.2 School Environment Questionnaire (SEQ)

The instrument was used to elicit information from physics teachers. The questionnaire is in three sections. Section A captured the general information of the teacher. Section B was on teacher qualification and experience. Section C focused on school environment as it affects students' academic performance.

3.5.3 Physics Instructional Materials Checklist (PIMC)

The checklist was designed to elicit information on the availability of instructional materials for effective teaching of physics concepts in the classroom. It was used by the observer (researcher and the research assistants) in the various schools to check the availability of the identified instructional materials.

3.5.4 Mathematics Achievement Test (MAT)

MAT was constructed by the researcher using test blue print. Two hundred multiple choice items with four options (A, B, C, and D) were generated from Senior Secondary Schools II mathematics syllabus. The validity of the MAT was ensured. The generated items were given to mathematics experts as well as experienced secondary school mathematics teachers for vetting. After carrying out the necessary amendment based on suggestions and corrections made, the items were trial tested on two hundred SS2 students from secondary schools similar to the targeted samples to establish both the difficulty indices and discriminating indices of each item. 30 out of the 82 items that survived with difficulty indices between 0.40 and 0.60 and discriminating indices of 0.3 and above were selected and was used for the study. The reliability coefficient was determined using Kuder-Richardson (KR-20) and the reliability coefficient gives 0.82.

Topics/Level of Cognition	Knowledge (10.0%)	Comprehension (26.7%)	Application (30.0%)	Analysis (23.3%)	Synthesis (6.7%)	Evaluation (3.3%)	Total
Number and Numeration (33.3%)	1	4	2	3	-	-	10
Algebraic Processes (36.7%)	-	-	4	4	2	1	11
Geometry and Menstruation (10%)	1	-	2	-	-	-	3
Trigonometry (6.7%)	-	2	-	-	-	-	2
Everyday Statistics (13.3%)	1	2	1	-	-	-	4
Total	3	8	9	7	2	1	30

Table 3.1: Table of Specification (MAT)

3.5.5 Physics Achievement Test (PAT)

PAT was also constructed by the researcher using test blue print. Two hundred multiple choice items with four options (A, B, C, and D) were generated from Senior Secondary Schools II Physics syllabus. The validity of the PAT was ensured. The generated items were given to Physics experts as well as experienced secondary school mathematics teachers for vetting. After carrying out the necessary amendment based on suggestions and corrections made, the items were trial tested on two hundred SS2 students from secondary schools similar to the targeted samples to establish both the difficulty indices and discriminating indices of each item. 30 out of the 93 items that survived with difficulty indices between 0.40 and 0.60 and discriminating indices of 0.3 and above were selected and was used for the study. The reliability coefficient was determined using Kuder-Richardson (KR-20) and the reliability coefficient was 0.94.

Topics/Level of Cognition	Knowledge (10.0%)	Comprehension (26.7%)	Application (30.0%)	Analysis (23.3%)	Synthesis (6.7%)	Evaluation (3.3%)	Total
Interaction of Matter, Space and Time (17.5%)	4	2	2	1	-	-	11
Conservation Principles (35%)	3	2	2	1	1	-	9
Waves-motion without Material Transfer (35%)	3	1	-	1	-	-	5
Energy Quantization and Duality of Matter(2.3%)	1	2	-	-	-	-	3
Physics in Technology (10.2%)	-	2	-	-	-	-	2
Total	3	8	9	7	2	1	30

Table 3.2: Table of specification (PAT)

3.6 Method of Data Collection

The researcher visited the schools with the help of two trained assistants to observe the schools and to collect data objectively. Before administering the instrument, a letter of introduction from the Institute of Education, University of Ibadan was presented to the school authority. The purpose of the study was explained and their full cooperation was sought for the exercise. The instruments were administered to the respondents while the researcher and the trained assistants waited and collected the filled instruments. The administration of the instruments lasted for four weeks. However, the researcher exercised high level of perseverance and patience. Out of the 450 administered questionnaires and achievement tests, 416 were retrieved back from the students, leading to the loss of 34 of the instruments.

3.7 Method of Data Analysis

The data collected from the study was analyzed through Pearson Product Moment Correlation and Multiple Regression at 0.05 level of significance.

IV. Results and Discussion

Table 4.1: Correlation Matrix of Variables of Achievement in Physics

	SE	AIM	TQ	BM	PM	PSS	PAT
SE	1.000	.218**	.005	-.005	.011	-.091	-.023
AIM		1.000	-.071	.284**	-.176**	-.068	.226**
TQ			1.000	-.162**	-.084	-.080	.041
BM				1.000	-.162**	.144**	.718**
PM					1.000	.068	-.127**

PSS						1.000	.151**
PATS							1.000
Mean	47.37	32.12	4.83	13.86	38.47	11.45	13.37
SD	5.610	6.617	.377	6.002	9.218	5.498	5.862

KEY: SE = School Environment, AIM = Availability of Instructional Materials, TQ=Teachers' Qualification, BM= Background in Mathematics, PM= Parental Motivation, PSS= Parental socioeconomic Status, PATS= Physics Achievement Test Scores.

