

## **Self-Efficacy and Motivation as Determinants of Students' Performance in Basic Science and Technology Examinations in Mkpato Enin Local Government Area of Akwa Ibom State, Nigeria**

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### **ABSTRACT**

*This study investigated self-efficacy and motivation as determinants of students' performance in basic science and technology examinations in Mkpato Enin Local Government Area of Akwa Ibom State. The study employed a survey research design. The population comprised 1645 JS3 basic science and technology students from 16 public secondary schools in Mkpato Enin Local Government Area. A sample of 217 JS3 basic science and technology students was drawn from 4 randomly selected secondary schools. The instruments used were validated for face and content validity by peer review. The reliability was determined using Cronbach Alpha for the Students' Self-Efficacy Questionnaire and Students' Motivation Questionnaire. Data were analysed using means, standard deviation, and one-way ANOVA to test the hypotheses at a 0.05 level of competence. The results revealed a significant influence of self-efficacy on students' performance in basic science and technology examinations. The result also showed that students' motivation significantly influenced their academic performance. It concluded that self-efficacy and motivation are elements of learning. Based on the findings, school guidance counsellors should encourage students to develop a high self-efficacy towards basic science and technology examinations.*

**Key Words:** Self-efficacy, Motivation, Performance, Basic Science and Technology

### **INTRODUCTION**

The success and failure in various classroom activities, particularly the learning processes depend on multi-various factors. Some studies attributed students' academic gains to teachers' variables such as teaching methods (Olagunju & Babayemi, 2014), years of teaching experience of the Science teachers (Cochran, Smith & Vilegas, 2016), teachers' competency and skills (Rahman, 2014). Other studies worked on school variables such as class size (Dieterle, 2015; Duflo, Dupas & Kremer, 2011), school location and environment (Owoeye & Yara, 2011), availability of infrastructural facilities such as good laboratory (Itighise & Babayemi, 2018). Many studies considered students' home backgrounds as another factor in their classroom success. Factors such as parental socio-economic background, family status, and educational level determine students' academic gains in science subjects (Alordiah, Akpadaka & Oviogbodu, 2015). This study investigated

psychological factors (self-efficacy and motivation) and students' performance in Basic Science and Technology examinations. An examination body reported students' performance in Basic Science and Technology in Nigeria. Table 1 reveals the performance of candidates in the Junior Secondary School Certificates Examination in Basic Science.

**Table 1:** Analysis of JSSCE Basic Science Result, Nigeria

Year	Number of candidates Registered	Numbers with credit A-C	%	Numbers without credit (P-F)	%
2010	15803	6639	42.01	9164	57.99
2011	16429	7693	46.83	8736	53.17
2012	20187	10249	50.77	9938	49.23
2013	26765	12903	48.21	13862	51.79
2014	17613	7604	43.17	10009	56.83
2015	18731	8135	43.43	10596	56.57
2016	18681	8953	47.92	10728	52.08
2017	19783	6831	34.52	12952	65.48

(Federal Ministry of Education, Research Statistics and Planning Section, 2018)

A critical look at the analysis regarding credit passes (that is, A-C) showed that it was only in 2012 that slightly higher than 50% of the students that registered for the Junior Secondary School Certificates Examination had credit passes. The failure rates (number without credit passes) recorded in 2010, 2011, 2013, 2014, 2015, 2016, and 2017 in Basic Science and Technology examinations bother a nation like Nigeria with scientific and technological goals to achieve in this millennium.

Research efforts to improve students' performance in Basic Science and Technology examinations showed attempts to improve teaching in secondary schools. Scholars lamented and recommended that further research to proffer a solution to this disheartening and persistent low academic performance in Basic Science and Technology should be conducted (Okpala, 2010). This study attempts to examine psychological factors that could be responsible for students' low performance in Basic Science and Technology examinations. The psychological factors are self-efficacy and motivation. Cherry (2018) remarked that self-efficacy, or individual belief in his abilities to deal with various situations, has a role in how he feels about himself, but whether or not he successfully achieves his goals in life. For this reason, scholars in educational research have shown concern about researching students' self-efficacy as it affects students' performance. [Doménech-Betoret](#), [Abellán-Roselló](#) and [Gómez-Artiga](#) (2017) examined self-efficacy, satisfaction, and academic achievement as the mediator role of students' expectancy-value beliefs. Their results revealed that students' expectancy-value beliefs (Subject value, Process expectancy, Achievement expectancy, Cost expectancy) played a mediator role between academic self-efficacy and the achievement/satisfaction relationship. The study by [Motlagh](#), [Amrai](#), [Yazdani](#), [Abderahim](#) and [Souri](#) (2011) investigated the relationship between self-efficacy and academic achievement in high school students. The study concluded that self-efficacy is a factor in academic achievement. Yusuf

