

Research Article

SOCIAL COMPETENCE AS PREDICATOR OF SECONDARY SCHOOL STUDENT'S ACADEMIC ACHIEVEMENT IN CHEMISTRY IN ENUGU STATE

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Article History:

Received: 02 July 2026 | **Accepted:** 07 July 2026 | **Published:** 15 July 2026

DOI: <https://doi.org/10.5281/zenodo.21369278>

*** Related declarations are provided in the final section of this article.*

Abstract

The study examined social competence as a predictor of secondary school students' academic achievement in chemistry at Enugu State. Two research topics and two hypotheses guided the investigation. The study's population consisted of 4934 SS2 Chemistry students. 347 SS2 Chemistry students 186 males and 161 females made up the study's sample size. A multistage sampling approach utilizing various techniques was used to draw the sample. Two tools were employed to gather the data. They are Social Competence Scale (SCS) and Chemistry Achievement Test (CAT). SCS contained 10 item questions while CAT contained 40 objective questions. The two instruments were validated by three experts. The reliability of (SCS) was 0.77 using Cronbach alpha while the reliability of (CAT) was 0.77 using Kuder-Richardson 20 formula. This indicated that the two instruments were reliable. The research question were answered using r and R^2 while the hypotheses were tested using P value. The findings revealed that there is moderate predictive power of social competence on secondary school student's academic achievement in Chemistry and the prediction was statically significant ($r = 0.510$; $R^2 = 0.260$; $P\text{-value} = 0.000$). More so, the result revealed a high and moderate positive predictive strength of social competence scores on male and female students' achievement scores in chemistry and the prediction was statically significant (Male: $r = 0.850$; $R^2 = 0.723$; $P\text{-value} = 0.000$) (Female: $r = 0.761$; $R^2 = 0.579$; $P\text{-value} = 0.000$). In order to

increase students' accomplishment in chemistry, the findings suggested, among other things, that chemistry teachers modify their instructional behavior to ensure accurate identification of the students' social competency in instructional practice. Conclusions were drawn from the suggestions.

Keywords: Science, Chemistry, Achievement, Social competence and Gender

Introduction

Every aspect of contemporary life has been impacted by science, which is the methodical process of learning about the universe through experiments and observation. Every morning, we are awakened by the sound of machines, cars, factories, and mills (Yildirim & Kahraman, 2024). Every aspect of our lives, including the food we consume, the clothes we wear, and the books and articles we read, has some connection to the application of science. The Nigerian government has been working hard to offer both qualitative and quantitative science education programs to its citizenry because it recognizes the value of science. Furthermore, given the daily modernization, the global workforce needs individuals who possess the requisite scientific and technological mindset and abilities. In order to help young people develop in the fields of science, technology, engineering, and mathematics for a stable and better technological society, educational organizations such as Science, Technology, Engineering, and Mathematics (STEM) were founded (Janštó, et al., 2024). According to Ahmad et al. (2023), science and technology education are seen by technical society as a means of advancing a nation's social and economic growth. From Yavuz and Çarkıt (2025), this is only feasible if scientific education produces scientists of a high caliber. This suggests that a country's strong science education programs play a major role in its scientific progress.

In order to create a society that is scientifically literate, science education is a branch of study that focuses on disseminating scientific concepts and methods to people who are not typically regarded as members of the scientific community. According to Nwafor et al. (2022), scientific education is a process of instruction and training, particularly in schools, to enhance one's environmental knowledge and capacity for methodical inquiry. It is crucial to remember that one of the most effective tools for preparing all members of society to deal with the dynamic character of science in contemporary society is science education and its application in technology. Science education has so many branches in accordance with secondary school curriculum in Nigeria. These include, Basic science, Basic technology and Mathematics for

junior secondary, Physics, Biology, Mathematics and Chemistry for senior secondary (Yildirim & Kahraman, 2024). For the purpose of this study, Chemistry will be considered.

