



Dimensions of Emotional Intelligence as Predictors of Academic Achievement in Physics Among Secondary School Students in Rivers State

Ojo Williams Daodu

Department of Psychology, Guidance and Counselling
Ingatius Ajuru University of Education, Nigeria
famwilly@yahoo.com

David Olugbade Ojedapo

Department of Psychology, Guidance and Counselling
Ingatius Ajuru University of Education, Nigeria
oludavid173@gmail.com

Abstract

This study investigated the influence of the Dimensions of Emotional Intelligence on academic performance in physics among secondary school students in Obio/Akpor Local Government Area of Rivers State. The population of the study consists of all senior secondary three (SS3) physics students in Obio/Akpor Local Government Area of Rivers state. The sample used for the study was 380 students obtained through stratified random sampling technique from four out of twelve secondary schools in the Local Government. The data of this research was obtained through the use of questionnaire prepared as Students' Emotional Intelligence Inventories (SEII) with reliability of 0.82 and Physics Achievement Test (PAT) with reliability of 0.96. The research design adopted was correlation design. These were obtained through test-retest. The research was guided by four research questions and four null hypotheses. The four research questions were answered using mean and standard deviation while the four null hypotheses were tested using simple regression. It was found that the four dimensions of Emotional Intelligence significantly predict academic achievement of secondary school students in physics. The study recommends that stakeholders in education should engage in programmes that are capable of promoting emotional intelligence to improve students' academic achievement in physics.

Keywords: Dimensions, Emotional Intelligence, Predictors, Academic Achievement.

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INTRODUCTION

It has long been a concern of many parties on factors contributing to academic performance among students in learning institutions, starting from nursery to tertiary level. Results and findings of numerous researches conducted in this area of study over a long period of time reveal a variety of factors; students' intelligent quotient (SIQ), socio economic status, motivation, peer-relationship, teacher-student relationship, parental involvement and personality. In 1940, David Wechsler described the influence of non-intellectual factors on intelligent behaviour, and further argue that our models of intelligence would not be complete until we could adequately describe these factors.

Howard Garner's (1993); frames of mind: "the theory of multiple intelligence" introduced the idea of "multiple intelligence" which included both interpersonal intelligence (ie., that capacity to understand the intensions, motivations and desires of other people) and intrapersonal intelligence (i.e. the capacity to understand oneself, to appreciate one's feelings, fears and motivation).

Among all these factors, Intelligence Quotient (IQ) had been commonly used as a determinant and associated with academic success. However, many recent and emerging studies are revealing that IQ alone is not a reliable predictor of students' academic achievement (Craggs, 2005). One of the most popular and most cited sources is Daniel Goleman's book *Emotional Intelligence: Why It Can Matter More Than IQ*. In his book Goleman (1995) claims that only 20% of a person's success can be attributed to IQ.

This claim prompts many researchers and academicians to explore and identify other factors that contribute another 80% to a person's success. The publishing of Goleman's first book has led to a new area of study not only in the field of education but also in business, human relationships, career development, leadership, industrial and organizational psychology and many more. Many parties are intrigued to know how Emotional Intelligence (EQ) of a student can help him or her to learn better and perform academically. Low and Nelson (2006) claimed that Emotional Intelligence EQ is crucial to a student's personal health and college success. They claimed that students with emotional intelligence skills are better able to cope with demanding and complex college experience. When individuals are able to lead their life successfully in the academy, they can focus on their learning and perform academically. Apart from its contribution to academic success, a person with high emotional intelligence is also said to function better as a worker citing reasons such as being able to be a team player, work under pressure, and contribute to organization's productivity. It is becoming more evident that employers nowadays are no longer looking for employees with good grades alone but they are more interested in applicants who can meet the demands of a working world and adapt to the forever changing climate and needs of their organization. This is especially true in profession that requires the employees to be highly emotionally intelligent (Antoniou, 2000; Kyriacou, 1987; Manthei & Solman, 1988 as cited in Noriah, Ramlee, Zuria, Siti & Rahayah, 2007).

Based on this discussion, it is apparent that having high emotional intelligence gives an added advantage to Individuals, especially in Educational pursuit or career development. This is because it has been soundly established that emotional intelligence is one of the important determinants of academic achievement among students and it is also what makes them versatile employees once they embark into the working world.

Emotional intelligence in the words of Goleman (1998) cited in Chidozie (2015) is the capacity for recognizing our own feelings, and those of others, for motivating ourselves, and for managing emotions well in ourselves and in our relationships. Emotional Intelligence can

also be defined as the ability to bring our emotions under control, being sensitive to the emotions of others in the course of our interaction with them in our day-to-day activities.

