



## Emotional Intelligence Dimensions as Predictors of Secondary School Physics Students' Academic Achievement in Nsukka, Enugu State, Nigeria

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### Abstract

Many studies suggest that Emotional intelligence (EI) is a predictor of academic success more than the intelligence quotient (IQ). However, some findings, especially in STEM-based subjects, show mixed evidence. The present study, therefore, sheds more light on the prediction of emotional intelligence in the academic achievement of physics students. A correlation survey design was employed with a sample of 360 senior secondary physics students from Nsukka Local Government Area, Enugu State, Nigeria. Data collection was done using a questionnaire and an achievement test. Cronbach's alpha reliability calculation revealed an overall index of 0.85 for the questionnaire, while Kuder-Richardson's reliability coefficient of 0.62 was obtained for the achievement test. Multiple regression, regression ANOVA, and t-tests were used to analyse the data. Findings revealed that of the EI components, only self-awareness and social skills significantly predicted achievement ( $p < 0.001$ ), whereas self-regulation, motivation, empathy, and overall EI did not. Given the findings, physics teachers should design cooperative learning tasks that foster social skills and self-awareness.

**Keywords:** Academic achievement, Emotional intelligence, Emotional intelligence dimensions, Physics, Secondary school students, Teachers

### Introduction

In contemporary society, navigating the world's complex political, social, and economic tapestry requires a special type of intelligence known as emotional intelligence (EI). Given that EI enables one to understand one's own emotions and those of others. It guides behaviours and actions and helps in achieving set goals. According to Sethi (2024), EI is the capacity to perceive one's own emotions and those of others, distinguish the varied feelings and emotions, and use the information to guide one's thinking, behaviour, and action. EI also helps one to overcome environmental stress. To this effect, Abbasi, Rezaie, Ebrahimi and Taravatmanesh (2018) define EI as an affective ability, performance, and skills that enable one to cope with pressure and overcome environmental stress. EI is a set of traits that helps one understand their own emotions and those of others, and leverages this understanding

to ensure an emotionally balanced atmosphere that achieves personal and group aims and objectives. Individuals who possess EI pride themselves as leaders and group motivators. Given that they can manipulate and handle group dynamics easily without an iota of self-loathing. This set of people appears to use an emotional barometer to gauge their own emotions and the emotions of those around them, and navigate through to achieve their aims and goals and those of the group. Therefore, EI traits should be possessed by everyone because everyone is a leader, though in different spheres of life, such as family, school, church, organisations, and government, among others. EI is particularly important for students for various reasons.

It has been argued that one major attribute required for success in school, in this age and time, is EI. Supporting MacCann, Jiang, Brown, Double, Bucich and Minbashian (2020) assert that in the contemporary challenging educational landscape, EI is needed for academic success. In a

similar vein, EI enables learners to handle various situations in the school (Alenezi, Saleh & Elkalashy, 2020). Moreover, EI is important for academic performance because it affects students' capacity to influence others, engage, collaborate, and perform in a variety of academic contexts (Kaur & Bhatia, 2023). Moreover, emotionally intelligent individuals possess the skill to decipher complex emotions, infer emotional responses to upcoming events, and determine an emotional state to achieve a goal (Mayer, Caruso & Salovey, 2016). Given this, EI could help students to overcome the learning environment challenges arising from teachers, fellow students, course leaders, as well as curricula and extracurricular bottlenecks. EI could place learners in the right temperament for studying, writing assignments, carrying out projects, engaging in practical activities, attending classes, paying close attention during classes, preparing for examinations, and ultimately becoming successful after examinations.

