

# Science Self Efficacy, Motivation and Adolescents' Academic Engagement in Science Related Subjects in Oyo, Nigeria

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## **Abstract**

*Shortage in health-related careers in the developing countries of the world due to the health practitioner's exodus to greener pasture becomes worrisome. Hence, study on Adolescents engagement in science subjects is worthwhile pursuing. This study investigates science self-efficacy, motivation and adolescents' academic engagement in science related subjects in Oyo, Nigeria. Researchers sampled a total of two hundred and ten adolescents from ten secondary schools in Oyo through simple random sampling technique. Researchers Self design instrument tagged science academic self-efficacy, motivation, science academic engagement (SAMSAE) was used for data collection. The instrument was pilot tested outside the study locale using Cronbach alpha yielded science academic self-efficacy  $r = 0.68$ , motivation  $r = 0.76$ ; and science academic engagement  $r = 0.82$ . Data administered with the aid of teachers at the study locale and collected on the spot and those that were correctly filled was analyzed using Pearson product moment correlation and multiple regression analysis. Result revealed significant correlation between adolescents' science academic engagement and academic self-efficacy, also significant relationship do exist between adolescents' science academic engagement and*

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*motivation. Furthermore, there was relative contribution of science academic motivation and academic self-efficacy to adolescent's science academic engagement. However, academic self-efficacy contributed greater than motivation to the dependent variable. Lastly, there was significant joint contribution of science academic motivation and science academic self-efficacy to adolescent's science academic engagement. Based on these results, conclusion includes that there is significant correlation between adolescents' science academic engagement and academic self-efficacy, significant relationship between adolescents' science academic engagement and science academic motivation and relative contribution of science academic motivation and academic self-efficacy. Thereafter, recommendations were made which include Guidance counselling or Educational psychologists should be posted to schools in order to adequately mounting the psychological constructs (academic self-efficacy and motivate) among the students. Parents should be encouraged to motivate their children towards science academic engagement and provide material to them and so on.*

*Keywords: science academic engagement; science academic self-efficacy; motivation; adolescents*

### **Introduction**

The decrease of health practitioners at developing countries particularly Nigeria calls for urgent attentions of the stakeholders. Persistent greener pasture search by health professionals and other careers are at alarming rate and if care is not taken, the devastating effect may be grievous. Science subjects to study in order to enter any health-related discipline are mathematics, biology, physics, chemistry plus English language that is compulsory for every student regardless of their departmental affiliation. It seems that every student wishes to be in a science class but not all of them possess the skills to achieve the objective of being there and this calls for mounting various psychological strategies capable of students' motivation towards science related subjects in school setting.

Studies have shown gender variation in the disposition to a science related subject. For example, Kang, Hense, Scheesoi and Keinonen, (2019) found that female students preferred biology and male preferred physics and chemistry. This means unless this disparity is reduced, there is likely to have continuous shortage of medical/health practitioners at various developing and developed countries as well. It is essential that science self-efficacy is an important variable that students should possess and display frequently. It is the belief an individual has about him/herself of being able to possess ability and capabilities to do science related subjects successfully. An individual belief on his/her ability is very germane to success. Once one is not sure of his/her capability on science related subjects, it is obvious that failure will be recorded at the end. Studies abound on the impact of self-efficacy on various fields of human endeavour. Kang; Li; Chen and Bao (2024), found that parental involvement and academic self-efficacy were positively associated with good academic performance. It is to emphasize that good academic performance is an offshoot of students' engagement on science related subjects and by extension other secondary school subjects, engagement of students on science subjects would no doubt boost future career on health-related discipline and this may reduce the acute short of health practitioners in Nigeria. Yi, Zhang, Lu and Shadiev (2024) found that sense of belonging positively and significantly influenced academic self-efficacy, academic hardiness

and post graduate emotional engagement. Academic self-efficacy and academic hardiness had a positive and statically significant impact contributed to postgraduates, cognitive, emotional and behavioural engagement. Ogunlade (2016) also found self-efficacy positively significantly to students' attitude to school. Also, Ogunlade (2015) found that self-efficacy has a positively significant relationship to project writing success among students of Emmanuel Alayande College of Education, Oyo. Likewise Ogunlade and Rasheed (2016) found self-efficacy positively significant relationship to academic achievement among secondary school students in Oyo East Local Government Area. Above findings show the importance of academic self-efficacy on both behavior and cognitive ability which may turn to success in the disposition of science related subjects. Science academic self-efficacy is more necessary to inculcate into adolescent, and this may invariably promote science related subjects' engagement among contemporary adolescents and in turn may increase health related career discipline and that effects of exodus of some health practitioner into foreign countries may be minimal.

