Impact of extrinsic academic motivation and interpersonal emotional intelligence on academic performance of undergraduate biology students in a Nigerian University

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ABSTRACT

Students' performance in science, especially biology, is influenced by a variety of essential factors, including their academic motivation and emotional intelligence. We investigated the impact of extrinsic academic motivation and interpersonal emotional intelligence on academic performance of undergraduate biology students in a Nigerian University. This descriptive survey comprised a sample of 379 undergraduate biology students who were selected at random from the Biological Sciences Department at Tai Solarin University of Education, Ogun State. Academic Extrinsic Motivation Questionnaire and the Emotional Intelligence Scale were adapted and utilized in this study. Correlational and regression statistics were used to test the hypotheses formulated for this research. Our findings revealed that extrinsic academic motivation and interpersonal emotional intelligence had a significant impact on academic performance of undergraduate biology students ($F_{2, 258}$= 4.931; p= 0.008; R^2= 0.037); extrinsic academic motivation was inversely correlated to academic performance of undergraduate biology students (r= -.202, p= 0.001) but interpersonal emotional intelligence showed no significant relationship with academic performance of undergraduate biology students (r= 0.010 p= 0.855). It was concluded that educators such as teachers, educational psychologists and counsellors should help their students develop strong academic motivation and emotional intelligence.

Key words: Extrinsic Academic Motivation, Interpersonal Emotional Intelligence, Academic Performance

INTRODUCTION

In several fields of study, the concept of motivation is used for examining the "what and why" of human behavior. It is well known that student motivation can improve performance, productivity and efficiency (Wilkesmann *et al*., 2012). Motivation is a key element that may affect students' academic performance in environments other than the workplace. Extrinsic motivation refers to actions that are carried out for motives other than one's own. Individuals act in certain ways to achieve desired outcomes, such as tangible prizes or to avoid a penalty that has been promised (Wilkesmann *et al*., 2012). Academic performance is predicted by motivation (Dogan, 2015). As a result, motivation is essential for academic performance. Therefore, there is the likelihood of a significant relationship between academic performance and motivation.

Influence of academic self-efficiency, student engagement and academic motivation on students' academic performance was investigated by Dogan (2015). The findings revealed that, in contrast to emotional and behavioural involvement, cognitive engagement predicts students' academic performance. Also, farourable and significant relationship exist between self-efficacy and academic motivation.

A related study to determine whether students' GPAs are predicted by academic self-regulated learning and academic motivation was conducted by Çetin (2015) and the result showed that there is no correlation between GPA, academic self-regulated learning and academic motivation.

Bolkan *et al*. (2015) examined the assertion that students' motivation has a bearing on the impact of an instructor's clarity on learning. The study's findings demonstrated that even with explicit instruction, test scores did not rise when students' motivation levels were low. Moreover, test scores rose when there was

explicit instruction and a high level of student motivation. According to the study's findings, under circumstances where instruction was highly explicit, pupils who were more motivated performed better than those who were less motivated.

Akomolafe and Adesua (2016) investigated the importance of physical facilities in enhancing levels of motivation and academic performance of senior secondary students in Southwest Nigeria. The findings revealed that there is a relationship between physical facilities, students' motivation and academic performance. According to the study, it was concluded that good functional facilities can inspire students to study, which improves their academic performance.

Oluoch *et al.* (2018) carried out a research to investigate the extent to which students' academic achievement in chemistry is predicted by extrinsic motivation in Kenyan public secondary schools. Extrinsic motivation beliefs were found to have a statistically significant, albeit weak and positive correlation with academic achievement in chemistry ($n=308$, $r=.274$, $p<05$). Extrinsic motivation accounted for only 7.5% ($R^2 =.075$) of the variation in performance of chemistry students on the Kenya Certificate of Secondary Education (KCSE) exams.

One of the significant factors that influences how well students perform academically in science, especially biology, is emotional intelligence. This is in line with the guidelines provided by O'Connor *et al.* (2018). The ten traits of emotionally intelligent people, according to O'Connor *et al*. (2018), include empathy, self-awareness, curiosity, analytical thinking, beliefs, wants and needs, passion, optimism, adaptability, and the decision to help others achieve. Emotional intelligence is the ability to process information relating to one's emotions and the capacity to use that information as a compass for comprehension and action. The capacity to monitor and distinguish between one's feelings and emotions and those of others, as well as apply that knowledge to guide one's thoughts and actions, is what is referred to as emotional intelligence (EI) (MacCann *et al*., 2011). Emotional intelligence, according to Al-Qadri and Zhao (2021), encompasses oneself, other people, and the environment. As a result, it must be better equipped to adapt to shifting circumstances and fulfill environmental requirements. Individuals who effectively use the EQ-i have a tendency to understand their emotions more and express them more effectively.

