RELATIONSHIP BETWEEN EMOTIONAL INTELLIGENCE AND STUDENTS' ACADEMIC PERFORMANCE IN CHEMISTRY

[1]Bukar Alhaji Umate, [2]Sa'adu Ibrahim &[3]Aliyu Sambo Abubakar
[1]Department of Science Education, University of Nigeria, Nsukka
[2]School of Science Education, Federal College of Education (Technical), Gombe, Nigeria
[3]School of Science Education, College of Education Zing, Taraba State

Corresponding author's email: bukar.umate@unn.edu.ng

Abstract
This study investigated the extent to which emotional intelligence predicts students' academic performance. The study was guided by five research questions and five corresponding hypotheses. A correlational research design with a sample of 113 (male = 79; female =34) NCE II and III chemistry students in the Federal College of Education (Technical), Gombe. The instrument for data collection was a validated Quick Emotional Intelligence self-assessment questionnaire, which has a reliability index of 0.79. The students' cumulative grade point average (CGPA) was used as a measure of academic performance. The research questions were answered using regression analysis, while regression ANOVA was used to test the hypotheses at the 0.05 level of significance. The findings of the study revealed that emotional intelligence is positively related to student's academic performance in chemistry. However, at a dimensional level, emotional awareness and emotional management are positively related to the students' academic performance, while social emotional awareness and relationship management are not related to the students' academic performance.

Keywords: Emotional awareness, self-management, social emotional awareness, relationship management, Academic Performance, Chemistry.

Introduction

The level of students' academic performance in science remains a top priority for chemistry educators. Research has long been geared towards exploring variables that contribute effectively to improving the academic performance of students in chemistry. Chemistry is the branch of natural science that deals with the composition of substance and the changes that they undergo as consequence of alternation in the composition of their molecules (Umate& Eya, 2019). Some of the applications include the production of essential human needs such as soap of all kinds, creams, drinks, petroleum and its bi-products, clothing, drugs, household utensils, and chemicals for the preservation of food items as well as textiles (Okafor, 2022). Chemistry knowledge is a fundamental aspect of our general education because chemistry has a major influence on our daily lives, is the

basis upon which many industries operate, and is the basis upon which new technologies are being developed (Ravshanova, 2022).

One of the main objectives of chemistry education is to help students use school knowledge to explain chemical phenomena that occur in everyday life (Emendu, (2014)). Emendu (2014) opines that chemistry education plays an important role in enhancing the quality of teaching and research as well as ensuring that students are equipped with good knowledge to produce intensive goods and services to meet human needs for food, health care products, and other materials aimed at improving the quality of life. Chemistry plays a central role in economic development and will be a key component in the industrial and agricultural development of Nigeria through its relevance in the entrepreneurship programme (Emendu, 2014). It is therefore necessary that students of chemistry understand the subject so that they can apply the knowledge to their everyday interactions with people and the everchanging environment.

Despite the importance of chemistry to society, students' academic performance in chemistry at the NCE level has not been satisfactory (Examination Officer's Report, Department of Chemistry, Federal College of Education (T)). The federal government has made efforts to improve students' academic performance by providing special grants through TETFUND and other non-governmental organizations such as UNESCO, and the World Bank (Toluwalop, 2016). Researchers have also made efforts to improve students' academic performance through the deployment of innovative teaching strategies and psychological therapies for managing stress, burnout, and depression, among others (Ezeudu et al.,2019a; Ezeudu et al., 2019b; Okafor, 2022). Despite these interventions, students' academic performance in chemistry continues to be low. Researchers reported many factors that could influence students' academic performance. Some of these factors include: students' factors, parental background (Oladebinu, Amos, &Oyediran, 2018), teachers' poor qualification and poor method of teaching (Ojukwu, (2016), inability to manage emotions (Umate& Eya, 2019), laboratory adequacy and teachers' attitude to chemistry teaching (Akissani, Muntari, & Ahmed, 2019).), negative attitude, and socio-cultural factors (Chikendu, 2022), among others. Research has shown that there are psychological variables that can influence students' performance, such as emotional intelligence.

Emotional intelligence describes the individual's ability and skills to identify, assess, and manage the emotions of oneself and others. Emotional intelligence involves understanding and controlling emotions to foster success (Davoudi, Nafchi&Khodabakhshi, 2015). It involves understanding oneself and others, relating well, and adapting to the environment (Bar–On, 1997). Individuals with high emotional intelligence are able to understand the negative impact of emotions on their minds, bodies, relationships, and capacities to achieve something (Chan & Pyland, 2022).). Bar-on (2006) posits that emotional intelligence develops over time and that it can be improved through training, programming, and therapy. A high level of emotional intelligence is necessary for the teaching profession. Emotional intelligence now becomes a collection of needed capabilities for the workplace (Tripathy, 2018). The author further posits that emotional intelligence plays a significant role in job performance, motivation, decision making, successful management, and leadership.

