



## Teachers' Psychosocial Characters and Students' Achievement in Basic Science and Technology

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**Abstract.** Teachers play an important role in the education of students in acquiring knowledge needed in the society they intend to live. The National Policy of Education (1981), Section 5, 32a and b dialogue on the acquisition, development and inculcation of the proper value-orientation for the survival of the individual and society; the development of the intellectual capacities of individuals to understand and appreciate their environments. It is in the view of this intention that this study aimed at examining influence of teachers' self-efficacy, motivation and pedagogical competence on student's academic achievement in Basic Science and Technology (BST) in Ijebu-North Local Government of Ogun State, Nigeria. The study adopted a descriptive survey research. Simple random sampling technique was used to select 150 BST students from 3 schools in Ijebu North Local Government of Ogun State. The study made use of validated BST achievement test and questionnaire for self-efficacy, motivation and pedagogical competence. The results of variables of study showed significant outcomes and recommendations were made accordingly in the study i.e emphasis should be laid on teachers' pedagogical competence in terms of training for teaching effectiveness while factors of motivation should be given adequate attention.

**Keywords:** Psychosocial characters, self-efficacy, motivation, pedagogical competence, behaviours, communication skill, conceptual clarity, personality and psychological equanimity, achievements, Basic Science and Technology

### 1. Introduction

The importance of education cannot be overemphasized in terms of nation's development. Bandura (2018) affirm that quality of education largely depends on the quality of teachers. Teachers are the people empowered to manage teaching and learning by giving direction and advice to the

learners. Their behaviours, communication skill, conceptual clarity and psychological equanimity have direct bearing on the behavior and personality of the students. A teacher is a great factor in the academic achievement of students. They are the pillars of Education. National Policy on Education (6<sup>th</sup> edition, 2014). The goal of teacher education goes thus:

- Produce highly motivated, conscientious and efficient class room teachers for all levels of the educational system;
- Further encourage the spirit of enquiry and creativity in teachers;
- Help teachers fit into the social life of the community and the society at large and enhance their commitment to national goals;
- Provide teachers with the intellectual and professional background adequate for the assignment and to make them adaptable to changing situations; and
- Enhance teachers' commitment to the teaching profession.
- Setting professional standards for teacher educators who train new teachers;

A good number of subjects constitute a body of knowledge and Basic Science and Technology is one of the most recognized science subjects at universal basic education level in Nigeria today. Afuwape (2011) in UNESCO-UNICEF (1971) described Basic Science and Technology as an approach to the teaching and learning of science in which concepts and principles are presented so as to express the fundamental unity of scientific thought and avoid premature or undue stress on the distinction between various scientific fields. As prescribed by National Universities Commission, Nigeria. The aim of Basic Science and Technology (Integrated Science) is targeted at the following objectives:

- Produce students who are well equipped with the knowledge and skills for teaching

Integrated Science at the Senior Secondary School level; such teachers will also be able to teach Basic Science and Technology Education at the lower, middle and upper basic education levels if the need arises.

- Produce students who will adopt the ethics of teaching as a profession
- Produce effective Integrated science teachers who are skilled in instructional designs, delivery and classroom management as well as in dealing with human learners.
- Equip graduates with necessary skills, competencies, intellectual and moral training for a career in science education;
- Produce students who will be adept in industrial applications of Integrated Science in such areas as pest and pollution controls, management of public health, wild life parks, fish and integrated farming, biotechnology centres and laboratories, water and sewage treatment plants;
- Equip students with effective laboratory skills and;
- Prepare integrated science graduates to assume responsible and leadership roles in Ministries of Education, government education agencies and private education establishments.

Advocates of integrated science believes that some majorities of children do not attend schools beyond the basic and compulsory education in most countries including Nigeria, the minimal science to make them survive the current world of science and technology should be integrated type which draws its contents from all specific science disciplines i.e Physics, Chemistry, Biology etc. Basic Science and Technology has not been yielding the expected results as reported in research studies of Afuwape 2002, Afuwape and Olugbuyi 2019; Alebiosu 2017. Among the uproars in Basic Science and Technology are the following psychosocial variables: Teachers (Self-efficacy, motivation, and pedagogical competence) that call for check and balances.

Tschannen Moran (2021) states that forethought and outcomes expectation can help to master a situation and achieve the desired target.

