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Original Research

Social Intelligence Dimensions and Secondary School Students' Interest in Learning Biology

Izunna Shedrack Nwuba, Josephine Nwanneka Okoli
Department of Science Education, Nnamdi Azikiwe University, Awka, Nigeria.

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ABSTRACT

The ongoing effort to identify variables that could be influenced for academic gains in the 21st-century classroom fueled the study on the predictive influence of social intelligence (SI) on secondary school students' interest in Biology, applying a predictive correlational research design. 1,198 Secondary School Year 2 (SS2) students, obtained using a multistage sampling procedure, were the respondents. Two adapted instruments, the Social Intelligence Scale (SIS) and the Biology Interest Scale (BIS), were employed for data collection. The adapted instruments (SIS and BIS), validated by three experts, when pilot tested, gave reliability coefficient values of 0.79 and 0.86, established using Cronbach's alpha. The data collected were analyzed using simple and multiple linear regression analyses. The findings revealed, among others, that SI caused 20.1% variance in students' interest in Biology, indicating that SI significantly and positively contributed to students' interest in Biology. On relative contributions of individual dimensions of SI, the study also revealed that all the dimensions of SI, individually and jointly, significantly predicted students' interest in biology. Based on the findings, it was recommended among others that education stakeholders should organize periodic trainings, sensitization and orientation programmes to educate students on strategies that can be adopted to promote the acquisition of social intelligence skills.

Corresponding Author:

Izunna Shedrack Nwuba
Department of Science Education, Nnamdi Azikiwe University, Awka, Nigeria.
Email: is.nwuba@unizik.edu.ng

1. INTRODUCTION

Social intelligence, a concept first introduced by Edward Thorndike in 1920, in today's classroom has been recognized as one of the 21st-century skills that influences learning outcomes as it encompasses an individual's ability to understand, manage and navigate social interactions effectively. In education, Saravanan and Prabu (2019) defined it as a student's ability to read other people and understand their intentions and motivations, enabling them collaborate well with others and interact effectively with them. As a concept rooted in cognition and human behaviour, Alagra and Bastin (2023) noted that social intelligence is not innate and encompasses the critical skills and abilities of empathy, interpersonal sensitivity, practical communication skills, and flexibility that enable students to navigate the complexity of social interactions and relationships. In the same vein, Silvera et al. cited in Odofin (2022) posited that social intelligence is a multi-faceted construct with close relation to cognitive and emotional intelligence, merging the skills of social intelligence into three core dimensions of Self-awareness skills/ interpersonal sensitivity (ability to

recognize one's feelings, understand one's emotional reactions, and how they influence one's behaviour and performance), social skills/facilitation (ability to sense how another feels or know what they think or intend, that facilitates successful communication) and social information processing skills (the ability to adjust individual and group behaviour to conform to the prevailing system of norms and values in a given society, class, or social group).

A deep understanding of the dimensions of social intelligence intimates one that social intelligence is an attribute that helps students develop a wide range of learning-related skills that allow them to build and maintain friendships, study independently, work in groups, and respond appropriately to adult feedback and correction. Supporting the premise, Hanan and Ebner (2017) stressed that the skills and abilities of social intelligence help one establish relationships with others through developing one's intrapersonal knowledge, ability to judge others' feelings, temperaments and incentives, effective social performance/function, ability to sympathize, and ability to be skilled in decoding non-verbal signs. In the same vein, Chopra and Kauts (2023) posited that these skills of social intelligence, when effectively inculcated, aim to develop group intelligence through encouraging effective communication, mutual respect, trust and conflict management. Summarizing these benefits, Alagra and Bastin (2023) opined that students' social intelligence skills are core to effective learning, as students' ability to interact, understand and collaborate with others helps in developing their thinking and problem-solving skills, which are essential in interaction and exchanging of ideas that foster their interest in learning.