Mounting science academic self-efficacy will promote positive disposition to science subjects among adolescents. Their interest will lead to regular class attendance, meaningful class participation, carry out laboratory works, involving in calculation and measuring related activities and at the end lead to full science academic engagement. Promotion of academic engagement in science related subjects can be best handled by both educational psychologists and science educators. Science self-efficacy which is the belief of individuals on their ability to be able to carry out works relating to science subjects successfully.

Individual belief on his/her ability to calculate, measuring, observing, doing or performing laboratory experimental work correctly and even in the midst of any setback, such person will never look back and will surely complete the work. Academic self-efficacy has been proved significantly on many school related tasks. For example, kand, Li, Chen and Bao (2024) revealed significant positive association between parental involvement, academic self-efficacy with good academic performance and this implies that

academic self-efficacy is a good predictor of success on virtually on areas of human endeavour and as be it may, it needs to be fostered among students. Likewise, academic self-efficacy plays a chain mediating role between the relationship of sustainable teaching innovation and graduate students' creative thinking (Yao, Liu, and Chen, 2024). According to Bandura 1997, self-efficacy refers to an individual belief about the ability to maintain set goals and achieve success. Individuals whose self-efficacy is low are not likely to achieve reasonable success in life and that is why counsellors or educational psychologists are needed in schools in order to mount this important psychological construct (science self-efficacy and motivation) among students. Students needs to be encouraged and tilted towards science related subjects' engagements, their phobia towards science needs to be removed psychologically.

Motivation of students towards science related subjects should be done psychologically. Motivation is an encouragement towards involvement on a given task. Motivation is an important aspect of learning, it drives learners towards the attainment of specific goals, it can be intrinsic, when students derive pleasure on science related subjects and extrinsic when students submit themselves in order to please significant person in their lives. However, whether intrinsic or extrinsic, both are good interventions that can enhance students positively disposition to science related subjects. Parents can motivate their children towards engagement in science subjects by providing stimulating environment, provision of relevant science textbooks, provision of incentives to them most especially when they performed excellently in science subject in school and so on. Government can also give awards to best students on science related subjects and this can motivate others to put in the best on science related subjects. According to Aseery (2024) revealed that teaching method for elementary teachers to increase motivation and engagement generally include making learning entertaining, breaking task into manageable steps, providing positive feedback, fostering equality, personalizing the learning environment, creating a positive attitude, incorporating physical activities having mastery of facts and story telling that implementing these would invariably promote motivation in religious education class. This assertion also

no doubt if implemented at secondary schools at science subjects' class will enhancing students' motivation.

Academic engagement in science subjects among adolescents could be fully enhanced with motivation through provision of conducive learning environment, good methodologies, physical activities and mounting motivation tasks capable of promoting positive attitude among the students. Health related officials, engineering related practitioners may be invited to come and give talks on courses available to science students in the nearest future and this no doubt will definitely promote science related subjects among the learners. Well-equipped laboratories and availability of science subjects at the school library may also foster students' interest on science related subject. Leong, Tan, Lau & Yong (2018) revealed in their studies that learners with high internal motivation perform better than students with low internal motivation and that positive association exist between motivation and science achievement supported motivation theory in which higher motivation led to higher achievement scores. Likewise (Ng, Lay, Areepattamanmil, Treagust and Chandrasegara (2012) found positive affect towards science and mathematics indicated statistically significant predictive effects on achievement in the two subjects for both Malaysian and Singaporean grade 8 students. Positive affectivity is a human features or attribute which explains how much people experience positive affects; and as a result, how one interacts with others and with their surroundings.

Presence of positive interaction between the students and teachers is likely to influence students' disposition to science related subjects. Teachers' sense of humor, encouragement of student involvement on science related subject would surely promotes their engagement and at the end have high science achievement. Motivation is like water to the plants and it works wonder on various human endeavour. Libao, Sagun, Tamangan, Pattahtan, Jr, Dupa, Bautista (2016), also found aptly extrinsic motivation to be related with students' academic performances among the indicators of motivations in learning science Areepattamanni, Khurma, Alhaknani, and Kadbey (2023) found science self-concept positively related to both intrinsic and instrumental motivation to science achievement.