Self-efficacy refers to the strength of an individual's belief in his ability to achieve a goal. Self-efficacy is synonymous with self-confidence and self-esteem. ([www.mariam-webster.com](http://www.mariam-webster.com)) defined self-efficacy as a feeling of satisfaction that one has in himself or herself, and self-respected. While self-esteem according to (Mbuva, 2016)

refers to a feeling of self-worth and confidence with regard to a specific activity or behavior. Self-esteem has been discussed by Maslow's hierarchy of needs. Shavelsen, Huber and starton (1976) identified these features of the concept as identified: organized, multifaceted, hierarchical, stable, developmental, evaluative, differentiable. Students are of different categories and individual differences, their potentialities, skills, and beliefs determine their academic performances. It is important to note that, their social life is characteriseed with self-efficacy, esteem and confidence. In that wise, student incentives are possible predictions of their clear-headed sound self-efficacy. Teachers' self-efficacy indicates confidence while teaching promotes students learning and academic achievement to desired levels. Teachers as pivotal of education desire self-efficacy. Self-efficacy is not concerned with specific attributes of an individual but the outcome of the attributes. It is concerned with the worth & value of an individual. It simply means that teachers are expected with high level of self-efficacy in order to be motivated in teaching and learning. It has been discovered that teachers with high levels of efficacy have positive attitude towards life and are open to new methods to yield positive academic achievement in students.

Motivation initiates guide and maintain goal-oriental behavior. It is a strong force directing individuals to act in more determined manner. Elliot et al (2020) noted that motivation is an important aspect of academic learning and success through childhood across adolescence. Teachers with a high developmental leadership profile will be able to create atmosphere which strengthens and help to reach a positive perception on student's studies while teachers with low developmental profile could create an atmosphere which is unsuitable for education. The concept of motivation is crucial in education and has been incorporated into the achievement literature as "expectancy" and "risk taking". Epitomizing Gewasari, Mnaullang and Sibuea, (2017). Motivation is seen as the power, urge, or need, passion, pressure, or psychological mechanism that encourages individuals to achieve specific targets. It is a level of anxiety that drives into accomplishing a task or mission or achieves a desired goal. Motivation could be used as an application of reinforcement approach in educational motivation as proposed by skinner. Studies in motivation investigated intrinsic and extrinsic motivation in the context of teaching and learning. Motivation is most important to everyday life activities for maximum achievement. Chia (2019) carried out research on the impact of teachers' motivation on academic performance of secondary school students, the study was conducted to investigate impact of teachers' motivation on

academic performance of secondary school students in Langtang North Local Government Area of Plateau State Four research questions were posed and two hypotheses tested. The descriptive research design was used for the study. The population for the study consisted of one thousand six hundred and fifty-six (1656) staff in the fifty (50) secondary schools in Langtang-North local government area. One hundred and fifty (150) teachers were drawn using simple random sampling technique. The instrument used for data collection was self-structured questionnaire which comprised of 18 items that investigated teachers' motivation on academic performance of students. Data were analyzed using mean score and chi-square. The findings revealed that lack of praise, teachers' reward being in heaven, gross insincerity and lack of political will to fund education are factors that influence poor motivation of teachers. The findings indicated that teachers' motivation help to enhance the psychomotor, affective and cognitive domains of the learners to perform well. Low motivation has an effect on the academic performance of the students.

Pedagogical competence is a powerful tool refers to as educational and teaching qualifications. Teacher's pedagogical competence is the ability to manage learning which includes planning, implementation and evaluation of learning outcomes. Pedagogical processes are reflections of competence, using procedures derived from established bodies of knowledge in curriculum areas, including methodological observation and instruction (Danielson, 2020). This level of competence is expected of teachers for the attainment of educational goals. And it is the mainstream of this study. The state of sound professional training and acquisition of teaching potentialities cannot be eroded in practice. Teacher with sound professional training and acquisition of teaching potentialities will find joy in the following:

- Mastery of subject matter
- Adequate and appropriate use of instructional materials and text series.
- Studying and understanding the learners' psychology
- Appropriate management of the learners in and outside the classroom
- Appropriate study and use of available educational plants
- Application of unending effective instructional interactions

Pedagogical competence is synonymous to teaching effectiveness, a dear need for a competent

educator. Dhurba Bahadur Shah (2022), carried out a research on TSE and its relationship on students affective and motivational variables in a higher institution. The sample of size of 95 teachers and 1924 students from Spanish Public Universities was used. Teachers were divided according to their prominent characters of self-efficacy. It was discovered from the result of the study that the teachers with intermediate self-efficacy responses had higher member of good students than the teacher with high self-efficacy. Teachers who believe highly in their teaching abilities had less control in assisting students to learn and the students' performance were not bold and encouraging but to low perception of self-efficacy, the students were not bold and encouraged in the content area but anxious than students of the teachers with the moderate self-efficacy. In all, 40% of the teachers believe in their abilities to assist the students think reasonably.