Table 4.1 indicated summary of data analysis on the test of relationship between the six independent variables. The result of the table reveals that, there is an inter correlation among the variables. The result also reveals that there is positive relationship among (availability of instructional materials, teachers' qualification, background in mathematics, parental socioeconomic status and students' performance in Physics) while there is negative relationship among (school environment, parental motivation and students' performance in Physics). The result also reveals that correlation coefficients shows that no two independent variables have same value of Pearson correlation index value that is more than 0.850, which shows that there isno multicollinearity in each of the predictor variables that could be used for the prediction of students' academic performance in Physics.

Discussion of Findings

The result of the study reveals that some school and students' factors had significant correlation with academic performance. The implication of this result is that physics students are aware of the factors that have the tendency of influencing their academic performance. This study supports the findings of Omeh (2010) who studied "influence of family background on the academic achievement of Senior Secondary School students". The findings of the study revealed that parental socioeconomic status have positive influence on the academic achievement of students. Also, Obafemi and Ogunkunle (2013) found that a sound background in mathematics will give students the ability to pursue their dream career in science and technology. They also postulated that the use of instructional materials that are student-centred, interactive and practical-oriented may enhance the performance of students in physics.

The result also reveals that teachers' qualification correlates with students' academic performance in physics but not significant. This implies that teachers who are teaching physics in Ekiti State are qualified. This study supports the findings of Guga (1998) who found that there is relationship between academic achievement and teachers' qualification. He asserted that education cannot be provided by just anybody, it requires a teacher who plans and delivers the lessons or instructions. This can only be achieved by qualified personnel with appropriate qualification. This result also agree with the study of Betts et al., (2003) which suggest that teacher with emergency certification (unqualified or without teaching qualification) negatively influence middle and high school students. However, the findings of this study negate the submission of Musa (2011) who found that there is no significant relationship between the availability of instructional materials and students' academic performance.

Table 4.2:Summary of Regression ANOVA table indicating the prediction of the criterion variable (Students' Performance in Physics)

R = .738[a]
R Squared = .545 Adjusted R Square = .538
R Standard Error of the Estimate = 3.989

ANOVA

Model	Sum of Square	DF	Mean Square	F	Sig
Regression	7735.118	6	1289.186	81.026	.000[b]
Residual	6459.744	406	15.911		
Total	14194.862	412			

Dependent Variable: Students Performance in Physics

Predictors: (Constant), Parental Socioeconomic Status, Availability of Instructional Materials, Teachers' Qualification, Parental Motivation, School Environment, Background in Mathematics *=Significant at P<0.05

Table 4.2 illustrate the multiple correlation (R), the multiple correlation squared (R^2) and the adjusted square multiple correlation (R_{adj}) which revealed how well the set of six predictor variables allowed reliable

prediction of the criterion variable (students performance in physics). The value obtained revealed that the coefficient of Multiple Regression, (R) = .738, (R^2) = .545 and adjusted R square is (R_{adj}) = .538. The model has a positive correlation. Therefore the variance observed is .538 which account for 53.8% estimate of the total variation of student performance in Physics. Hence, it is attributable to the contribution of the predictor variables built into the regression model.

Furthermore, Table 4.2 equally showed that F-test that examined the relationship to which the independent variables and dependent variable were linear. The F-ratio $_{(6,406)}$ = 81.026, p<0.05 was significant and allow for a reliable prediction of student performance in Physics.

Discussion of Findings

The result of the analysis reveals that the independent variables (school environment, availability of instructional materials, teachers' qualification, background knowledge in mathematics, parental motivation and parental socioeconomic status) significantly predicts students' academic performance in physics in Senior Secondary Schools at p<0.05. R^2 which is the co-efficient of determination shows that the independent variables account for a high proportion of about 53.8% of physics students' performance. Also, the standard error of the estimated means is 3.989%. This implies that the independent variables are relevant towards the determination of the dependent measure students' academic performance in physics. The study is in line with the work of Bandele (2003) who noted that the importance of instructional materials cannot be overemphasized. The result also support the findings of Omeh (2010) that parental motivation and socioeconomic status influenced students' academic achievement. This study also supports the findings of Ogunleye et al., (2014) that there is significant positive relationship between students' background knowledge in mathematics and their physics scores. The study was also in agreement with the findings of Owolabi and Adebayo (2012) who examined the effect of teacher's qualification on the performance of Senior Secondary School students in Physics. The results showed that students taught by teachers with higher qualifications performed better than those taught by teachers with lower qualifications.