Above, review of studies conducted by the scholars showed the significant impact of the psychological variables on science subjects among students' at various clime, however, it is evidently cleared that career on science-related subjects like nursing, medical doctors are relatively few at both developing and developed countries of the world and this may be due to Japa syndrome which motivates this present study. The study, therefore investigated the relationship between science self-efficacy, motivation and academic engagement in science related subjects among adolescents in Oyo, Nigeria.

Following hypotheses were raised and tested at 0.05 level of significance

- Ho1: there will be no significant relationship between science self-efficacy and academic engagement in science subjects among adolescents in Oyo town
- Ho2: There will be no significant relationship between science academic motivation and academic engagement in science subject among adolescents in Oyo town.
- Ho3: There will be no significant relative contribution of independent variables (science self-efficacy and academic motivation on dependent variable (academic engagement in science subjects among adolescents in Oyo town.
- Ho4: There is no significant joint contribution of independent variables (science self-efficacy and science motivation to dependent measure i.e. academic engagement in science subject among adolescents in Oyo town.

## **Methodology**

### **Research Design**

Descriptive research design of correlational type was employed for the study.

### **Population**

The population consisted of two thousand five hundred and two adolescents science students in senior secondary school II within

urban area of Oyo and they do not have external examination as an when they were chosen.

### **Sample and Sampling Techniques**

Two hundred and ten senior secondary school II students were randomly selected using simple random sampling techniques from the study locale. Thirty science senior secondary school II adolescents from seven senior schools were sampled in each school to make a sampled size of two hundred and ten.

### **Instrumentation**

Researchers' Self designed instrument tagged science academic self-efficacy, motivation, science academic engagement (SAMSAE) was used for data collection. The instrument was pilot tested outside the study locale (Ibadan) using Cronbach alpha yielded science academic self-efficacy  $r = 0.68$ , motivation  $r = 0.76$ ; and science academic engagement  $r = 0.82$  and it was judged suitable for the present studies. Data Administration: Researchers did the administration of the research instruments with the support of staff at the study locale and it was collected on the spot.

### **Data Analysis**

Data collected were analyzed using percentages, frequency count, Pearson product moment correlation and multiple regression analysis.

**Results**

**Hypotheses Testing**

Ho1:

**Table 1: Pearson Product Moment Correlation of Adolescents Science Academic Engagement and Academic Self-Efficacy**

		Science_Academic_Engagement	Academic_Self_Efficacy
Science_Academic_Engagement	Pearson Correlation	1	.333**
	Sig. (2-tailed)		.000
	N	209	193
Academic_Self_Efficacy	Pearson Correlation	.333**	1
	Sig. (2-tailed)	.000	
	N	193	204

\*\* . Correlation is significant at the 0.01 level (2-tailed).

From Table 1, there is a weak, positive and significant correlation between adolescents’ science academic engagement and academic self-efficacy ( $r=.333$ ;  $n=209$ ,  $p<.05$ ). Therefore, Ho1 is not accepted.

Ho2:

**Table 2: Pearson Product Moment Correlation of Adolescents Science Academic Engagement and Science Academic Motivation.**

		Science_Academic_Motivation	Science_Academic_Engagement
Science_Academic_Motivation	Pearson Correlation	1	.494**
	Sig. (2-tailed)		.000
	N	202	191

Science_Academic_Engagement	Pearson Correlation	.494**	1
	Sig. (2-tailed)	.000	
	N	191	209

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 2, revealed that there is an average, positive and significant relationship between adolescents’ science academic engagement and science academic motivation ( $r=.494$ ,  $n=202$ ,  $p<.05$ ). Therefore,  $H_02$  is not accepted.

$H_03$ :

**Table 3: Regression Analysis of Relative contribution of Science Academic Motivation and Academic Self-efficacy to Adolescents Science Academic Engagement.**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	19.336	4.042		4.784	.000
Academic_Self_Efficacy	.311	.149	.255	2.082	.039
Science_Academic_Motivation	.306	.146	.257	2.098	.037

a. Dependent Variable: Science Academic Engagement

Table 3 indicates that the relative contributions of science academic motivation ( $\beta=.255$ ;  $t=2.08$ ,  $p<.05$ ) and academic self-efficacy ( $\beta=.257$ ;  $t=2.10$ ,  $p<.05$ ) to adolescents’ science academic engagement are significant. Therefore,  $H_03$  is not accepted.