Chemistry is one of the scientific fields that investigates the properties of matter as well as the related changes and their effects on human welfare and societal well-being. The world has benefited much from chemistry. It has aided humanity in comprehending the intricacies of his body, surroundings, advantages, and dangers of this world. In the fields of health, agriculture, food, shelter, clothing, and education, it has been employed more and more to provide solutions (Obikezie, 2023). Almost every aspect of our everyday lives is impacted by chemistry. Nevertheless, it is depressing to see that kids' academic performance in chemistry on the senior secondary school certificate exam is unimpressive. The study on the subject's shortcomings from 2015 to 2024 by the Chief Examiner of the West African Examination Council (WAEC) supports this. Additionally, the Chemistry WAEC results from 2015 to 2025 demonstrate that the pass rate for C6–A1 achievement was below 70%.

According to Obikezie et al. (2023), in order for a country to advance technologically, students' scores in science-related subjects, such as chemistry, in high school exams, such as the WAEC, must be at least 70% or higher. The authors went on to say that secondary school chemistry students' lower academic achievement on external exams like the WAEC may be the reason why the majority of countries in various Latin American countries and Africa, particularly Nigeria, are still underdeveloped. What would be the reasons behind secondary school chemistry students' shortcomings and below-average distinctions, as revealed by WAEC Chief Examiners in recent years?

Some literature report that the cause of learners' weaknesses and below distinction in Chemistry achievement may be as a result of many factors. According to Johnston and Wu (2023), factors that can contribute to learners' weaknesses and lower distinctions in Chemistry includes cognitive load, gaps in prior knowledge, ineffective instructional strategies and limited hands-on experimentation. While Hake (2020) was of the opinion that the cause of learners' weaknesses and below distinction in Chemistry achievement are language and communication barriers, socioeconomic constraints or social competence, anxiety and low chemistry self-efficacy, inadequate feedback and formative assessment, access disparities, cultural relevance and digital literacy. Social competence was taken into consideration for this investigation.

Social competence is the ability to navigate interpersonal interactions effectively by recognizing emotions, communicating clearly, collaborating constructively, and adapting behaviour to diverse social contexts, enabling positive relationships, conflict resolution, and socially appropriate collaboration. It includes interpersonal abilities, self-control, social consciousness, self-awareness, and responsible decision-making. Yulis, et al., (2024) opined that social competence includes emotional understanding, effective communication, collaboration, and adaptive behaviour consistently predicts how students perform in science. The authors further averred that when students can navigate group work, articulate reasoning, manage conflicts, and seek help, they engage more deeply with scientific practices, leading to higher achievement. Furthermore, Fan, and Chen (2023) asserted that positive peer interactions foster inquiry, motivation, and persistence, while supportive teacher–student relationships reinforce feedback acceptance and self-efficacy, crucial for mastering abstract concepts and lab skills which is part of social competence. It now makes sense that Okoli and Usang (2025), who investigated social intelligence as a predictor of Cross River State secondary school students' academic success in chemistry. The researchers discovered that social intelligence was a strong predictor of chemistry achievement. Suggesting that a student's social skills are a reliable indicator of their academic success in chemistry. Similarly, Santos et al. (2022) discovered that in their cross-cultural multilevel investigation on social and emotional abilities as predictors of young student engagement, they were significant predictors of student engagement independent of the country-level variables. Conversely, social difficulties can impede participation, reduce study engagement, and widen achievement gaps, particularly in collaborative laboratory settings. Meta-analytic evidence links social-emotional skills to gains in science learning outcomes, independent of IQ, highlighting the importance of classroom climate and structured collaborative routines not minding gender type involvement.

Gender is a variable that may contribute to poor academic achievement in Chemistry generally. Wei et al., (2022) asserted that gender determines the academic achievement of one in a particular subject area. Also gender differences in achievement in science are nuanced, context dependent and social competence. Ofosu-Koranteng, et al., (2025), who investigated on male and female-based differences in computer proficiency among students studying economics in a Ghanaian university, and found a moderate overall level of digital competence among the students, with relatively high skills in “communication and collaboration (CC) and

data and information literacy (DIL). Thus, justifying the capability of social competence in predicting students' academic achievement positively. In social situations, most of the teenagers had modest levels of social ability, according to Kuranchie and Addo's (2021) study, which looked at social competence in adolescents and determined group variations on gender, type of parents they lived with, and community.