Table 4.3: Summary of Relative Contribution of school related factors and student related factors to student's achievement in Physics

Model	Unstandardized Coefficient		Standardized Coefficient		
	B	Std. Error	Beta	T	Sig.
(Constant)	-9.686	3.495		-2.771	.006
School Environment	-.025	.036	-.024	-.695	.488
Instructional Materials	.035	.032	.040	1.090	.276
Teachers' Qualification	2.564	.532	**.165**	**4.820**	**.000**
Background in Mathematics	.708	.035	**.726**	**20.069**	**.000**
Parental Motivation	.005	.022	.007	.213	.832
Parental Socioeconomic Status	.063	.037	.059	1.710	.088

Dependent Variable: Students Performance in Physics

Table 4.3 reports the standard beta (β) coefficients which give a measure of the contribution of each independent variable to the model as predictor of the dependent (criterion) variable. Table 4.3 reveals that, among the six independent variables (school environment, availability instructional materials, teachers' qualification, background in mathematics, parental motivation and parental socioeconomic status) only two factors significantly predicted the student performance in physics. These are: teachers' qualification [β = .165, $t_{(406)}$ =4.820, p< .05], background in mathematics [β = .726, $t_{(406)}$ =20.069, p< .05]. Thus, teachers' qualification and background in mathematics contributed significantly to the prediction of students' performance in physics.

Discussion of Findings

The study indicated that the contributions of only two (teachers' qualification and background in mathematics) out of the six independent variables significantly predict students' performance in physics. This implies that teachers' who studied physics are the ones teaching the physics students. Also, the physics students are proficient in mathematics and understand the language of calculations. The study agrees with the findings of Ornek et al., (2008) that the language of physics is mathematics. The study also support the view of Vogt (2001) which suggest that measures of teacher academic qualifications represent one of the best predictors of students' better performance.

Table 4.3 also indicates that background in mathematics [β = .726, $t_{(406)}$ =20.069, p< .05] best predict students' performance in physics. Hence, it is statistically significant.

Discussion of Findings

The findings of the regression analysis reveals that students background in mathematics best predict students' performance in physics. The educational implication of this is that mastering of the basic mathematics skills by the physics students is among the most important factors for success in physics in secondary school. Hence, there is need for coordination between the curricular of physics and mathematics at secondary school level. This will remove the difficulty students faced in the application of mathematics in physics. It will also help the students to transfer concepts, ideas and procedures learned in mathematics to a new and unanticipated situation in physics. This is in line with Liu and Liu (2011) that there is a strong interrelationship between physics and mathematics in historical view. Also, Izaak (2014) show that there is a positive relation between interest at Physics and knowledge of Mathematics basic concepts with students' ability to solve Physics problems.

V.   Summary, Conclusion and Recommendations

The study was to establish the key determinants of performance in physics in Ekiti State, Nigeria in an attempt to provide a way of remedying the persistent poor performance in the subject. Data for analysis was obtained through questionnaires, checklist and achievement test. Physics students and physics teachers were used as subjects of the study.

5.1 Conclusion

Based on the findings and discussions of the study, it could be concluded that; student background in mathematics has great influence on students' performance in physics. The underlying assumption here is that where students have a solid background in mathematics, they will have a strong foundation for the study of physics. It is therefore expected that only schools with qualified mathematics teacher will have the opportunity to produce learners that have a better understanding of physics contents and improve their procedural knowledge to inter-relate various symbols during solving of physics problems.

5.2 Suggestions for Further Research

1. Further research could be carried out in other part of the country in order to generalize the findings of the study.
2. The study focused on schools and students factors as predictors of students' performance in physics, with much attention on school environment, availability of instructional materials, teachers' qualification, background in mathematics, parental motivation and parental socioeconomic status. Other variables should therefore be considered in further studies to ascertain how students' performance in physics will be influenced.
3. The researcher is suggesting the same study should be carried out on physics in other states of Nigeria and in other discipline.

5.3 Recommendations

1. Government should ensure that necessary instructional materials and teaching aids such as textbooks, charts and visuals are provided to aid physics learning.
2. The government should make all effort to recruit qualified and experienced teachers to teach physics in all the public schools in the state.
3. Sound mathematics background should be ensured for physics students in order to enhance their performance in physics concept.
4. Physics teachers should endeavor to teach prerequisite mathematics concepts in physics before engaging in real physics teaching as this will allow for meaningful understanding and integration of mathematics concepts embedded in physics contents.
5. There should be an increased instructional supervision in physics and mathematics education in the state. This should be undertaken by knowledgeable supervisors in the subjects.
6. Parents should provide should provide relevant textbook and writing materials for their children and give proper monitoring on how they study at home.

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