EI has been theorised to have different dimensions, or components. For example, Mayer and Salovey (1997) propose a model that suggests that EI encompasses four distinct abilities: the perception of emotions, the comprehension of emotions, the utilisation of emotions to enhance cognitive processes, and the regulation of emotions. Similarly, Goleman's (1998) framework suggests that EI comprises five key elements: self-awareness, self-regulation, self-motivation, empathy, and social skills. Self-awareness is the ability to recognise and understand one's moods, motivations, and abilities, and understand the effects they have on others. Self-regulation refers to the capacity to manage one's impulses, consider responses before speaking or acting, and communicate properly. Motivation involves possessing a desire for learning and personal growth, as well as the resilience to persevere in the face of life's challenges. It encompasses the establishment of objectives and the commitment to achieve them. Empathy is defined as the ability to comprehend the emotions and reactions of others. Goleman posits that an individual must first comprehend their own emotions and behaviours before they can effectively understand those of others. Social skills encompass the capacity to recognise humour, sarcasm, provide customer

service, sustain friendships and relationships, and establish commonalities with others. Consequently, a student who possesses self-awareness, self-regulation, motivation, empathy, and social skills is likely to achieve commendable academic success both during their studies and upon graduation.

Academic achievement is one of the measurable attributes of success in school. Academic achievement is the outcome of instruction (Steinmayr, Meißner, Weidinger & Wirthwein, 2015). It signifies the extent to which the instructional goal has been achieved by both the teacher and the students (Spinath, 2012). It is the scholastic, quantifiable attribute gauging instructional success or otherwise. In secondary school physics, the achievement of most students falls below an acceptable threshold. According to the West African Chief Examiner's Reports from 2019 to 2023, students' achievements in physics have been declining. The reports show that, over the years, the students' raw mean scores were consistently far below the 60 benchmark out of 100 in physics. Consequently, various factors have been investigated, including the methods used by teachers, the nature of questions set by examination bodies, students' characteristics, and parental variables. However, previous studies have found that EI correlates with achievement (Sethi, 2024; Kaur & Bhatia, 2023).

If EI predicts achievement in subjects like humanities and social science subjects, does it do the same in science subjects like physics? Unlike the humanities and social sciences, physics learning is highly dependent on cognitive and psychomotor engagement. Hence, raising the question of whether EI is a meaningful predictor of achievement in physics, or whether its role is limited to certain dimensions. This is necessitated because cognitive and psychomotor engagement, such as intelligence and practical skills, enable students to succeed in physics, unlike humanities and social science subjects, which may require intelligence and certain behavioral and social skills to succeed. Interrogating the subject- or discipline-specific nature of EI in the learning of subjects like physics remains a concern for the present study. Results on the prediction of achievement by EI in Science, Technology, Engineering, and

Mathematics (STEM) have shown mixed evidence.

Research indicates no significant positive relationship between EI and Engineering students' GPAs (Skipper & Brandenburg, 2013). It was also found that EI components (emotional management, awareness, negative outlook, non-verbal messages, and positive outlook) have no significant relationship with the performance of engineering students (Devi & Narayanamma, 2014). Moreover, a weak positive correlation was found between EI and the achievement of Engineering students (Ergin, Karatas & Mutlu, 2020). On the contrary, a positive association was found between EI dimensions (self-regulation, self-awareness, self-motivation, and social competence) and students' achievement in Engineering (Patil, Patil & Patil, 2023). Therefore, this suggests mixed results of the predictability of EI on achievement in Engineering subjects.

Further, it is also important to examine the research evidence on the relationship between EI and students' achievement in science subjects. Studies have revealed that EI subscales correlate with students' achievement in chemistry, physics, and mathematics, with motivation showing the highest relationship and empathy the least (Pranata, Sastria, Ferry & Zebua, 2023). In the same vein, dimensions of EI such as self-actualisation, social responsibility, stress-tolerance, and impulse control were predictors, although they varied across the science subjects (Yüksel & Geban, 2014). However, overall, EI was not significantly related to students' achievement in physics, chemistry, biology, and mathematics subjects (Yüksel & Geban, 2014).