Ho4:

**Table 4: Regression Analysis of Composite contribution of Science Academic Motivation and Academic Self-efficacy to Adolescents Science Academic Engagement.**

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.492 <sup>a</sup>	.242	.233	7.82457

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3455.166	2	1727.583	28.217	.000 <sup>b</sup>
	Residual	10836.634	177	61.224		
	Total	14291.800	179			

a. Dependent Variable: Science Academic Engagement

b. Predictors: (Constant), Science Academic Motivation, Academic Self Efficacy

From Table 4, there is significant composite contribution of science academic motivation and academic self-efficacy to adolescents science academic engagement ( $R=.492$ ;  $R^2 =.242$ ;  $F_{(2,177)}=28.22$ ). Therefore, Ho4 is not accepted.

### Discussion of findings

Hypothesis one was not accepted. This result is in tandem with the findings of Kanget al. (2024) who found that parent involvement and academic self-efficacy were positively associated with good academic performance likewise it was also supported by the results of Ogunlade (2015) that argued that self-efficacy positively significant relationship in project writing success among Emmanuel Alayande College of Education students. Furthermore, Yao et al. (2024) opined that academic self-efficacy plays a chain mediating role between the relationship of sustainable teaching innovation and graduate students' creative thinking.

This is an evidence that academic self-efficacy is an important psychological construct that should be fostered among the learners. Belief an individual has towards himself/herself will surely determine success whether in academic or in other areas of human endeavour.

Also, there is an average, positive and significant relationship between adolescent's science academic engagement and science academic motivation in the study locale. This supported the view of Leong et al (2018) that revealed in their study that learners with high internal motivation perform than students with low internal motivation and that positive association exists between motivation and science achievement as supported by motivation theory in which higher motivation led to higher achievement scores. Likewise, these findings corroborated the findings of Libao et al. (2016) that found extrinsic motivation to be related with students' academic performances among the indicators of motivations in learning science.

This implied that as water to the plants is important likewise motivation to the science academic engagement among the students is very much important. Parents, guidance and policy maker should put in place every wherewithal capable of promoting science academic engagement and this would invariably promotes health related careers and reduce the acute shortage of these important personnel both at developed and developing countries of the world.

There are relative significant contributions of science academic self-efficacy and motivation to adolescent's science academic engagement. However, findings revealed that academic self-efficacy is higher when compared with science academic motivation. Both psychological constructs are very important and should be fostered among the learners. This supported the works of Ng et al. (2012) who revealed positive affect towards science and mathematics indicated statistically significant predict effects on achievement in the two subjects for both Malaysian and Singaporean grade 8 students. This means both positive interaction couple with belief one has will surely lead to goal attainment. Knowledge of one's ability to carry a task successfully will surely motivates such person to carry on with the tasks regardless of any obstacle. Hence, science

academic self-efficacy is a psychological construct that must be mounted among adolescents and this will invariably promote career on health-related courses.

Lastly, there is joint contribution of the science academic self-efficacy and motivation to the dependent measure that is, science academic engagement. Both the independent variables should be mounted to enhance science academic engagement among adolescents. This result further agreed with the findings of Leong et al. (2018) who indicated in their study that learners with high internal motivation performed better than students with low internal motivation and that positive association exist between motivation and science achievement supported motivation theory in which higher motivation led to higher achievement scores. In the same vein, this result also in line with the work of Libao et al. (2016) that found extrinsic motivation to be related with students' academic performances among the indicators of motivations in learning science. This implies that both motivation and academic self-efficacy is very much important in a bid to promotes science academic engagement among learners.

### **Conclusion**

There is a weak, positive and significant correlation between adolescents' science academic engagement and academic self-efficacy, also there is an average, positive and significant relationship between adolescents' science academic engagement and science academic motivation, furthermore, there is relative contribution of science academic motivation and academic self-efficacy and lastly, there is joint contribution of science academic motivation and academic self-efficacy to adolescents' science academic engagement.

### **Recommendations**

Guidance counselling and Educational psychologists should be posted to schools in order to adequately mounting the psychological constructs (academic self-efficacy and motivate) among the students. Parents should be enlightened to motivate their children towards science academic engagement and provide material to them.

Scholarship award; Government and private organization should deem it fit to award scholarship to students who performed brilliantly on science and science related subjects.

Employment opportunity with adequate welfare package be given to health-related careers and this will invariably promote student interest on science related subjects which will lead to career on /health-related jobs.

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