There are different models of emotional intelligence, and these are: i) the ability-based model ii) mixed model and iii) trait model. The ability model was developed by Mayer and Salovey (2000), and it argues that in order to be emotionally intelligent, you need to possess certain **competences. The ability model classified EM into**four distinct types of ability: emotional perception, use of emotions, understanding emotions, and managing emotions. The trait model of emotional intelligence was first developed by Petrides (2001) and is geared more toward emotional self-perception. Trait EI It argues that people have **emotional self-perceptions and traits** that form part of their personalities. Goleman (1995) developed the mixed model of emotional intelligence, which places an emphasis on emotional intelligence based on the following areas.: emotional-awareness, self-management, social emotional awareness, and relationship management. In this study, the mixed model of emotional intelligence was adopted because it combines both **the ability and trait models of emotional intelligence.**

There have been many studies conducted on the relationship between emotional intelligence and students' academic performance. Suleman et al. (2019) found a strong positive association between emotional intelligence and undergraduate students' academic performance in Pakistan. Almegewly (2022) found a positive relationship between emotional intelligence and the academic performance of nursing students in Reyard. The Almegewly (2022) study also found a positive correlation between some dimensions (self-awareness and relationship management) and academic achievement. Halimi (2022) reported that academic performance was strongly associated with the self-awareness dimension of emotional intelligence. Chan and Pyland (2022) found a positive relationship between emotional intelligence and some of its dimensions (self-awareness, self-management, and relationship management) and academic performance using a sample of undergraduate students in the United States of America. Nwosu (2022) reported a positive relationship between emotional intelligence and academic performance with a sample of undergraduate guidance and counseling students. The study of Khatun (2019) revealed a positive correlation between emotional intelligence and academic performance among higher secondary students in West Bengal.

Some studies reported no significant relationship between emotional intelligence and students' academic performance. Al-Ghamdi (2014) revealed that there is no statistically significant relationship between emotional intelligence and academic performance. Zirak (2015) revealed that there is no relationship between emotional intelligence as well as its dimensions (self-awareness, self-management, social awareness, and relationship management) and academic performance. Kashani, Azimi, and Vaziri (2012) indicated that there was no significant association between emotional intelligence and students' achievement scores. Pope, Roper, and Qualter (2012) did not find a relationship between emotional intelligence and academic performance among undergraduate psychology students in the UK.

A review of the literature has shown that there are many studies carried out on the relationship between emotional intelligence and students' academic achievement. However, careful analysis of the literature revealed that the findings of these studies are contradictory; most of these studies involved samples of foreign students. While some involved samples of students from other disciplines at the undergraduate level other than NCE students. Some of these studies looked at emotional intelligence as a whole without

considering its dimensions. Importantly, studies on emotional intelligence in relation to students' academic performance in chemistry are scarce. These are the gaps this study filled by carrying out research on the relationship between emotional intelligence and NCE chemistry students' academic performance in Federal College Education (T), Gombe State, Nigeria.

Research questions

1. What is the relationship between emotional awareness and students' academic performance in chemistry
2. What is the relationship between emotional management and academic performance in Chemistry
3. what is the relationship between social-emotional awareness and academic performance in Chemistry
4. What is the relationship between relationship management and academic performance in Chemistry
5. What is the joint relationship between emotional intelligence and students' academic performance in Chemistry?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance

1. the relationship emotional awareness and students' academic performance is not significant
2. The relationship between emotional management and academic performance in Chemistry is not significant
3. The relationship between social emotional awareness and academic performance in Chemistry is not significant
4. The relationship between relationship management and academic performance in Chemistry is not significant
5. The joint relationship between emotional intelligence and students' academic performance in Chemistry is not significant