(2011) investigated the impact of self-efficacy, achievement motivation, and learning strategies on students' academic achievement. Selected undergraduate students participated in the study. Self-efficacy beliefs significantly enhanced learning attainment. Motivation is a trigger stimulus; it is a process of arousing, maintaining, controlling, and channeling interest and attention toward or while performing a particular task. What is relevant to the learner can be motivated and thus facilitates perception. Motivation positively influences study strategy, academic performance, adjustment, and well-being of students in the domain of education. Asun (2001) observed that learning at whatever stage requires motivation and that initial germinal motivation is crucial and determines whether the students follow from the onset. To improve students' cognitive and affective outcomes in Basic Science and Technology and school learning, Basic Science and Technology Educators have continued to search for variables (personal and environmental) that could be manipulated to favour academic gains.

Of the entire personal and psychological variables that have attracted researchers in this area of educational achievement, motivation seems to be gaining more popularity and leading to other variables (Aire & Tella, 2003). The issue of motivating learners is an aspect of effective learning. The part of students' motivation in academic performance is considered an aspect of effective learning. Hall (2009) asserts that there is a need to motivate students to arouse and sustain their interest in learning Basic Science and Technology.

This study on self-efficacy, motivation and students' performance in Basic Science and Technology examinations is based on David McClelland's Achievement Theory (McClelland, 2002-2010). The theory emphasizes that an individual with a high need for achievement seeks to excel and avoids low-risk and high situations. Achievers avoid low-risk because the easily attained success is not a genuine achievement in high-risk projects; achievers see the outcome as a chance rather than an effort. Considering this from the classroom situation, learners achieve differently. The need for achievements by individual learners is a necessary factor. This need, according to the theory, is influenced by an internal drive for action (intrinsic motivation) and the pressure exerted by the expectation of others (extrinsic motivation). The need for achievement motivates an individual to succeed in competition and excel in important activities.

Sources of high need achievers as identified by McClelland (2002-2010) are:

- i. Parents who motivated independence in childhood (background training).
- ii. Praise and rewards for success (reinforcement).
- iii. Association of achievement with positive feelings (favourable attitude).
- iv. Association of achievement with one's competence and effort (including self-efficacy beliefs) not luck (independence)
- v. Desire to be effective or challenged (courage) among others.

The theory is very relevant to this present study in that it emphasizes that motivation and beliefs (self-efficacy) are connected to the achievements of individual learners. This study, therefore, investigated self-efficacy and motivation as determinants of students' performance in Basic Science and Technology examinations.

The emphasis placed on secondary school subjects in national policy on education reveals that Basic Science and Technology is an important science subjects needed for

individual and national development. As important as Basic Science and Technology subject is to individuals and national development, their teaching and learning are influenced by some psychological factors such as students, self-efficacy, and motivation. Reports from an examination body revealed students' performance in Basic Science and Technology is low; scholars attributed it to both students and teachers contributions. They recommended further research to proffer a solution to the problem. This study, therefore, investigated self-efficacy and motivation as determinants of students' performance in Basic Science and Technology examinations. Gender was also examined as a moderating effect.

This study investigated self-efficacy and motivation as determinants of students' academic performance in Basic Science and Technology examinations in Mkpato Enin Local Government Area. Specifically, this study was conducted to:

1. Ascertain the level of self-efficacy of Junior Secondary School 3 Basic Science and Technology students.
2. Determine the level of motivation of Junior Secondary School 3 Basic Science and Technology students.
3. Determine the difference in basic science and technology performance of students with different levels of self-efficacy.
4. Determine the influence of students' motivation on their academic performance in Basic Science and Technology examinations.

The following hypotheses were formulated to guide the study.