To suffice, the teachers, with high self-efficacy were strongly determined and believed, they can assist students' academic challenges effectively.

### 1.1 Research Questions

The following questions were raised for the study:

- Do teachers self-efficacy influence students' academic achievement in Basic Science and Technology
- Do teachers' motivation influence students' academic achievement in Basic Science and Technology?
- Do teachers' pedagogical competence influence students' academic achievement?

### 2. Research Methodology

The study adopted a descriptive survey research. Simple random sampling technique was used to select 150 Basic Science and Technology (BST) students from 3schools in Ijebu North Local Government of Ogun State. The study made use of validated BST. Achievement test and questionnaire for self-efficacy, motivation and pedagogical competence. The data collected was analyzed using inferential statistics of multiple regression analysis method to test the questions to show the influence of teachers' characteristics (self-efficacy, motivation, and pedagogical competence) on students' academic achievement in Basic Science and Technology.

3. Result and Discussion

**Research Question 1:** Do teachers self-efficacy affect students’ academics achievements in Basic Science and Technology.

**Table 1:** Regression Analysis of Teachers Self-Efficacy on Academic achievement in Basic Science and Technology.

Model Summary	ANOVA					
	Model	Sum of Squares	Df	Mean Square	F	Sig
R= .286	Regression	314.593	1	414.593	3.784	.042b
R <sup>2</sup> = .0817	Residual	55232.249	148	53.262		
Adj. R <sup>2</sup> = .506	Total	55646.842	149			
Std Errors=7.29805						

Table 1 shows the result of the regression of teachers’ self-efficacy on achievement in Basic Science and technology. The result shows significant outcome ( $F(1,148) = 3.784, P < 0.05$ ). This implies that teacher efficacy as predictor variable contribute significantly to the variance in academic achievement in Basic Science and Technology. The result further shows a multiple correlation coefficient of .286,  $R^2$  value of .0817 and adjusted  $R^2$  value of .506. This shows that the predictor variable accounted for 8.1% of the variance in academic achievement in Basic science and technology. Thus, teachers’ self-efficacy has significant effect on students’ academic achievement in Basic Science and Technology

**Research Question 2:** Of what effect is teachers’ motivation on students’ academic achievement in Basic science and technology?

**Table 2:** Regression Analysis of teacher motivation on students’ Academic achievement in Basic Science and technology.

Model Summary	ANOVA					
	Model	Sum of Squares	Df	Mean Square	F	Sig
R = .210	Regression	676.773	1	676.773	2.767	.000
R <sup>2</sup> = .0441	Residual	54970.070	148	53.009		
Adj. R <sup>2</sup> = .046	Total	55646.842	149			
Std Error = 7.28071						

Table 2 shows the result of the regression of teachers’ motivation as predictor variable on academic achievement in Basic science and technology. The result shows significant outcome ( $F(1,148) = 2.767, P < 0.05$ ). This implies that teachers’ motivation as predictor variable contributed significantly to the variance in academic achievement in Basic science and technology. The result further shows a multiple correlation coefficient of .210,  $R^2$  value of .0441 and adjusted  $R^2$  value of .046 thus showing that the predictor variable accounted for 4.4% of the variance in academic achievement in Basic science and technology. Thus, teachers’ motivation has significant effect on student achievement in Basic science and technology.

**Research Question 3:** Do teachers Pedagogical Competence influence students’ academic achievements in Basic science and Technology?

**Table 3:** Regression Analysis of teachers’ pedagogical competence on Basic science and technology.

Model Summary	ANOVA					
	Model	Sum of Squares	Df	Mean Square	F	Sig
R = .188	Regression	2805.613	1	2805.613	9.127	.003
R <sup>2</sup> = .035	Residual	76232.711	148	307.390		
Adj. R <sup>2</sup> = .032	Total	79038.324	149			
Std Error = 17.53254						

Table 3 shows the result of the regression of teacher pedagogical competence as predictor variable on academic achievement in Basic science and technology. The result shows significant outcome ( $F(1,148) = 9.127, P < 0.05$ ). This implies that teacher pedagogical competence as predictor variable contributed significantly to the variance in academic achievement in Basic science and technology. The result further shows a multiple correlation coefficient of .2188,  $R^2$  value of .035 and adjusted  $R^2$  value of .032 thus showing that the predictor variable accounted for 3.5% of the variance in academic achievement in Basic science and technology. Thus, teachers’ pedagogical competence has significant effect on students’ academic achievement in Basic science and technology.