Recognizing the contributions of social intelligence to learning outcomes, several empirical studies have been carried out to ascertain the influence and relationship between social intelligence and students' learning outcomes. For instance, Sini and Amalraj (2019) examined the relationship between social intelligence and academic achievement among the secondary school students in Kollam district, India, adopting a normative survey research method. The study concluded that there exists a significant relationship between social Intelligence and academic achievement among the secondary school students, irrespective of gender. In another study, Mangarin and Montefolka (2023) ascertained the influence of social-emotional intelligence on public school students' attitude towards mathematics instruction in Davao del Norte, Philippines. The study, which adopted a quantitative non-experimental descriptive-correlational research design, using a sample of 300 Grade 12 students in a certain public school in Davao del Norte, revealed that there was no significant relationship between students' social-emotional intelligence and their attitude towards Mathematics instruction. Magar and Magre (2023) investigated the social intelligence of secondary school students in relation to their social attitude in Thane district, India. The study which adopted a descriptive survey design involving correlational and causal comparative methods revealed that there was a significant relationship in social intelligence and social attitude of Secondary school student on the basis of gender, medium of instruction, types of school and Geographical area, indicating that students with higher levels of social intelligence tend to have more positive social attitudes and are more likely to display empathy towards others. In his study, Odofin (2022) examined the relationship between social intelligence competencies and academic achievement of secondary school students in Rivers State, Nigeria, adopting a correlational survey research design. The study revealed that there was no linear relationship between social intelligence competencies and academic achievement, concluding that social intelligence competencies do not support students' academic achievement. A glance through the reviewed empirical studies informs the researcher that, despite the assumption that social intelligence contributes positively to learning outcomes, empirical findings on the attribute have remained inconsistent. Also, based on empirical reviews, no similar study known to the researcher has been conducted to ascertain the contributory influence of social intelligence and its dimensions on students' interest in learning Biology, specifically in Anambra State, Nigeria. This is the gap the study intends to fill.

Interest, in today's modern classroom, has been recognized as a student psychological variable that could influence or be influenced for academic gains. In the academic context, it refers to a persistent tendency of a student to engage in the teaching and learning process, usually lasting throughout the duration of the instruction (Anyanwumelu and Okigbo, 2021). Similarly, Nwuba et al. (2023) defined interest in education as a personal attribute of a student towards a learning situation, usually expressed as a like or dislike. As a student-related variable, Awosika and Okoli (2023) posited that interest plays a great role in the field of psychology as it is closely related to personality, motivation, cognition, development, emotion, vocations, aesthetics, behavior, hobbies, reasoning, and information processing. Interest can help one think more clearly, understand more deeply, and remember more accurately, transforming struggling performers to high achievers (Attamah, 2023). In learning Biology specifically, interest has been recognized as a key component of successful and positive learning because of the nature of the biology curriculum. Supporting the premise, Rowland et al. (2019) and Nwafor and Oka (2018) reported that students' interest in biology is a key factor for their motivation, persistence and success, as by arousing students' interest in learning biology, can teachers enhance their enthusiasm for learning biology, help them master biological knowledge and

techniques better, forming the scientific spirits and attitudes. Considering these powerful contributions of interest in the teaching and learning process, researchers in the present have shifted emphasis to viewing interest as a two-faced factor, that could influence and be influenced, driving them in search of other student psychological variables that could be appealed to and manipulated to influence students' interest. In the course of the literature review, the authors identified social intelligence as a student interpersonal variable that influences learning outcomes and were motivated to ascertain its influence on students' interest in learning Biology.

Biology, one of the pure science subjects studied in Nigerian secondary schools, has been recognized as a tool for national development as its study of plants and animals has significantly contributed to genetic evolution, disease control, conservation of resources and agriculture. Supporting the premise, Baseya & Francis (2011) argued that a sound knowledge of biology leads to self-understanding of how the body system works as it equips its learners with knowledge and skills that can help them face challenges in society, especially those related to common diseases, pollution, and genetics. Biology provides the knowledge applied in every sphere of life today, especially in areas of biotechnology, environmental protection, resource conservation, genetic engineering and agriculture, aimed at creating a better environment for one to live in (Nwuba et al., 2024). A glance at these benefits, intimates one on the indisputable relevance of Biology to sustainable development and as a result, the need to instill and foster students' interest in learning the subject, since most students are attracted to the subject not because of their interest in biology per se, due to the bulky nature of the biology curriculum and its complex concepts, but because of career goals. Considering the premise, the rationale behind the study was conceived to ascertain if social intelligence predicts students' interest in learning Biology.

1.1. Research Questions

The following research questions guided the study:

1) What is the predictive value of social intelligence on secondary school students' interest in biology?
2) What are the relative contributions of the individual dimensions of social intelligence (social awareness (SA), social Skills (SS) and social information processing skills (SIPS) to secondary school students' interest in biology?