1. There is no significant difference in Basic Science and Technology performance of students with different levels of self-efficacy.
2. There is no significant influence of students' motivation on their performance in Basic Science and Technology examinations.

## METHOD

This study adopted a survey research design. The population comprised 1645 (809 male and 836 female) JSS3 students during the 2018/2019 academic session in the 16 secondary schools in Mkpato Enin Local Government Area of Akwa Ibom State, Nigeria (State Secondary Education Board, Uyo, 2018). A simple random sampling technique by balloting was used to select four (4) schools from Mkpato Enin Local Government Area. The intact class from the schools gives a sample of two hundred and seventeen (217) JSS3 Basic Science and Technology Students.

The instruments for data collection were the students' Self Efficacy Questionnaire (SSEQ) (Gahuma Erickson, Soukup, Noonan and McGurn 2016) and the Students' Motivation Questionnaire (SMQ) (Tuan, Chin and Shieh 2005) adapted with modifications. The reliability indices of the instruments were respectively 0.90 and 0.87 for SSEQ and SMQ, using Cronbach Alpha. The instruments SSEQ and SMQ were of two sections, A and B. Section A of SSEQ contained the school and gender of the respondents. Section B contained a 10-item questionnaire of Likert type, which the respondents indicate their opinion using, Not very like me =1, Not like me =2, Like me = 3, and Very like me = 4. Section B of SMQ contained a 16-item inventory of Likert type, which indicate the respondents opinion,

using Nothing like me = 1, partially like me = 2, Much like me = 3, and Very Much like Me = 4. School Result Sheet (SRS) that posed second-term examination results (scores) measured the students' performance. The instruments were administered to JSS 3 Basic Science and Technology students in Mkpato Enin Local Government Area. The completed and returned questionnaires were collected immediately for analysis. The Analysis of Variance (ANOVA), mean, and standard deviation were used for data analysis.

## RESULTS

**Table 1:** Mean and Standard Deviation of Self-Efficacy of JSS 3 Basic Science and Technology Students

S/n	Statements	NVLM	NLM	LM	VLM	Mean	Std. D	Decision
1.	I can learn what is been taught in class this year	112 51.6%	64 29.5%	34 15.7%	7 3.2%	1.71	.848	Not Like Me
2.	I can figure anything if I try hard enough	26 12.0%	82 37.8%	63 29.0%	46 21.2%	2.60	.953	Like Me
3.	If I practice every day, I could develop just about any skill.	56 25.8%	27 12.4%	88 40.6%	46 21.2%	2.57	1.091	Like Me
4.	Once I have decided to accomplish something that is important to me, I keep trying to accomplish, even if it is harder than I thought.	74 34.1%	55 25.3%	48 22.1%	40 18.4%	2.25	1.115	Not Like Me
5.	I am confident that I will achieve the goals that I set for myself.	25 11.5%	55 25.3%	69 31.8%	68 31.3%	2.83	1.002	Like Me
6.	When I'm struggling to accomplish something difficult, I focus on my progress instead of feeling discourage.	48 22.1%	76 35.0%	48 22.1%	45 20.7%	2.42	1.051	Not Like Me
7.	I will succeed in whatever careers path I choose.	51 23.5%	78 35.9%	56 25.8%	32 14.7%	2.32	.993	Not Like Me
8.	I believe hard work pays off.	41 18.9%	59 27.2%	80 36.9%	37 17.1%	2.52	.986	Like Me
9.	My ability can grow with effort	5 2.3%	12 5.5%	140 64.5%	60 27.6%	3.18	.629	Like Me
10.	I can change my basic level of ability considerably.	2 .9%	17 7.8%	71 32.7%	127 58.5%	3.49	.681	Like Me
<b>Weighted Mean=2.59</b>								

\*NVLM=Not Very Like Me, NLM=Not Like Me, LM=Like Me, VLM=Very Like Me

Table 1 shows the weighted mean score of 2.59 out of the maximum of 4.00, which is higher than the standard mean of 2.50. It implies that JSS3 Basic Science and Technology students' level of self-efficacy is high.