Continuing, in chemistry, a positive relationship was found between EI and the academic achievement of secondary school students, with self-motivation, emotional stability, and self-awareness exhibiting the highest correlation (Paramasivan & Mani, 2012; Owan, 2022). Similar results were found in the Stoichiometry topic of chemistry (Anekwe, Opara & Nnorom, 2024). Additionally, a meta-analysis of 36 studies in mathematics revealed a medium effect size of EI on mathematics achievement (Muhtadi, Pujiriyanto, Kaliky, Hukom & Samal,

2021). However, a contrary result showed no significant relationship between EI and achievement in algebra (Musonda, Shumba & Tailoka, 2021). In physics, an influence of EI on achievement was found (Tepi, Daud, Nasar & Wolo, 2022). Additionally, a positive, albeit weak, relationship was found between EI and achievement in physics (Tato, Napitupulu, Pasaribu, Werdiana & Ali, 2023). A take-home from the reviewed studies is that results on the prediction of achievement in science subjects by EI remain mixed, in both EI subscales and overall EI, highlighting the need for further studies, particularly in physics, where there is a paucity of studies, especially in EI dimensions. It is worth noting that although some studies have found a relationship between EI and achievement in physics, mathematics, engineering, chemistry, and biology, the significance of this relationship was not established in most cases. This trend was observed across the studies, with many of them only investigating the relationship without testing the corresponding hypothesis to establish significance. For instance, in the two cited studies in physics, one of them found a weak relationship, which typically indicates no significant relationship. Motivated by this gap, the study sought to establish the significant prediction of students' achievement in physics by EI. Also, the extent of contributions of EI dimensions on students' achievement in STEM, particularly in physics. Considering this, the study investigated the extent overall EI and its dimensions significantly predict students' achievement in physics. Thus, the present study hypothesised that EI traits/components, and their overall effect, are not significant predictors of students' achievement in physics.

### Literature review

#### *Measures of Emotional Intelligence*

To understand EI, knowledge of the three different models of representing the concept is key. The ability, trait, and mixed models shed light on the concept of EI. The ability model recognises EI as a cognitive, intelligent, and mental ability capable of objective measurement. EI deals with the use of emotions to guide reasoning. Championed by Mayer and Salovey (1997), who

see EI as an interaction between emotion and intelligence. EI is the ability to accurately reason about emotion and use emotions and emotional knowledge to shape thought and reasoning (Mayer, Roberts & Barsade, 2008). Given this understanding, the authors developed an ability tool in the form of a test for objective assessment of EI. However, the test is limited by its inability to assess behaviours or personality (Bru-Luna, Martí-Vilar, Merino-Soto & Cervera-Santiago, 2021).

Given the limitation of the ability model, a trait model was conceived, which recognises EI as an integral part of personality (Petrides & Furnham, 2001). The trait model yielded a measurement tool in the form of a questionnaire, with no correct or wrong answers. It is a scale-like instrument that enables an individual to assess his/her behaviours in a non-dichotomous form. Like an ability test, a trait-like scale has its limitations of being subjective.

The mixed model opines that EI is an intersection of cognitive abilities and personality traits (Goleman, 1998). The mixed EI model recognises the role of cognition and personality in the management of emotions. Thus, Goleman developed a scale tool for assessing EI. Another mixed model of EI is Bar-On's (2004). Unlike the Goleman mixed model, the Bar-On mixed model sees EI as an interplay of emotional and social competencies. Bar-On also uses a scale to gauge EI.

A close observation of all three models of EI reveals that they are related in one form or the other, given that their dimensions have some resemblance. The relationship notwithstanding, the Goleman model was adopted in this study, given that it incorporates both the cognitive and behavioural dimensions of EI, making it applicable in an educational setting. In educational assessment, students' performance is usually drawn from cognitive, affective, and psychomotor objectives, or at least two domains. In mixed model EI, as proposed by Goleman, this appears to be the case, given that it encompasses both cognitive (mental) and affective (behavioural/personality) domains, unlike other models of EI.