Methodology

This study adopted a correlational research design. Correlation design provides an opportunity for a researcher to establish the relationship among the variables (Sani, 2017). This is because it aims to determine the degree of relationship between, emotional intelligence and students' academic performance. The population of this study comprised 113 (male = 79; female =34) NCE II and III chemistry students at the Federal College of Education (Technical), Gombe. All 113 NCE chemistry students were used as a sample in this study because of the manageable size of the population. The instrument that was used for data collection in this study is aQuick Emotional Intelligence Self-Assessment Questionnaire as developed by Mohapel (1998), which was based on the emotional intelligence model by Goleman (1998). The questionnaire was adopted from Mohapel (1998) and consists of 40 items, with 10 items from four dimensions: emotional awareness, emotional management, social emotional awareness, and relationship management. The

items are on a 5-point Likert scale; never, rarely, sometimes, often, and always. For the purpose of this study, the researcher has modified the instrument by capturing the registration number, gender, and CGPA of the sample respondents. The instrument was trial tested on 30 NCE III chemistry students at the College of Education Billiri, Gombe State, which is outside the study area, and a reliability index of 0.79 was obtained using the Cronbach's alpha reliability coefficient. Regression analysis was used to answer the research questions, while regression ANOVA was used to test the hypotheses at the 0.05 level of significance.

Results

Table 1: *Regression analysis of the relationship between Emotional Awareness and academic performance in Chemistry*

Variable	N	R	R^2
Academic performance in Chemistry Emotional Awareness	113	.130	.017

Key: N=Number of respondents, R = correlation coefficient, R^2 = Coefficient of determination

The result in Table 1 shows that there is a relationship between students' academic performance in chemistry and academic performance (R =.130). This indicates there is a weak positive relationship between emotional awareness and academic performance in chemistry. This implies that as the emotional awareness level of the student increases, academic performance increases, and vice versa. The coefficient of determination indicates that 2% of the variation in chemistry academic performance is explained by the students' emotional awareness.

Table 2: *Regression ANOVA of the relationship between EA and students' academic performance in Chemistry*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.442	1	1.442	1.904	.170[b]
	Residual	84.087	111	.758		
	Total	85.529	112			

a. Dependent Variable: performance
b. Predictors: (Constant), EA

Result in Table 2 shows that F(1, 111) = 1.904; p=0.170 >0.05 for the relationship between emotional awareness and students' academic performance in Chemistry. The observed p-value is greater than the level of significance (0.05). Therefore, the null hypothesis is accepted. Hence, the inference drawn is that there is no relationship between EA and students' academic performance in Chemistry. This implies thatthe students' Emotional awareness is not related to the students' academic performance in Chemistry.

Table 3: *Regression analysis of the relationship between emotional management and academic performance in Chemistry*

Variable	N	R	R^2
Academic performance in Chemistry Emotional management	113	.287	.082

Key: N=Number of respondents, R = correlation coefficient, R^2 = Coefficient of determination

The result in Table 3 shows that there is a positive relationship between students' academic performance in chemistry and their emotional management (R =.287). The coefficient of determination indicates that 8% of the variation in chemistry academic performance is explained by the students' emotional management.

Table 4: *Regression ANOVA of the relationship emotional management and students' academic performance in Chemistry*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.031	1	7.031	9.943	.002[b]
	Residual	78.497	111	.707		
	Total	85.529	112			

a. Dependent Variable: performance
b. Predictors: (Constant), EM

The result in Table 4 shows that F(1, 111) = 9.943; p=0.002 < 0.05 for the relationship between emotional management and students' academic performance in chemistry. The observed p-value is less than the level of significance (0.05). Therefore, the null hypothesis is rejected. Hence, the inference drawn is that there is a positive relationship between emotional management and students' academic performance in chemistry. This implies that the higher the students' emotional management, the higher their academic performance in chemistry, and vice versa.

Table 5: *Regression analysis of the relationship between SEA and academic performance in Chemistry*

Variable	N	R	R^2
Academic performance in Chemistry	113	.126	.016

Motivation

Key: N=Number of respondents, R = correlation coefficient, R^2 = Coefficient of determination

The result in Table 5 shows that there is a relationship between students' academic performance in chemistry and their self-efficacy (R =.126). This indicates the relationship is positive. The coefficient of determination indicates that 2% of the variation in chemistry academic performance is explained by the students' social emotional awareness.

Table 6: *Regression analysis of the relationship between SEA and academic performance in Chemistry.*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.361	1	1.361	1.795	.183[b]
	Residual	84.168	111	.758		
	Total	85.529	112			

a. Dependent Variable: performance
b. Predictors: (Constant), SEA

The result in Table 6 shows that F(1, 111) = 1.795; p=0.183 > 0.05 for the relationship between social awareness and students' academic performance in chemistry. The observed p-value is greater than the level of significance (0.05). Therefore, the null hypothesis is accepted. Hence, the inference drawn is that there is no relationship between social awareness and students' academic performance in chemistry.