**Table 2:** Mean and Standard Deviation of Motivation of JSS 3 Basic Science and Technology Students

S/N	Statements	SD	D	A	SA	Mean	Std. D	Decision
1.	When learning new Basic Science and Technology concepts, I attempt to understand them.	92 42.4%	90 41.5%	10 4.6%	25 11.5%	1.85	.925	Disagreed
2.	When learning new Basic Science and Technology concepts, I connect them to my previous experiences.	14 6.5%	-	147 67.7%	56 25.8%	3.13	.708	Agreed
3.	When I do not understand a Basic Science and Technology concept, I would discuss with the teacher or other students to clarify my understanding.	97 44.7%	91 41.9%	14 6.5%	15 6.9%	1.76	.885	Disagreed
4.	When I make a mistake, I try to find out why.	16 7.4%	14 6.5	63 29.0%	124 57.1%	3.36	.897	Agreed
5.	I think that learning Basic Science and Technology is important because I can use it in my daily life.	-	15 6.9%	57 26.3%	145 66.8%	3.60	.617	Agreed
6.	I think that learning Basic Science and Technology is important because it stimulates my thinking.	53 24.4%	113 52.1%	39 18.0%	10 4.6%	1.45	.508	Disagreed
7.	In Basic Science and Technology, I think it is important to participate in inquiry activities.	52 24.0%	128 59.0%	28 12.9%	9 4.1%	1.97	.732	Disagreed
8.	I participate in Basic Science and Technology subject to get a good grade.	9 4.1%	14 6.5%	50 23.0%	144 66.4%	3.52	.794	Agreed
9.	I participate in Basic Science and Technology lessons to perform better than other students.	11 5.1%	107 49.3%	85 39.2%	14 6.5%	2.47	.694	Disagreed
10.	During a Basic Science and Technology lesson, I feel most fulfilled when I am able to solve a difficult problem.	-	22 10.1%	67 30.9%	128 59.0%	3.49	.674	Agreed
11.	During a Basic Science and Technology lesson, I feel most fulfilled when the teacher accepts my ideas.	-	13 6.0%	95 43.8%	109 50.2%	3.44	.607	Agreed
12.	During a Basic Science and Technology lesson, I feel most fulfilled when other students accept my ideas.	7 3.2%	29 13.4%	67 30.9%	114 52.5%	3.33	.827	Agreed
13.	I am willing to participate in this Basic Science and Technology subject because the content is exciting and changeable.	65 30.0%	113 52.1%	27 12.4%	11 5.1%	1.97	1.002	Disagreed
14.	I am willing to participate in this Basic Science and Technology lesson because the teacher uses a variety of teaching methods.	-	46 21.2%	76 35.0%	95 43.8%	3.23	.776	Agreed
15.	I am willing to participate in this Basic Science and Technology lesson because the teacher pays attention to me.	73 33.6%	92 42.4%	44 20.3%	8 3.7%	1.97	.828	Disagreed
16.	I am willing to participate in this Basic Science and Technology lesson because the students are involved in discussions	9 4.1%	36 16.6%	67 30.9%	105 48.4	3.24	.874	Agreed
	<b>Weighted Mean=2.73</b>							

Table 2 shows the weighted mean score of 2.73 out of the maximum of 4.00, which is higher than the standard mean of 2.50. It implies that JSS 3 Basic Science and Technology students' level of motivation is high.

**Table 3:** ANOVA JSS 3 Basic Science and Technology Students' Performance by Self-Efficacy

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	70463.736	2	35231.868	475.141	.000*
Within Groups	15868.190	214	74.150		
Total	86331.926	216			

Table 3 revealed a significant difference in basic science and technology performance of students with different levels of self-efficacy ( $F=475.141$ ;  $p<.05$ ). This means that self-efficacy significantly influenced students' performance in Basic Science and Technology examinations. Thus, hypothesis one that there is no significant difference in basic science and technology performance of students with different levels of self-efficacy was rejected. Table 4 shows estimated marginal means of academic performance based on self-efficacy. The result supported the findings of Yusuf (2011), who investigated the impact of self-efficacy, achievement motivation, and learning strategies on students' academic achievement. Scientifically, results of direct and indirect techniques showed that self-efficacy beliefs significantly enhanced learning attainment. Corroborating these results, Honicke and Broadbent (2016) revealed that self-efficacy influenced students' academic performance and that higher self-efficacy is more likely to result in higher levels of academic performance. Also, reporting from the same dimension, Tenaw (2013) investigated the effect of self-efficacy on students' academic performance and stated that students with high self-efficacy obtained higher scores on 50 mathematical problem tests. However, the result of this study negates the works of Gebka (2014); Cho and Shen (2013), who reported converse results on self-efficacy and academic performance. Their results showed that self-efficacy has an insignificant relationship with academic performance. The reasons include the timing or measurement and students' cultural differences (Honicke & Broadbent, 2016).