Statement of the problem

Social competence is a vital ingredients needed by students to advance their learning in the modern-day learning environment driven by extensive technology embracement. Students who possess strong social competence and viable digital literacy skills, are likely to pay more attention to their studies and record improved academic achievement. Despite the significant importance of Chemistry to humanity and nations, students' academic achievement in the subject linked to low interest of students in the subject especially as reported by some studies and observed in WAEC Chief Examiners' Reports remains consistent. The summary of the WAEC Chief examiners' reports have it that from 2015 to 2024, there has been persistent weaknesses across Chemistry papers, with several recurring themes. Furthermore, evidence in the Chemistry WAEC results from the year 2015 to 2024 show that the percentage passes in achievement of $C_6 - A_1$ from the year 2015 to 2024 were not up to 70%. Many researchers attributed these fluctuations in academic achievement to factors such as cognitive load, gaps in prior knowledge, ineffective instructional strategies and limited hands-on experimentation, language and communication barriers, social competence, anxiety and low chemistry self-efficacy, inadequate feedback and cultural relevance could be linked to students' poor achievement in chemistry. Could it be that secondary school students in Enugu State inconsistent poor achievement in chemistry is as a result of their social competency? This is because, social competence is capable of boosting classroom belonging, collaboration, and motivation, can help students communicate effectively, listen actively, feel safer to take risks, ask questions, and seek help. It also supports deeper understanding and persistent effort. With the numerous importance attributed to social competence , it seems that researchers understood it well because most studies as espoused in the background revealed high and moderate relationships though all the studies were done independently. Also, most of these studies were done in developed continents of Europe and America. Based on this assumption, the researchers looked into social competence as a predictor of secondary school students' academic success in Chemistry in Enugu State.

Purpose of the study

The purpose of the study was to examine social competence as predictor of secondary school student's academic achievement in Chemistry in Enugu State. Specifically, the study determined:

1. Predictive strength of social competence on secondary school student's academic achievement in Chemistry.
2. Predictive strength of social competence on male and female secondary school student's academic achievement in Chemistry.

Research Questions

The following research questions guided the study:

1. What is the predictive strength of social competence on secondary school student's academic achievement in Chemistry?
2. What is the predictive strength of social competence on male and female secondary school student's academic achievement in Chemistry?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1. Students' social competence is a not a significant predictor of academic achievement of students in Chemistry.
2. Students' social competence is a not a significant predictor of academic achievement of male and female students in Chemistry.

Method

This study adopted correlation design. The area of study was Enugu State, Nigeria. The population of study was 4934 SS2 Chemistry students with males totaling 1830 and the females totaling 3104. The sample size of the study consisted of 347 SS2 Chemistry students (186 male and 161 female). A multistage sampling approach utilizing various techniques was used to draw the sample. The zones were first created using the purposive selection technique in accordance with the locations of smart schools (Agbani and Enugu). This was to take care of social competence is the major independent variables under study. Second, coeducational government-owned schools were selected through purpose sampling. Since gender is the only moderating element in this study, the goal was to guarantee equal gender type of students. Finally, four coeducational schools were selected from each of the education zones using the

proportionate sample technique, for a total of eight schools. The goal is to guarantee that the sample reflects population proportions and that there is an equal number of schools represented in each of the education zones.