## Theoretical framework

The theoretical framework underpinning this study is Goleman's (1998) theory of EI. In 1995, Goleman opined that intelligence quotient (IQ) is not the primary factor or variable for success in life. Goleman theorises that EI is more significant than IQ for life success. Goleman explained that human emotion is controlled by a separate part of the brain, and the same goes for IQ. Due to the evolution of the brain, the emotional and intuitive aspects of the brain govern human actions. However, emotional responses tend to act faster than the intuitive or reasoning part of the brain. This places human beings in a state of making irrational decisions or actions, which can be damaging. So, Goleman theorises the need to use intelligence to guide our emotions, giving birth to EI. Based on this, a framework for EI based on five elements was proposed by Goleman (1998). Specifically, these include self-awareness, self-regulation, motivation, empathy, and social skills. Self-awareness entails examining how emotional conditions affect one's achievement. It also means understanding one's own strengths and weaknesses. So, self-awareness is about understanding one's emotions well and using the information to achieve a set goal. Self-regulation is the ability to guide anger and stress, thinking clearly amid pressure and threats. Motivation is the drive to succeed in the face of challenges. It is also about setting one's goals and pursuing them to a logical conclusion, despite daunting challenges. Empathy is the ability to understand individual differences, avoid stereotypical behaviours, and encourage others to succeed. Social skills encompass the ability to inspire, persuade, and communicate meaningfully with others, thereby influencing their actions. This encompasses the capacity to mediate disputes, engage in negotiations, and collaborate with others.

Goleman maintains that people who possess these attributes are usually successful in life. In line with this, the study is anchored on this framework to determine the contributions of each of the elements/dimensions of EI and overall EI on students' achievement in physics. Physics, being a practical and problem-solving-based subject, requires students to be fully engaged in the subject to achieve meaningful learning. Physics also

requires higher-order thinking skills to succeed in the subject. Putting Goleman's framework of EI in the context of physics achievement. The model encompasses cognitive and behavioural interaction, such as general achievement. If a learner uses emotions to guide cognition or the inverse, achievement in a cognitively demanding subject like physics could improve. It is understood that proper self-awareness and regulation, for instance, can help a student be attentive to teaching, participate actively during lessons, and engage meaningfully in physics practicals. In a similar vein, self-motivation can help a student develop a desire to study the subject even in an unfavourable situation. Social skills and empathy can be drivers for helping a student relate well with fellow students in the class, and thus aid the student in achieving well in the subject. Thus, it is believed that EI dimensions can play a significant role in promoting students' achievement in the subject.

### Methods

A correlation survey research design was utilised for this investigation. This design aims to determine the nature of the relationship that exists between two or more variables, indicating both the direction and strength of the relationship among the variables (Nworgu, 2015). The selection of this design for the current study is due to its focus on examining the relationship between the components of EI and students' academic performance in physics. The research was conducted in the Nsukka Local Government Area of Enugu State. Enugu State is in southeast Nigeria. This location was chosen because students' academic performance in physics has consistently been below average in this region over the years. There is a total of 31 secondary schools within this area.

The study's population comprised all 2,637 class one students (SS1) from senior secondary schools in the region during the 2019/2020 academic year. The selection of SS1 students was based on the premise that this group is at a critical juncture for establishing a foundation in physics, and their academic success at this level could significantly influence their performance in subsequent classes. The sample for

this research included 360 students enrolled in senior secondary school class one, which accounts for 13.7% of the total population. This sample was arrived at using Yamane's (1967) formula for calculating the minimum sample size, which yielded 347, but 360 were used, surpassing the minimum threshold set by Taro. Multi-stage sampling techniques were employed to form the sample. Initially, simple random sampling through balloting with replacement was utilised to choose 12 schools from a total of 31 schools within the Local Government Area (L.G.A.), representing 39% of the total schools in the area. In the subsequent stage, no further sampling was necessary, as all students from the selected schools in the first stage who were taking physics and expressed a willingness to participate were included in the study.

In this study, two research instruments were employed. These include the Students' Emotional Intelligence Rating Scale (SEIRS) and the Physics Achievement Test (PAT). The SEIRS was modified to gather data regarding the EI skills of the students. This instrument was developed based on Goleman's EI model. It consists of two sections (A and B). Section A gathered information about the demographic characteristics of the participants. Section B focused on the items of the questionnaire that assessed five domains of emotional competency: self-awareness, self-regulation, motivation, empathy, and social skills (Goleman 1995, 1998). Section B was organised into five clusters, each addressing specific components of EI. A four-point Likert-type rating scale was utilised, namely Strongly Agree – 4, Agree – 3, Disagree – 2, and Strongly Disagree – 1. The researchers adapted this instrument, making several modifications during the adaptation process, such as rephrasing certain items to better fit local contexts.