Babajide and Amosu (2019) in their study examined how senior secondary school students' academic performance in physics is influenced by emotional intelligence. The findings indicated that students' academic achievement in physics is majorly influenced by emotional intelligence.

The study of Suleman *et al*. (2019) in Pakistan examined the relationship between emotional intelligence and academic achievement among undergraduate students of Kohat University of Science and Technology (KUST) and their results showed significant positive relationship between undergraduate students' academic success and emotional intelligence ($r = 0.880$). Furthermore, the multiple linear regression analysis also showed that undergraduate students' academic achievement is positively predicted by emotional stability, self-development, altruistic behavior, relationship management and dedication. It was therefore suggested that the undergraduate students' emotional intelligence may be further developed in order to improve their academic performance.

Academic performance is defined as the rate at which those admitted in school systems complete and achieve their educational objectives (Okoye *et al*., 2021). This implies that how well students are achieving their desired educational goals and objectives is measured by their academic achievement. Okoye *et al*. (2021) stated that secondary students' academic performance and graduation rates have been a source of concern, and researchers have shown a great deal of interest in examining the factors that influence this performance. Academic performance make students that achieve well academically to enter highly competitive areas and as well prepare them for future employment. Future employment opportunities and student advancement may also be impacted by academic performance. Test results have

been demonstrated to be excellent indicators of future success, as assessed by income, profession, and education (Jonsdottir, 2012).
One of the keys to achieving personal, societal development and growth is academic performance. Therefore, the qualities that parents exhibit in training their children are crucial in enabling them focus on their studies and achieve good academic performance (Chowa *et al*., 2012).

It is a well-established fact that students' academic performance is an important discussion when it comes to educational issues in the society. Stakeholders like parents, teachers, government, curriculum developers and planners have been really disturbed about students' academic performance. These stakeholders are happy when the output of education in terms of academic performance are result oriented biology examinations but reverse is the case when output does not measure up to input which is evident in poor academic performances. There are many factors which could lead to students' poor academic performance and this could be not being aware of their emotional capabilities and the lack of motivation to continuously push for excellence. The combination of these factors could affect positively or negatively students' academic performance, hence, this study investigated the impact of extrinsic academic motivation and interpersonal emotional intelligence on academic performance of undergraduate biology students in a Nigerian university. To achieve this, the following research hypotheses were formulated: (i) extrinsic academic motivation and interpersonal emotional intelligence have no significant impact on academic performance of undergraduate biology students; (ii) there is no significant correlation between extrinsic academic motivation and academic performance of undergraduate biology students; (iii) there is no significant correlation between interpersonal emotional intelligence and academic performance of undergraduate biology students; (iv) there is no significant gender difference in the academic performance of undergraduate biology students.

METHODOLOGY

A descriptive survey design was adopted for this study.

Population and Sample

The study population comprised all undergraduate biology students in Tai Solarin University of Education, Ogun State, Nigeria. Simple random sampling technique was used to select three hundred and seventy-nine (379) undergraduate biology students who studied in the 2021/2022 academic year. A total of 81 out of 379 (21%) participants were males, and 298 out of 379 (79%) were females. This was because females are more predominant in the Biological Sciences Department.

Research Instruments and Procedure

Academic Extrinsic Motivation Questionnaire by Regina (1998) and Emotional Intelligence Scale by Schutte *et al*. (1998) were used as instruments for data collection. The questionnaire and the scale consist of 39 and 15 items respectively. Academic Extrinsic Motivation Questionnaire factors include: Authority expectations, peer acceptance, power motivations and fear of failure. Each of the factors has statements that made up the 39 items. Interpersonal Emotional Intelligence has 15 items from the whole 33 items of the Emotional Intelligence Scale. Before the application stage, item analysis was carried out using 67 students from the target population who were not part of the main study. This item analysis was done to standardize the items on the questionnaire and the scale. Cronbach Alpha was used to test the reliability of the items on the questionnaire and the scale, and it had a good internal consistency reliability coefficient of 0.851 and 0.726 for extrinsic academic motivation and interpersonal emotional intelligence respectively.

During the administration stage, four hundred and twenty (420) copies of the instruments were distributed to the randomly selected undergraduate biology students who filled them on the same day they were given. At the point of retrieval, only three hundred and seventy nine (379) copies were retrieved which

showed a 90% return rate. Data on academic performance was obtained from the Biological Sciences Department, Tai Solarin University of Education, Ogun State, Nigeria.