Emotional Intelligence is made up of five subscales or dimensions such as self-awareness, self-regulation, self-motivation, social skill or social awareness and empathy. The first three dimensions are intra-personal while the last two are inter-personal (Goleman, 1995).

- **Self-awareness:** this is the first component of Emotional Intelligence which refers to the ability to know one's emotions, strengths, weakness, drives, values and goals as well as to recognize their impact on others while using gut feelings to guide decisions.
- **Self-Regulation:** Involves controlling or redirecting one's disruptive emotions and impulsive emotions and impulses and adapting to changing circumstances.
- **Self-Motivation:** refers to marshalling emotion in pursuit of a goal. People who have this ability tend to be more productive and effective in whatever they do.
- **Social Skill or Social Awareness:** This is the ability to manage relationships, to move people in the right direction.
- **Empathy:** Considering other people's feelings especially when making decisions.

Pool (1997), cited in Wikipedia (2012), and wrote that emotional wellbeing is the strongest predictor of achievement in school and on the job.

Physics is the most basic natural science and considers physical systems ranging in size from nuclei to atoms and to cosmos. It is an extremely broad field, with many sub-fields. Understanding the forces and laws that underpin the interactions of matter and energy forms a major part of the discipline. Applying this understanding to other sciences and technology offers numerous opportunities for the well-trained physicist (Washington State University Admission, Department of Physics, 2018).

Unfortunately, students' performance in the subject over the years is not encouraging as majority of them fail while few escape with low grades. Kanno (2000) opined that students' performance in examinations especially WAEC and NECO conducted senior secondary school certificate examinations is one of the criteria for measuring and establishing the effectiveness of Nigerian secondary school. Osuagwu (2011) reported that the breakdown of May/June SSCE 2010/11 examination reveals the poor performance of students in WAEC and NECO exams in recent time has resulted in an average failure rate of 72 per cent (72%), 74percent (74%), 74 percent (74%) and 75 percent (74%) in 2008,2009, 2010 and 2011 respectively. A breakdown of the May/June SSCE 2010/2011examination results shows that only 29.49 per cent of the candidates who sat for the exam obtained credit level in Physics. A similar percentage was also recorded in NECO. In science subjects, especially Physics as a subject, he also observed that the general performance of students in physics in Senior School Certificate Examinations (SSCE) is poor with the highest average of 4.82 which is equivalent to C5.

Statement of the Problem

Among many researches carried out to find out why achievement in physics is poor, the influence of the dimensions of Emotional Intelligence on achievement in physics is scarcely explored. The present study is therefore focused on using the dimensions of Emotional Intelligence to predict academic achievement in physics among secondary school students in Obio/Akpor Local Government Area of Rivers State.

There has been a public outcry over low performance of students in physics and other subjects in the print and electronic media. This is to the point that hardly can you see two or more academicians discussing on academics without relating it to causes of low performance of students in Senior School Certificate Examinations (SSCE). If this low performance in physics and other subjects is not taken care of, one might not know the fate of our educational system in the near and far future.

The problem of this study therefore, is to find out if the dimensions of Emotional Intelligence can help to predict academic performance of secondary school students in physics.

Purpose of the Study

This study sought to investigate if the dimensions of emotional Intelligence (self-awareness, self-regulation, self-motivation, social skill or social awareness and relationship management) can predict academic performance in physics among secondary school students in Obio/Akpor Local Government Area of Rivers State. In more specific terms, the objectives of this study are to find out the extent to which the dimensions of emotional intelligence; self-awareness, self-regulation, self-motivation and relationship management can predict academic performance of secondary school students in physics.

The study was guided by the following research questions:

- To what extent does self-awareness predict secondary school students' academic achievement in physics?
- To what extent does self-regulation predict secondary school students' academic achievement in physics?
- To what extent does self-motivation predict secondary school students' academic achievement in physics?
- To what extent does relationship management predict secondary school students' academic achievement in physics?

Hypotheses

The following null hypotheses tested at 0.05 alpha level of significance were formulated to guide the study:

- H₀₁. Self-awareness does not significantly predict academic achievement of secondary school students' in physics.
- H₀₂. Self-regulation does not significantly predict academic achievement of secondary school students' in physics.
- H₀₃. Self-motivation does not significantly predict academic achievement of secondary school students' in physics.
- H₀₄. Relationship management does not significantly predict academic achievement of secondary school students' in physics.