Table 5: *Regression analysis of the relationship between Relationship Management and academic performance in Chemistry*

Variable	N	R	R^2
Academic performance in Chemistry RM	113	.135	.018

Key: N=Number of respondents, R = correlation coefficient, R^2 = Coefficient of determination

The result in Table 5 shows that there is a weak positive relationship between students' academic performance in chemistry and their relationship management (R =.135). The coefficient of determination indicates that 2% of the variation in physics academic performance is explained by the students' relationship management.

Table 6: *Regression analysis of the relationship between relationship management and academic performance in Chemistry*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.567	1	1.567	2.071	.153[b]
	Residual	83.962	111	.756		
	Total	85.529	112			

a. Dependent Variable: performance
b. Predictors: (Constant), RM

The result in Table 6 shows that F(1, 113) = 1.567; p=0.153 > 0.05 for the relationship between relationship management and students' academic performance in chemistry. The observed p-value is greater than the level of significance (0.05). Therefore, the null hypothesis is accepted. Hence, the inference drawn is that there is no significant relationship between relationship management and students' academic performance in chemistry.

Table 7: *Regression Analysis of joint relationship between emotional intelligence and students' academic performance in Chemistry*

Model Summary

Model	R	R Square
1	.297	.088

a. *Predictors: (Constant), EA, EM, SEA, RM*

The result in Table 7 shows that there is a moderate and positive relationship between EI and students' academic performance in chemistry (R= .297). The coefficient of determination indicates that 1% of the variation in chemistry academic performance is explained by the students' emotional intelligence.

Table 8: *Regression ANOVA test of joint relationship between EI and students' academic performance in Chemistry.*

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	7.521	4	1.880	2.603	.040[b]
Residual	78.008	108	.722		
Total	85.529	112			

a. Dependent Variable: performance
b. Predictors: (Constant), RM, EA, EM, SEA

The result in Table 8 shows that $F(4, 108) = 2.603$; $p=0.04 < 0.05$ for the joint relationship between emotional intelligence and students' academic performance in chemistry. The observed p-value is less than the level of significance (0.05). Therefore, the null hypothesis is rejected. Hence, the inference drawn is that there is a positive relationship between emotional intelligence and students' academic performance in chemistry.

Discussion

One of the findings of this study revealed that there is a weak positive relationship between self-awareness and students' academic performance in chemistry. But the relationship is not significant. This may be due to the fact that the students are aware of their emotions while carrying out tasks as well as when relating to people. The finding of this study is in line with the findings of (Almegewly, 2022 ; Chan & Pyland, 2022) who also found a positive relationship between emotional awareness and students' academic performance.

Another interesting finding of this study revealed a positive relationship between self-management and students' academic performance. This may be due to the fact that the students' work together cooperatively while carrying out academic tasks. This might have increased their self-management skills in relation to their academic performance. The finding of this study is in agreement with the findings of (Almegewly, 2022; Chan & Pyland, 2022) who also found a positive relationship between self-management and students' academic performance.

Another finding of this study revealed that there is no significant relationship between social emotional awareness and students' academic performance in chemistry. The reason for this finding might be that the students are busy with academic activities so as to pass with a good grade. The students may not have time for the social activities on campus. The finding of this study is in line with the findings of (Al-Ghamdi, 2014; Zirak, 2015) who also did not find a relationship between social emotional awareness and students' academic performance.

It was found in this study that there is no significant relationship between relationship management and students' academic performance in chemistry. The reason for this finding might be because the students are always concentrating on their academic activities whenever they dismiss from lectures. This, in turn, may lead to working alone without considering others, which might affect relationship management. The finding of this study is in agreement with the findings of (Al-Ghamdi, 2014; Zirak, 2015) who also did not find a relationship between relationship management and students' academic performance.

This study revealed a positive relationship between emotional intelligence and students' academic performance in chemistry. The reason for this finding might be because the students are aware of their emotions and their consequences when it comes to the learning process. Surprisingly, when dimensions of emotional intelligence are considered separately, the relationship between some of them and academic performance is not significant. But when taken as a whole, the relationship is significant. This might be due to bias by the respondents while completing the clusters of the emotional intelligence questionnaire. The finding of this study is in line with the findings of (Suleman et al.,

Khatun, 2019; Nwosu, 2022), who also found a positive relationship between emotional intelligence and students' academic performance.

Conclusion

This study examined the relationship between emotional intelligence and NCE chemistry students' academic performance. The study found a positive relationship between emotional intelligence and students' academic performance. However, at the dimensional level, a positive relationship was only found between self-awareness as well as relationship management and students' academic performance.

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