Statistical Analysis

The data collected were analyzed using mean, frequency counts and percentages (descriptive statistics). Product Moment Correlation (PPMC), Regression and Analysis of Variance (ANOVA) were used to test the research hypotheses.

RESULTS

The analysis of the participants' age showed that 78 (20.6%) respondents fell within the age range of 20 years and below while 301 (79.4%) respondents fell within the age range of 20-34 years. Also, it was revealed that 129 (34.0%) respondents were in 200L, 122 (32.2%) were in 300L and 128 (33.8%) were in 400L. The majority of the respondents were in 200L.

Table 1 shows a positive significant impact of extrinsic academic motivation on academic performance of undergraduate biology students (β = -0.203, t = -3.083 and p = 0.002). This implies that a unit increase in extrinsic academic motivation is associated with -0.203 decrease in the academic performance of undergraduate biology students. Also, interpersonal emotional intelligence had a positive non-significant impact on the academic performance of undergraduate biology students (β = 0.036, t = 0.547 and p = 0.585). Furthermore, the regression model shows R^2 value of 0.037, indicating Extrinsic Academic Motivation (EAM) and Interpersonal Emotional Intelligence (IEI) only account for 3.7% of the variance in academic performance of undergraduate biology students. However, the model was significant ($F_{2,}$ 258 = 4.931, P = 0.008; R^2= 0.037).

Table 1: Impact of Extrinsic Academic Motivation and Interpersonal Emotional Intelligence on Academic Performance of Undergraduate Biology Students

Model	**Unstandardized Coefficients**		**Standardized Coefficients**		**t**	**Sig.**
	(R^2 = 0.037, $F_{2, 258}$ = 4.931, P = 0.008).					
	B	**Standard Error**	**Beta**			
EAM	-0.156	0.051	-0.203	0.036	-3.083	0.002
IEI	0.061	0.111			0.547	0.585

EAM means Extrinsic Academic Motivation.

IEI means Interpersonal Emotional Intelligence.

Using Pearson correlation analysis, Table 2 shows the correlation of extrinsic academic motivation and interpersonal emotional intelligence with academic performance of undergraduate biology students. The result revealed that extrinsic academic motivation was inversely correlated to academic performance of undergraduate biology students (r= -.202, p= 0.001) and interpersonal emotional intelligence showed no significant relationship with academic performance of undergraduate biology students (r= 0.010 p= 0.855).

Table 2: Correlations of Extrinsic Academic Motivation and Interpersonal Emotional Intelligence with Academic Performance of Undergraduate Biology Students

	AP
EAM	-0.202**
IEI	0.010

****** Significant at 0.01

EAM means Extrinsic Academic Motivation.

IEI means Interpersonal Emotional Intelligence.

AP means Academic Performance

Table 3 reveals the mean score of the academic performance of male and female undergraduate biology students. The mean scores of academic performance of male and female undergraduate biology students were 54.72±10.29 and 54.13±9.71 respectively. The result revealed that the male undergraduate biology students performed better than their female counterparts. In addition, the independent samples t-test for academic performance of male and female undergraduate biology students showed that, there is no significant difference between the academic performance of male and female undergraduate biology students (P> 0.05).

Table 3: Mean Score of the Academic Performance of Male and Female Undergraduate Biology Students

	Mean	**N**	**SD**	**Mean Difference**	**SD error**	**t**	**Df**	**Sig**
Male	54.72	78	10.285	.586	1.260	.465	356	0.642
Female	54.13	280	9.713	.586	1.301	.450	118.0	

KEY: N- Total number of Participants; **SD**- Standard Deviation; **SD error**- Standard Deviation Error, **t**- calculated difference in units of standard error; **Df**- Degrees of Freedom; **Sig:** Significance level

DISCUSSION

The investigation of the impact of extrinsic academic motivation and interpersonal emotional intelligence on academic performance of undergraduate biology students in a Nigerian university is a study that is focused on ways of improving students' academic performance using the variables under study.

The analysis of research hypothesis one showed that extrinsic academic motivation and interpersonal emotional intelligence had a significant impact on the academic performance of undergraduate biology students. The findings of (Ogundokun & Adeyemo, 2010; Mavroveli & Sanchez-Ruiz, 2011; Sontakke, 2016) that emotional intelligence increases motivation towards school tasks and both in students' academic performance corroborate our findings. This can be further explained that emotionally intelligent students would be motivated to perform better in their academic performance in school. Our findings that extrinsic academic motivation and interpersonal emotional intelligence had a significant impact on the academic performance of undergraduate biology students are also consistent with those of Supervia and Bordas (2018), who found that academic performance, emotional intelligence and school motivation all have an impact on students' personal and academic development.