The second instrument is the PAT, comprising 30 questions, which were used to determine the academic achievement of the students. The instrument was self-developed by the researchers from the students' past questions and physics textbooks. Content validity of the PAT was established through a table of specifications by ensuring that the questions were distributed

across the six levels of Bloom's cognitive taxonomy.

Due to the modifications implemented in SEIRS, both the validity and reliability of the instrument were reconfirmed, alongside those of PAT. Copies of SEIRS and PAT were provided to one expert in each of the fields of educational psychology, measurement and evaluation, and physics education, all affiliated with the Faculty of Education at the University of Nigeria, Nsukka. This was done for the purpose of face validation, along with the study's objectives, research questions, and hypotheses, to facilitate their assessment of the relevance of the items to the study's aims. To assess the reliability of the instruments, a pilot test was carried out involving 30 SS I students from a school that was not part of the study, instead shares similar characteristics with the schools included in the research. The data garnered from the participants was compiled and analysed using Cronbach's alpha for SEIRS and Kuder-Richardson (K.R. 20) for PAT. The internal consistency coefficients of the instrument were found to be 0.82 (Self-Awareness), 0.79 (Self-regulation), 0.82 (Motivation), 0.79 (Empathy), 0.83 (Social skills), and an overall reliability of 0.85 for SEIRS. The reliability index of PAT was found to be 0.62.

Before the administration of the instruments, ethical compliance was ensured by securing the students' and teachers' consent before the research and ensuring that anonymity was maintained using codes instead of the students' names (pseudonyms). Furthermore, the students were guaranteed that their responses would remain confidential. The researchers employed a personal delivery technique (PDT), meaning that they administered the instrument directly to the students in person. The students received instructions on how to complete the questionnaire. The respondents filled out the questionnaires and returned them immediately on-site. The data gathered for the study were analysed using multiple linear regression analysis to address the research questions, while analysis of variance

(ANOVA) and t-test were utilised to evaluate the null hypotheses at a 0.05 level of significance. Multiple regression analysis was used because it is a statistical method for predicting a criterion variable by group predictor variables. ANOVA was employed, given that the five EI components collectively serve as predictor variables, allowing the hypotheses to be tested in an integrated manner. Moreover, the t-test was used to test the hypothesis discretely across the EI dimensions. According to Nworgu (2015), an R value between 0.80 and above is a high relationship; an R value between 0.30 to 0.79 is a moderate relationship; an R value between 0.01 to 0.29 is low, and an R value of 0.00 is no relationship.

## Results

### *Magnitude of prediction of students' academic achievement by their emotional intelligence*

The analysis in Table 1 shows the multiple regression analysis of the extent to which overall EI predicts students' academic achievement. The table reveals a low linear regression coefficient of 0.155. Furthermore, the coefficient of determination ( $R^2$ ) is 0.024. This implies that only 2.4% of students' academic achievement is predicted by their EI.

The results in Table 2 show  $F(5, 354) = 1.734$ ,  $P = 0.126 > 0.05$ . Since the probability value (sig) of 0.126 is greater than the 0.05 level of significance, the null hypothesis was upheld. Thus, EI is not a significant predictor of students' academic achievement in physics.

The results in Table 3 show  $t(359) = 2.294$ ,  $P = 0.022 < 0.05$ , for self-awareness;  $t(359) = 0.30$ ,  $P = 0.529 > 0.05$ , for self-regulation;  $t(359) = 1.838$ ,  $P = 0.042 < 0.05$ , for social skill;  $t(359) = 0.585$ ,  $P = 0.559 > 0.05$ , for motivation; and  $t(359) = 1.191$ ,  $P = 0.235 > 0.05$ , for empathy. The probability value (sig) is less than the 0.05 level of significance in self-awareness and social skills, and greater in the rest. Thus, it shows that out of the five dimensions of EI, only self-awareness and social skills are significant predictors of students' achievement in physics.