1.2. Hypotheses

The null hypotheses were tested at the 0.05 level of significance:

1) Secondary school students' social intelligence does not significantly predict their interest in biology.
2) The relative contributions of the individual dimensions of social intelligence (social awareness (SA), social skills (SS) and social information processing skills (SIPS)) to secondary school students' interest in biology are not significant

2. METHOD

The study applied a predictive correlational research design. A predictive correlational research design, according to Creswell (2012), is a type of correlation design that seeks to not only determine the relationship that exists between variables, but also attempts to predict or understand future behavior to identify the independent variable(s) that predict the dependent variable(s). The respondents were 1,198 students, drawn from the 24,102 Senior Secondary Year Two (SS2) students offering Biology in the 265 government-owned secondary schools in Anambra state, in the 2024/2025 academic session, using a multi-stage sampling procedure. A 21-item Social Intelligence Scale (SIS) adapted from Silvera et al. (2001), Tromso Social Intelligence Scale (TSIS) and Biology Interest Scale (BIS) adapted from the original Academic Interest Scale for Adolescents (AISA) developed by Luo et al., 2019, were employed for data collection. SIS and BIS, which were revalidated by experts, were subjected to pilot testing to yield a reliability coefficient of 0.79 and 0.86, respectively, estimated using the Cronbach Alpha formula. The data collected were analyzed using regression analyses (simple and multiple regression).

3. RESULTS

Research Question One: What is the predictive value of social intelligence on secondary school students' interest in biology?

Table 1. Prediction of Secondary School Students' Interest in Biology by their Social Intelligence

Model	R	r^2	Adjusted r^2	Unstandardized coefficients (B)	Std. Error
Constant				56.172	
Social Intelligence	0.448[a]	0.201	0.200	0.369	7.235

a. Predictors: (Constant), Social Intelligence (SI)
b. Dependent: Interest in Biology (IB)

The result in Table 1 shows an *R*-value of 0.448 (indicating a moderate positive relationship between SI and IB) and an R^2 (coefficient of determination) value of 0.201. The coefficient of determination (r^2) value obtained reveals that 20.1% of the variance in students' interest scores in biology is predicted by social intelligence. Also, the unstandardized coefficient *B* of 0.369 indicates that a unit rise in social intelligence increases students' interest in biology by 36.9%.

Null Hypothesis One: Secondary school students' social intelligence does not significantly predict their interest in biology.

Table 2. Significance of the Prediction of Students' Interest in Biology by their Social Intelligence

	Model	Sum of Squares	Df	Mean Square	*F*	*p*-value	Decision
1	Regression	15716.414	1	15716.414	300.274	0.000[b]	Sig.
	Residual	62598.898	1196	52.340			
	Total	78315.312	1197				

a. Dependent Variable: Interest in Biology
b. Predictors: (Constant), Social Intelligence

Analysis of data in Table 2 reveals that at an *F*-value (1 and 1196) of 300.274, the *p*-value is 0.000. Since the *p*-value is less than the 0.05 alpha level, the null hypothesis is rejected. This confirms that social intelligence is a significant predictor of secondary school students' interest in Biology. Since social intelligence significantly predicts students' interest in Biology, the regression model ($Y = a + bx$) for the prediction as obtained from Table 1, where the constant is 56,172 and the *b* value is 0.369, is: **IB = 56.172 + 0.369 (SI)**, where **IB** = Interest in Biology and **SI** = Social Intelligence Score.

Research Question Two: What are the relative contributions of the individual dimensions of social intelligence (social awareness (SA), social skills (SS) and social information processing skills (SIPS)) to secondary school students' interest in biology?

Table 3. Contributions of the Individual Dimensions of Social Intelligence to the Prediction of Secondary School Students' Interest in Biology

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	SD. Err.	Beta	T	Sig.
1	(Constant)	56.272	1.410		39.903	.000
	Social Information Processing	.345	.066	.148	5.227	.000
	Social Skills	.550	.055	.292	10.008	.000
	Social Awareness	.204	.048	.119	4.214	.000

a. Dependent Variable: Interest in Biology

The unstandardized *B* coefficient values, in Table 3, reveal that a unit rise in social information processing increases students' interest score in biology by 34.5%, a unit rise in social skills increases students interest score in biology by 55.0%, and finally, a 20.4% increment in students' interest score in biology is accompanied by a unit rise in social awareness. The result in the table reveals that the order of contributions of each dimension of social intelligence to students' interest score in biology, from highest to lowest, is Social skills (55%), followed by social information processing (34.5%) and lastly, by social awareness (20.4%)

Null Hypothesis Two: The relative contributions of the individual dimensions of social intelligence (SA, SF and SIPS) to secondary school students' interest in biology are not significant.