The result of research hypothesis two revealed a statistically significant inverse correlation between extrinsic academic motivation and academic performance of undergraduate biology students. Our findings are in line with a study by Gbollie and Harriet (2016) that was carried out in Liberia which discovered a negative correlation between extrinsic motivation and academic performance. Moreover, the findings of Haider *et al.* (2015) which reported a positive correlation between extrinsic motivation and academic achievement, are at variance with the results we obtained that there is significant inverse correlation between extrinsic academic motivation and academic performance of undergraduate biology students. Also, our study's findings conflict with those of Owino *et al.* (2015), who reported a positive relationship between extrinsic motivation and academic achievement in biology. Furthermore, our results are at contrast with those of Nilson (2016), who reported that students' academic achievement in biology was positively correlated with extrinsic motivation in Canada. Also, our results do not support Meltem's (2012) study, which reported that extrinsic motivation and academic achievement were positively correlated.

According to analysis of research hypothesis three in our study, there is no significant correlation between interpersonal emotional intelligence and academic performance of undergraduate biology students. Although there is little research on the relationship between students' academic achievement and their interpersonal emotional intelligence, Zahed-Babelan and Moenikia in 2010 discovered that this relationship was in fact negative. Our findings are supported by Al-Qadri and Zhao's (2021) findings which reported no statistically significant differences in the respondents' emotional intelligence according to the grade variable. The studies by Rahimi (2016) and Yıldızbaş (2017) found no significant correlation between the emotional intelligence scale and academic achievement. The results of our study is also in contrast with those of Babajide and Amosu (2019), who reported that emotional intelligence in senior secondary school students had a significant impact on their academic performance in physics. According to studies by Arradaza-Pajaron (2015) and Doost (2017), emotional intelligence can predict academic performance and directly affect studies. Our results are also inconsistent with those of Younis (2019), who found that emotional intelligence and academic performance are positively correlated. This is because educators and parents have started to support a broader educational agenda that promotes teachers' and students' social and emotional skills.

The result of hypothesis four revealed that there is no significant gender difference in the academic performance of undergraduate biology students. Furthermore, the results indicated that male biology undergraduates outperformed their female counterparts in terms of academic performance. Our findings support those of Ayotola and Abiodun (2010), Adegbija and Falode (2014), Gambari *et al*. (2014) Salisu (2015) and Akpoghol *et al.* (2016), who found no appreciable differences between the academic performance of male and female students who were taught science. Furthermore, Ikwuka and Samuel's (2017) findings, which found that gender had a significant influence on the academic performance of male and female students who were taught through computer animation (cartoon concept), support our findings in favor of men. Omajuwa (2011), who asserted that gender has no influence on students' academic achievement in schools, further supports our findings. Our results, however, do not support Effiong's (2018) findings, who reported a statistically significant difference between the academic performance of male and female students when they were compared within the same experimental groups. The results of Kareem (2018), who found that gender had a significant influence on students' learning outcomes, do not corroborate our findings either.

CONCLUSION

It can be concluded that extrinsic academic motivation and interpersonal emotional intelligence had a significant impact on the academic performance of undergraduate biology students. This implies that extrinsic academic motivation and interpersonal emotional intelligence can support the academic performance of undergraduate biology students. The result of the findings showed that extrinsic academic motivation was inversely correlated to academic performance of undergraduate biology students. This implies that the impact of extrinsic academic motivation on academic performance of undergraduate biology students is significant in such a way that the motivation undergraduate biology students get from their study and other external sources have ways of influencing their academic performance.

In addition, it can also be concluded based on the result of the findings that interpersonal emotional intelligence showed no significant relationship with academic performance of undergraduate biology students. It therefore implies that interpersonal emotional intelligence does not have significant effect on the academic performance of undergraduate biology students.

The result of the findings showed that the male undergraduate biology students performed better than their female counterparts, however, there was no significant difference in their academic performance, therefore, it can be concluded that gender does not have anything to do with the academic performance of the students in biology. Finally, it can be inferred that the male undergraduate biology students pay more attention in the classroom and this is evident in their performance.

RECOMMENDATIONS

It is recommended that through the provision of suitable counseling intervention programmes and supportive environments, instructors, counselors, and educational psychologists should support the development of a strong academic motivation and emotional intelligence in the students. In order to give educators the knowledge they need to improve the emotional intelligence of their students, different programmes, conferences, and seminars on the topic should be organized at each level. To also help students understand themselves and other people, regulate their own emotions and the emotions of others, care for others and perform, educators should teach emotional intelligence abilities at each level.

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