METHODS

The research design adopted for this study is correlational design. The population for the study consists of all SS3 Physics students in Obio/Akpor Local Government Area of Rivers

State 2018/2019 academic session. This is because these category of students have been taught physics from senior secondary one (SS1) to senior secondary three (SS3). Hence they have been exposed to a broad content coverage. The sample for the study consists of three hundred and eighty (380) SS3 physics students from the four secondary schools randomly selected. The sampling technique adopted for this study was stratified random sampling technique. Two instruments were used for data collection in this study. These are: a self-developed inventory titled: “students’ Emotional Intelligence Inventory” (SEII) and “Physics Achievement Test” (PAT) also developed by the researcher.

The students’ Emotional Intelligence Inventory (SEII) elicits information on self-awareness, self-management, self-motivation, and relationship management respectively. The inventory contains 40 items as a whole and was responded to base on a 4 Likert Scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). These response levels weighed 4 points, 3 points, 2 points and 1 point respectively for positively worded items while the reverse will be the case for negatively worded items. The inventory attracts a maximum of 80 marks and a minimum of 20 marks as the ten inventories under each emotional intelligence dimension have a total mark of 20. The four dimensions therefore attract 80 marks.

The Physics Achievement Test (PAT) consists of two sets of test items developed to test the SS3 Students in Physics.

A 10 multiple choice items

In the second set of items, the students will be required to fill in the gap. Every question rightly answered will attract 4 marks. PAT score will be 80.

Research Question One: To what extent does self-awareness predict secondary school students’ academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis One: Self-awareness does not significantly predict academic achievement of secondary school students’ in physics among secondary school students in Obio-Akpor Local Government Area of Rivers State.

To answer this research question, mean and standard deviation analysis was carried out. The results obtained are as presented in the tables that followed.

The ability of the dimensions of Emotional intelligence to significantly predict academic achievement can be explained using the correlation matrixes as shown in tables 1, 2, 3, 4, 5, 6, 7 and 8.

Table 1: Mean and standard deviation for Physics Achievement Test (PAT) Score and Self-awareness

	\bar{X}	<i>Std. Deviation</i>	<i>n</i>
PAT score	44.5132	10.45091	380
Self awareness	34.1316	3.28642	380

From table 1, the mean scores of the students in Physics Achievement Test yielded 44.51 with the standard deviation of 10.45 while the mean and standard deviation for the self-awareness yielded 34.13 and 3.29 respectively.

Table 2: Summary of the simple Regression Analysis

Model		Sum of Squares	Df	R	R Square	Adjusted R Square	Mean Square	f	Sig.
1	Regression	38749.362	1				38749.362	5536.518	.000 ^b
	Residual	2645.572	378	0.968	0.968	0.936	6.999		
	Total	41394.934	379						

Table 2 shows that the simple regression coefficient obtained is 0.968, R^2 is also 0.968 while the adjusted R^2 is 0.936.

Research question 2: To what extent does self-regulation predict secondary school students' academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis 2: Self-regulation does not significantly predict academic achievement of secondary school students' in physics.

Table 3: Mean and standard deviation for Physics Achievement Test (PAT) Score and Self-regulation

	\bar{X}	Std. Deviation	N
PAT score	44.5132	10.45091	380
Self-regulation	30.6316	4.24774	380

From table 3, the mean scores of the students in Physics Achievement Test yielded 44.51 with the standard deviation of 10.45 while the mean and standard deviation for the self-regulation yielded 30.6316 and 4.24774 respectively.

Table 4: Summary of the simple Regression Analysis

Model		Sum of Squares	Df	R	R Square	Adjusted R Square	Mean Square	f	Sig.
1	Regression	39195.775	1				39195.775	6737.122	.000 ^b
	Residual	2199.159	378	0.973	0.947	0.947	5.818		
	Total	41394.934	379						

Table 2, shows that the simple regression coefficient obtained is 0.973, R^2 is 0.947 while the adjusted R^2 is also 0.947.

Research question 3: To what extent does self-motivation predict secondary school students' academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis 3: Self-motivation does not significantly predict academic achievement of secondary school students' in physics in Obio-Akpor Local Government Area of Rivers State

Table 5: Mean and standard deviation for Physics Achievement Test (PAT) Score and Self-motivation

	\bar{X}	Std. Deviation	n
PAT score	44.5132	10.45091	380
Self-motivation	32.6447	3.69948	380

From table 3, the mean scores of the students in Physics Achievement Test yielded 44.51 with the standard deviation of 10.45 while the mean and standard deviation for the self-motivation yielded 32.6447 and 3.69948 respectively.