Table 4. Significance of the Prediction of Students' Interest in Biology by the Individual Dimensions of Social Intelligence

	Model	Sum of Squares	Df	Mean Square	F	P-value	Decision
1	Regression	14598.883	3	4866.294	91.191	0.000[b]	Sig.
	Residual	63716.429	1194	53.364			
	Total	78315.312	1197				

a. Dependent Variable: Interest in Biology
b. Predictors: (Constant), Social Awareness, Social Information Processing, Social Skills

Data in Table 4 reveal that all the individual dimensions of social intelligence jointly predicted students' interest in biology significantly, since the *p*-value (0.000) obtained is less than the 0.05 alpha level, at an *F*-value (3 and 1194) of 91.191. Further analysis of data contained in Table 3 reveals that social

awareness, social skills and social information processing skills, individually, are significant predictors of students' interest in Biology, since their obtained p-values at *t*-values (3,1194) of 4.214 for social awareness (0.000), 10.008 for social skills (0.000) and 5.227 for social information processing skills (0.000), are less than 0.05 alpha levels. Since the result confirms that all the dimensions of social intelligence, individually and jointly, are significant predictors of students' interest scores in biology, the equation for the regression model ($Y = a + bx_1 + cx_2 + dx_3$) derived from Table 3 can be written as **IB = 56.272+ 0.345 (SIP) + 0.550 (SS) + 0.204 (SA)**, where **IB** = Interest in Biology**, SIP** = Social Information Processing Skills, **SS** = Social Skills, and **SA** = Social Awareness.

4. DISCUSSION

The findings of the study revealed that social intelligence positively and significantly predicted students' interest in Biology. This positive and significant prediction can be ascribed to the skills of inter and intrapersonal knowledge imbedded in social intelligence that help students develop a wide range of learning-related skills that allow them to study independently, work in groups, build and maintain friendships, respond appropriately to adult feedback and correction, judge others' feelings, temperaments, incentives, as well as sympathize and decode non-verbal signs. Students, through the skills of social intelligence, interact, understand and collaborate well with others, developing their thinking and social skills, which are tools essential for interaction and exchange of ideas that positively foster their interest in learning. The findings of the study consent to that of Sini and Amalraj (2019) and Mangarin and Montefolka (2023), who reported in their respective studies that social intelligence positively and significantly correlated with students' learning outcomes. The findings of Magar and Magre (2023) and Suman et al. (2023) also endorse the findings of the study.

On the predictions of the individual dimensions of social intelligence to students' interest in Biology, the study revealed that the dimensions of social intelligence (social information processing (SIP), social skills (SS) and social awareness (SA) positively and jointly predicted students' interest in Biology significantly, with SS having the highest prediction, followed by SIP and lastly, SA. The study also revealed that, individually, all the dimensions of social intelligence, on their own, are significant predictors of students' interest in Biology. The findings affirm that despite the complex and cumbersome nature of the biology curriculum, social intelligence and its dimensions significantly influence students' interest in learning Biology as social intelligence enhances prosocial behaviours (kindness, sharing and empathy), communication and collaboration skills that make people feel comfortable and included to share ideas, harnessing their talents to achieve economic growth and technical development. The findings of the study support the findings of Magar and Magre (2023) and Mangarin and Montefolka (2023), who reported in their studies that social intelligence positively and significantly relates to students' learning outcomes.

5. CONCLUSION

The study investigated the predictive influence of secondary school students' social intelligence on their interest in learning biology, adopting a predictive correlational research design. Based on the findings, the study concluded that social intelligence and its dimensions are positive and significant predictors of secondary school students' interest in Biology. The study establishes that social intelligence, when fostered through classroom interactions and methodological interventions, significantly enhances students' interest in learning Biology.

The following recommendations were made, considering the findings:

1. Considering the bulky nature of the biology curriculum, curriculum planners and developers should restructure the biology curriculum to inculcate activities during lessons that give students opportunities to collaborate with members of their peers to foster their collaborative and social skills, that promote their interest in the subject, and reinforce their resilience in the process.
2. Biology teachers, during the implementation process, should design classroom instructions to create atmospheres that are collaborative, interactive and friendly enough for students to express their affective learning through healthy emotional expressions.

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DECLARATION OF INTEREST

There is no conflict of interest between the researchers. The findings were accepted, as reported.

RESEARCH FUNDING

There was no funding for this study.

ETHICAL STATEMENT

An ethical letter of approval was obtained, by the researchers, from the Ethics unit of Nnamdi Azikiwe University, Awka, Nigeria and presented to the administrators of the sampled schools and students, requesting for approval to conduct the research. The letter was acknowledged by the administrators and respondents, before the administration of the questionnaire and collection of Biology Scores from the classroom teachers.

AI USE STATEMENT

None.

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