**Table 1:** Multiple Regression analysis of the magnitude of prediction of students' academic achievement by their emotional intelligence

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,155 <sup>a</sup>	0,024	0,010	7,30207

a. Predictors: (Constant), empathy, self-awareness, motivation, self-regulation, social skills

**Table 2:** ANOVA analysis of the significance prediction of students' academic achievement by their emotional intelligence

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	462,157	5	92,431	1,734	,126 <sup>b</sup>
	Residual	18875,373	354	53,320		
	Total	19337,531	359			

a. Dependent Variable: Achievement

b. Predictors: (Constant), empathy, self-awareness, motivation, self-regulation, social skills

**Table 3:** T-test analysis of the prediction of students' academic achievement by their emotional intelligence dimensions

Coefficients <sup>a</sup>						
Model		Unstandardised Coefficients		Standardised Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	32,878	2,876		11,433	<,001
	Selfawareness	,434	,189	,145	2,294	,022
	Selfregulation	,099	,158	,043	,630	,529
	socialskills	,337	,183	,138	1,838	,042
	motivation	,094	,160	,039	,585	,559
	empathy	,159	,133	,082	1,191	,235

a. Dependent Variable: Achievement

## Discussion

The study's findings reveal that of all five dimensions of EI, only self-awareness and social skills significantly predict achievement in physics. This finding is attributable to the fact that self-awareness involves internal insight into one's emotions and their impact on others. It entails the ability to understand, manage, and control one's emotions to have a positive impact on others. Effective management of emotions is key to effective management of others. When a student is aware of themselves, it helps them determine their learning style, which in turn improves study habits

and promotes academic achievement. Social skills, on the other hand, help students to get along well and thus succeed academically. Given that students share ideas with their peers while completing assignments, solving problems, and engaging in practical settings, social skills inadvertently promote academic achievement in the subject.

On the contrary, the findings revealed that self-regulation, motivation, and empathy do not predict physics students' academic achievement. Self-regulation alone may not significantly impact academic achievement, but it should interact with other variables, such as study habits, attention, and

regular class attendance, to influence achievement. A habit of controlling one's impulses, expressing oneself clearly, and thinking before speaking cannot improve achievement alone. Also, being motivated alone is not enough for academic success. The researchers agree that motivation is important to success, but it must align with other actionable variables, such as class attendance, studying, completing assignments, and participating in class activities, to achieve academic success. Again, the ability to understand other people's emotions and reactions is empathy. Understanding people's emotions cannot improve achievement without the student/candidate attending classes, carrying out given assignments, and so on. Physics, as is known, is a practical and problem-solving-based subject that requires the full commitment and engagement of the learner to succeed, not what being eloquent in speaking and controlling one's impulses can do. Thus, students must attend classes, actively participate in the learning activities, and take their learning seriously to ensure academic success in the subject.

Lastly, the findings revealed that, overall, EI is not a significant predictor of students' academic achievement in physics. EI is simply the perceiving, understanding, and controlling of one's emotions and those of others. Physics is a practical-based subject that involves problem-solving, requiring critical thinking, creativity, and engagement with the learning materials. Although EI may indirectly influence engagement in the subject, the findings suggest that achievement in physics is more strongly shaped by cognitive, psychomotor, and study-related variables. For instance, when a student fails to attend physics classes, carry out practical investigations, solve problems, and complete assignments given to them, even if the student understands themselves and their fellow students well, the student may not succeed academically in a physics class. These findings reinforced the findings of the previous studies, both in STEM and other subjects (Ergin et al., 2020; Devi & Narayanamma, 2014; Shengyao et al., 2024; Song, Ituang, Peng, Law, Wong & Chen, 2010; Skipper & Brandenburg, 2013; Tato et al., 2023; Yasmeen, Shah, Naseer & Syeda, 2023; Yüksel & Geban, 2014). The agreement in findings could be that the authors of the studies

tested whether any relationship found was significant or not, a practice followed in the present study. The importance of this exercise cannot be overemphasised, given that some findings only showed a relationship exists between the two variables without further establishing significance. The present results indicate that relationships exist, but they are weak, and further hypothesis testing revealed that these relationships were not statistically significant. Another reason for the agreement in the findings could be the nature of science subjects, particularly physics and engineering, which require reasoning skills and practical engagement. Even though students' engagement could be influenced by their EI, findings could suggest otherwise.