#### 4. Discussion of findings

The result of the study shows that teachers' self-efficacy has significant effect on students' academic achievement in Basic science and technology. Teachers with high assurance of home, approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such teacher approach threatening situations with assurance that they can exercise control over them. Maria Eliophotou Menon, Andreas (2021) described the relationship between teacher self-efficacy, i.e., the extent to which teachers believe they can affect student learning, and student learning. MS Hussain, S.A Khan (2022) as cited by Matoti and unqueira (ND) reviewed 88 teacher self-efficacy studies and suggested that teachers with higher levels of efficacy are more likely to learn and use new approaches and strategies for teaching, use management techniques that enhance student autonomy and diminish student control, provide special assistance to low achieving students, build students' self-perceptions of their academic skills, set attainable goals, and persist in the face of student failure. This shows that there is a relationship between teaching efficacy and student academic performance which is similar to the finding of this study. It also aligns with Marjolein zee (2018) report that there is significant correlation between teacher self-efficacy and students' academic achievement.

The study also finds out that teacher motivation has significant on students' achievement in Basic science and technology. Teacher's Motivation level has a substantial impact on student levels of engagement and achievement behavior. Teachers high level of motivation is of utmost importance as it is one of the factors enabling them to efficiently carry out their educational duties which in turns influence students' academic achievement. The finding corresponds with Ken and Orji (2016) who examined the impact of teachers' motivation on the academic performance of students and found that teachers' motivation could impact on students' academic achievements by helping to explore, harness and develop students cognitive, psychomotor and affective domains for the betterment of our society. It also corresponds with Debarshi (2019) which showed that components of teachers' motivation were significant predictors of students' academic achievement. It is also close to Chia (2019) report that teachers' motivation helps to enhance the psychomotor, affective and cognitive domains of the learners to perform well. Low or poor motivation has an effect on the academic performance of the students.

The study also reported significant influence of teachers' pedagogical competence on students' achievement in Basic science. Thus, this finding support Ebenezer and Augustus (2021) who conducted a research on pedagogical competence of teachers and students academic achievement in junior secondary schools and found that with pedagogical competence, the teachers provide appropriate feedback, adapt to changing conditions, explained content to students and communicated learning goals effectively. It also confirms the report of Adegbola (2019) who conducted a research on teachers pedagogical competence as determinants of students' attitude towards basic science in South West Nigeria. The study teachers' pedagogical competence significantly influences students' attitude towards Basic Science. Similarly, appreciate the report of Filgona, Sakiyo and Gwany (2020) who conducted a research on the effects of teachers pedagogical content knowledge and students' academic achievement. The study reported significant outcome of pedagogical competenc on students' achievement.

Similarly, it corresponds with Fatmawada, Maswati and Krismiyati (2020) who conducted a research study on the Effect of Teacher's Pedagogical Competence and stated that teacher's pedagogical competence significantly influences the students' achievement.

Finally, the result shows that teachers' characteristics have influence on students' achievement in Basic science and technology. The role of teacher in achieving educational objectives cannot be over emphasized. Thus, factors related to teachers have always been of interest to researchers. This finding aligns with the report of Jeremie (2022), students' academic achievement is centered on school productivity and is largely influenced by teachers' characteristics. There is a consensus that teachers characteristics have significant effect on students learning outcomes (Oviawe, 2016). Adeniyi (2009) found out that teachers' characteristics are strongly associated with performance of students.

#### 5. Recommendations

It is recommended that emphasis should be laid on teachers' pedagogical competence in terms of training while factors that will motivates teachers should also be given adequate attention. Teachers should also intensify efforts in using various teaching styles which could influence students' achievement. It was also recommended that adequate measures should be taken by the teachers to ensure that students benefit from their teaching. In addition, the government and other educational stakeholders should arrange for seminars and

workshops for their teachers to boost their levels of competence in the classroom. Teachers should also exhibit intrinsic motivation that can influence students' attitude towards Basic Science and Technology in Nigeria Schools.

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