Table 6: Summary of the simple Regression Analysis

Model		Sum of Squares	Df	R	R Square	R Square Adjusted	Mean Square	f	Sig.
1	Regression	39226.534	1				39226.534	6838.049	.000 ^b
	Residual	2168.400	378	0.973	0.948	0.947	5.737		
	Total	41394.934	379						

Table 8, shows that the simple regression coefficient obtained is 0.973 R^2 is 0.948 while the adjusted R^2 is 0.947.

Research question 4:

To what extent does relationship management predict secondary school students' academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis 4:

Relationship management does not significantly predict academic achievement of secondary school students' in physics in Obio-Akpor Local Government Area of Rivers State.

Table 7: Mean and standard deviation for Physics Achievement Test (PAT) Score and Relationship- management

	\bar{X}	Std. Deviation	N
PAT score	44.5132	10.45091	380
Relationship Mgt	32.1447	4.30899	380

From table 7, the mean scores of the students in Physics Achievement Test (PAT) yielded 44.51 with the standard deviation of 10.45 while the mean and standard deviation for the Relationship management yielded 32.1447 and 4.30899 respectively.

Table 8: Summary of the simple Regression Analysis

Model		Sum of Squares	Df	R	R Square	R Square Adjusted	Mean Square	f	Sig.
1	Regression	37602.178	1				37602.178	3747.571	.000 ^b
	Residual	3792.756	378	0.953	0.908	0.908	10.034		
	Total	41394.934	379						

Table 8, shows that the simple regression coefficient obtained is 0.953 and R^2 is 0.908 while the adjusted R^2 is 0.908.

DISCUSSION

Research Question One: To what extent does self-awareness predict secondary school students' academic achievement in physics?

Hypothesis One: Self-awareness does not significantly predict academic achievement of secondary school students in physics.

From the result presented in table 1, it could be seen that the mean score and standard deviation for PAT are 44.51 and 10.45 respectively while the mean and standard deviation for the self-awareness yielded 34.13 and 3.29 respectively. If the standard deviation index is low and the mean is high, it indicates that the improvement in self-awareness can predict a commensurable increase in physics performance. Table 2 shows that the simple regression coefficient obtained is 0.968, R^2 is also 0.968 while the adjusted R^2 is 0.936. The R^2 value obtained (0.968) indicates that 97% improvement in performance in physics can be predicted through self-awareness improvement while the remaining 3% in performance are not accountable by self-awareness.

The regression value ($R^2 = 0.968$) at 0.05 alpha level of significance indicates that there is a strong relationship between self-awareness and academic achievement of students in physics. The simple regression data yielded an F-ratio of 5536.518 at degree of freedom of 1 and 378 at 0.000 level of significance. Since 0.000 is less than the chosen 0.05 level of significance, it therefore indicates that the Dimension of Emotional Intelligence (Self-awareness) can indeed significantly predict students' academic achievement in physics, which implies that the null hypothesis is therefore rejected. This means that self-awareness can indeed; significantly predict academic achievement of secondary school students in physics.

According to Nwankwoala (2012), emotional, personal and social intelligence are concerned with the ability to understand self and others relate to people and to adapt to, and cope with the immediate surrounding challenges which increase one's ability to be more successful in dealing with environmental demands.

Research Question 2: To what extent does self-regulation predict secondary school students' academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis 2: Self-regulation does not significantly predict academic achievement of secondary school students' in physics.

From the result presented in table 3, it could be seen that the mean score and standard deviation for PAT are 44.51 and 10.45 respectively while the mean and standard deviation for

the self-regulation yielded 30.6316 and 4.24774 respectively. If the standard deviation index is low and the mean is high, it indicates that the improvement in self-regulation can predict a commensurable increase in physics performance. Table 4 shows that the simple regression coefficient obtained is 0.973, R^2 is also 0.947 while the adjusted R^2 is also 0.947. The R^2 value obtained (0.947) indicates that 95% improvement in performance in physics can be predicted through self-awareness improvement while the remaining 5% in performance are not accountable by self-regulation.

The regression value ($R^2 = 0.947$) at 0.05 alpha level of significance indicates that there is a strong relationship between self-regulation and academic achievement of students in physics. The simple regression data yielded an F-ratio of 6737.122 at degree of freedom of 1 and 378 at 0.000 level of significance. Since 0.000 is less than the chosen 0.05 level of significance, it therefore indicates that the dimension of emotional intelligence (Self-regulation) can indeed significantly predict students' academic achievement in physics, which implies that the null hypothesis is therefore rejected. This means that self-regulation can significantly predict academic achievement of secondary school students in physics.

Researchers often use the Self-Control Scale developed by Tangney, Baumeister and Boone in 2004. High locus of control, where an individual attributes success to personal decision making and positive behaviors such as discipline, is a ramification of self-control. High locus of control has been found to have a positive predictive relationship with high collegiate GPA.