**Table 4:** Mean and Standard Deviation of Basic Science and Technology Students' Performance by Self-Efficacy.

Self-Efficacy	N	Mean	Std. D
Low	97	28.34	9.16
Moderate	84	52.83	8.73
High	36	77.75	6.52
Total	217	46.02	19.99

Table 4 shows the estimated marginal means of academic performance based on self-efficacy. Basic Science and Technology students with high self-efficacy had the highest mean score ( $=77.75$ ), followed by students with moderate self-efficacy ( $=52.83$ ), and Basic Science and Technology students with low self-efficacy had the less performance mean score

(=28.34). It means self-efficacy influences students' performance in Basic Science and Technology examinations.

**Table 5:** ANOVA of Influence of Basic Science and Technology Students' Motivation on Academic Performance

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	66473.484	2	33236.742	358.168	.000
Within Groups	19858.442	214	92.796		
Total	86331.926	216			

Table 5 revealed a significant influence of students' motivation on their performance in Basic Science and Technology examinations ( $F=358.168$ ;  $p<.05$ ). This means that inspiration significantly influenced students' performance in Basic Science and Technology examinations was by their motivation. Thus, hypothesis 2 that there is no significant influence of students' motivation on their performance in Basic Science and Technology examinations was rejected. The result agrees with Oriahi (2009), who stressed student motivation for better output in academic pursuit. Students' motivation correlates with academic performance (Oriahi, 2009). Reporting from the same dimension, Sukor, MohdAyub, Norhasnida and Norkhaizura (2017) found that inspiration is positively related to academic performance but that the level of motivation was moderate. The work of Chan and Norlizah (2017) demonstrated a contradicting result when compared with this study that showed Basic Science and Technology students with a high level of motivation significantly influenced their academic performance. Chan and Norlizah (2017) showed that students' moderate motivation to learn science resulted in their mid-low achievement in science. This result showed the importance of motivation in science learning.

**Table 6:** Mean and Standard Deviation of Basic Science and Technology Students' Performance by Motivation.

Students' Motivation	N	Mean	Std. D
Low	138	33.41	11.24
Moderate	37	58.57	3.98
High	42	76.38	6.93
Total	217	46.02	19.99

Table 6 shows estimated marginal means of academic performance based on s students' motivation. Basic Science and Technology students with high motivation had the highest mean score (=76.38), followed by students with moderate motivation (=58.57), and Basic Science and Technology students with low motivation had the less performance mean score



(=33.41). It implies that inspiration influenced students' academic performance in Basic Science and Technology examinations.

## CONCLUSION AND RECOMMENDATIONS

The findings of this study showed Basic Science and Technology students' extent of self-efficacy was moderate, and Basic Science and Technology students' level of motivation was high. There was a significant influence of students' self-efficacy on academic performance in Basic Science and Technology examinations. The result showed students' motivation significantly influenced their academic performance in Basic Science and Technology examinations. This study, therefore, concluded that students that showed a high level of self-efficacy and are positively motivated have a greater tendency to achieve highly even with moderate efforts. Self-efficacy and motivation are elements in students' learning. If these elements are of high degree, students will appreciate basic science and technology and may be motivated in overall learning outcomes. Based on the findings, the recommendations are:

1. School guidance counsellors should encourage students to develop high-efficacy beliefs toward Basic Science and Technology.
2. Parents should provide necessary school materials and living expenses for their ward to improve their motivation to learn Basic Science and Technology.
3. Teachers should use methods that motivate students to learn and not be gender biased.
4. The Ministry of Education should motivate students by giving scholarships to students who perform well in their academic pursuits in Biology. It will encourage other students to work hard and strive to get better in their academic engagements.
5. The School administrators should also give awards to students who perform well in Basic Science and Technology to motivate others.

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