It is also worth noting that previous studies in STEM and other fields were inconsistent with the findings of the present study. For instance, it was found that there exists a positive correlation between EI and students' achievement (e.g., Anekwe et al., 2024; Kaur & Bhatia, 2023; Martínez-Rodríguez & Ferreira, 2025; Muhtadi et al., 2021; Paramasivan & Mani, 2012; Pranata et al., 2023; Owan, 2022; Sethi, 2024). This discrepancy in findings could be attributable to the extent the analysis was reported. If the authors only reported the nature of the relationship between the two variables without testing the supporting hypothesis, it could lead to different interpretations of the results. Another reason could be the type of model employed in the study, which ultimately suggests the measures used for data collection. In this study, the Goleman model was adopted, informing the use of a subjective scale for data collection. Understandably, subjective scales have their limitations, including self-rate bias, which could lead respondents to rate them high for ego's sake. Another reason for the difference in the findings could be the nature of physics. EI could help a student to succeed in physics, but it is not a significant factor. The student's study habits, learning style, class attendance, and learning engagement, including their background in mathematics, all contribute to making a student successful in physics learning.

Lastly, it is worth noting that some of the skills, such as self-awareness and social skills, have a positive correlation with achievement in

physics, agreeing with Goleman's (1998) EI framework partly, which posits that self-awareness, self-regulation, motivation, empathy, social skills, and general EI contribute to success in life. However, it is worth noting that in physics, achievement and success receive more attention in relation to students' efforts to study, attendance in classes, and engagement in practical activities, rather than EI. EI dimensions and indeed EI overall could play a part in helping the students' study and engage in practical activities through self-awareness and social skills, but attention should be shifted to other variables outside the scope of this study, such as other students' variables like their cognitive factors, academic engagement, attendance in classes, among others

### Conclusion

The findings revealed that out of the five components of EI, only two predicted the students' academic achievement in physics: self-awareness and social skills. However, the other three components (self-regulation, motivation, and empathy) did not predict the students' academic achievements in physics. Generally, it was evident that EI does not significantly predict the academic achievement of physics students. This implies that other variables outside EI play a role in students' achievement in physics. The variables could include the teacher's instructional strategies, the learners' IQ, engagement, and study habits, among others. The nature of physics requires students to be actively engaged in the learning process through experimentation and problem-solving. This could be one of the reasons EI appears not to influence students' academic achievement, although some of its components, such as self-awareness and social skills, contribute to students' achievement. This also suggests the need for physics teachers to integrate group-based activities that enhance social skills and encourage students' self-awareness of their learning processes. However, given the limited predictive power of overall EI, interventions should prioritise cognitive engagement strategies alongside selected EI dimensions to place students in groups for social cohesion and learning.

These findings shed more light on the concept of EI and challenge thorough research by

future researchers working on the relationship between EI and academic achievement in the humanities, social sciences, arts, and other scientific subjects to investigate EI subject-specific dynamics. Moreover, physics teachers should design cooperative learning tasks that foster social skills and self-awareness.

### Limitations of the Findings

One major limitation of the findings is that EI was assessed using a self-report instrument, which is subjective and may not provide an objective assessment of the traits evaluated. Another limitation of the findings is the study's limited scope, as it only utilised one education zone in the State. Future research in this subject should employ a wider geographical coverage, involving physics students from a representative sample. Additionally, a mixed-methods approach to assessing EI is encouraged, which will yield robust measures of the construct.

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### Declarations

#### Ethics Approval and Consent to Participate

The consent to participate was obtained orally as the researchers approached the teachers and students. Only those who agreed to participate were given the instruments to respond.

#### Consent for publication

All the authors give their consent for this manuscript to be published

#### Availability of Data and Materials

Available data can be obtained through the corresponding author upon request.

#### Competing Interest

The authors declare that there is no conflict of interest

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