Research Question 3: To what extent does self-motivation predict secondary school students' academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis 3: Self-motivation does not significantly predict academic achievement of secondary school students' in physics in Obio-Akpor Local Government Area of Rivers State.

From the result presented in table 5, it could be seen that the mean score and standard deviation for PAT are 44.51 and 10.45 respectively while the mean and standard deviation for the self-motivation yielded 32.645 and 3.699 respectively. Since the standard deviation index is low and the mean is high, it indicates that the improvement in self-motivation can predict a commensurable increase in physics performance. Table 6 shows that the simple regression coefficient obtained is 0.9738, R^2 is also 0.948 while the adjusted R^2 is 0.9476. The R^2 value obtained (0.948) indicates that 95% improvement in performance in physics can be predicted through self-motivation improvement while the remaining 5% in performance are not accountable by self-motivation. Motivation is the reasoning behind an individual's actions. Research has found that students with higher academic performance, motivation and persistence use intrinsic goals rather than extrinsic ones. Furthermore, students who are motivated to improve upon their previous or upcoming performance tend to perform better academically than peers with lower motivation. In other words; students with higher need for achievement have greater academic performance. Bad dietary habits can create the disadvantage of a lack of motivation.

The regression value ($R^2 = 0.948$) at 0.05 alpha level of significance indicates that there is a strong relationship between self-awareness and academic achievement of students in physics. The simple regression data yielded an F-ratio of 6838.049 at degree of freedom of 1 and 378 at 0.000 level of significance. Since 0.000 is less than the chosen 0.05 level of significance, it therefore indicates that the Dimension of Emotional Intelligence (Self-

motivation) can significantly predict students' academic achievement in physics, which implies that the null hypothesis is therefore rejected. This means that self-motivation can indeed; significantly predict academic achievement of secondary school students in physics.

Research question 4: To what extent does relationship management predict secondary school students' academic achievement in physics in Obio-Akpor Local Government Area of Rivers State?

Hypothesis 4: Relationship management does not significantly predict academic achievement of secondary school students' in physics in Obio-Akpor Local Government Area of Rivers State.

From the result presented in table 7, it could be seen that the mean score and standard deviation for PAT are 44.51 and 10.45 respectively while the mean and standard deviation for the Relationship-management yielded 32.1447 and 4.3089 respectively. Since the standard deviation index is low and the mean is high, it indicates that the improvement in Relationship-management can predict a commensurable increase in physics performance. Table shows that the simple regression coefficient obtained is 0.953, R^2 is 0.908 while the adjusted R^2 is also 0.908. The R^2 value obtained (0.908) indicates that 91% improvement in performance in physics can be predicted through Relationship-management improvement while the remaining 9% in performance are not accountable by self-motivation.

The regression value ($R^2 = 0.908$) at 0.05 alpha level of significance indicates that there is a strong relationship between Relationship-management and academic achievement of students in physics. The simple regression data yielded an F-ratio of 3747.571 at degree of freedom of 1 and 378 at 0.000 level of significance. Since 0.000 is less than the chosen 0.05 level of significance, it therefore indicates that the Dimension of Emotional Intelligence (Relationship-management) can significantly predict students' academic achievement in physics, which implies that the null hypothesis is therefore rejected. This means that Relationship-management can indeed; significantly predict academic achievement of secondary school students in physics. Moreover, there are many unrelated factors that influence the relationship between academic achievement and participation in extracurricular activities (Mahoney et al., 2005). These variables include: civic engagement, identity development, positive social relationships and behaviors, and mental health (Mahoney et al., 2005). In other research on youth, it was reported that positive social support and development, which can be acquired through organized after school activities is beneficial for achieving academic success (Eccles & Templeton, 2002).

CONCLUSION

The findings of this study showed that there is a high and positive correlation between the dimension of Emotional Intelligence "self-awareness, self-regulation, self-motivation and relationship management" and students' academic achievement in physics. Therefore, self-awareness, self-regulation, self-motivation and relationship management can significantly predict academic achievement among secondary students in physics.

Recommendations

Based on the findings of the study, the following recommendations were made:

- There is need to introduce programmes of Emotional literacy in physics education with aim of promoting a change in attitude and Emotions towards physics and physics learning.
- Parents, school authorities as well as government should engage in programmes that are capable of promoting the dimensions of Emotional Intelligence to improve students' Academic Achievement in physics.
- Physics teachers should adopt various instructional strategies of which Dimensions of Emotional Intelligence are introduced to help students understand difficult physics concepts exposed to them and develop physics skills and problem-solving ability.

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