Instrument

Two instruments were used for data collection. They are Social Competence Scale (SCS) and Chemistry Achievement Test (CAT). The Social Competence Scale (SCS) comprises 10 items developed by the researchers on a four-point rating scale. The SCS has two Sections A and B. Section A elicited information on respondents' personal data. Section B elicited responses from the respondents on Social Competence Scale in chemistry with 10 item questions based on the validators' recommendations. The second instrument was Chemistry Achievement Test (CAT) which was a multiple-choice objective questions containing 40 questions with options A – D. It covered four topics – organic chemical equations, rate of reactions, energy changes, and chemical equilibrium. The two instruments were validated by three experts, two from Department of Science Education and one from Department of Educational Foundation all from Nnamdi Azikiwe University, Awka. Social Competence Scale (SCS) generated 0.77 consistency value using Cronbach alpha while Chemistry Achievement Test (CAT) generated 0.77 using Kuder-Richardson 20 formula after try testing the instruments in another area that is not the place of the study.

To address research issues, the study's data was analyzed using r and R^2 . The rule proposed by Abonyi et al. (2022) regarding the interpretation of correlation coefficients was used to interpret the study using the following range of scores: ± 0.80 to ± 1.00 was assigned to high positive or negative predictive value, ± 0.31 to ± 0.79 was assigned to moderate positive or negative predictive value, and ± 0.00 to ± 0.30 was assigned to low positive or negative predictive value. The null hypothesis was rejected when the P-value was less than or equal to 0.05 ($P < 0.05$), according to the decision criterion. Conversely, the null hypothesis was not rejected (accepted) when the P-value above the alpha level of 0.05 ($P > 0.05$).

Results

Research question 1

What is the predictive power of social competence on secondary school student's academic achievement in Chemistry?

Table 1: Predictive Matrix of Students SCS scores and CAT scores in chemistry

Scores	N	r	R ²
Social Competence			
	347	0.5	0.3
Achievement			

Number of Cases = 347

As shown in Table 1, the computed 'r' between the students' social competence and achievement scores in chemistry was 0.510 which falls within the range 0.31 – 0.79. Thus, the computed 'r' value indicated a moderate positive predictive strength of social competence scores on the students' achievement scores in chemistry. The coefficient of determination (R²) for the computed (r) which was 0.260 indicated that 26.01% of the variation in students' achievement scores in chemistry was explained by their social competence scores in chemistry.

Research question 2

What is the predictive power of social competence on male and female secondary school student's academic achievement in Chemistry?

Table 2: Predictive Matrix of Male and Female Students SCS scores and CAT scores in chemistry

Gender	N	r	R ²
Males	186	0.85	0.72
Females	161	0.76	0.58

Number of Cases = 347

As shown in Table 2, the computed 'r' between the male and female students' social competence and achievement scores in chemistry were 0.850 and 0.761 respectively which falls within the range 0.31 – 0.79 and 0.8 – 1.00 respectively. Thus, the computed 'r' values indicated a high and moderate positive predictive strength of social competence scores on

male and female students' achievement scores in chemistry. The coefficient of determination (R^2) for the computed (r) which were 0.723 and 0.579 indicated that 72.3% and 57.9% of the variation in male and female students' achievement scores in chemistry was explained by their social competence scores in chemistry.

Ho1: Students' social competence is a not a significant predictor of academic achievement of students in Chemistry.

Table 3: Significance of the predictive strength of the students' social competence scores on their academic achievement scores of the students in Chemistry

		Adjusted R-square	Std. Error			
Computed r	R-square			Beta	t. cal.	Sig. t
0.51	0.26	0.261	3.42134	0.01	16.04	0

As indicated in Table 3, the calculated 't' value of 16.039 was greater than the significance of 't' value 0.0000. The researcher therefore rejected the null hypothesis and conclude that there was significant prediction of the students' social competence scores on their academic achievement scores in Chemistry.

Ho2: Students' social competence is a not a significant predictor of academic achievement of male and female students in Chemistry.

Table 4: Significance of the predictive strength of male and female students' social competence scores on their academic achievement scores in Chemistry

			Adjusted R-square	Std. Error			
Gender	Computed r	R-square			Beta	t. cal.	Sig. t
Male	0.85	0.723	0.72	3.46514	0.09	10.63	0
Female	0.761	0.579	0.578	3.36749	0.08	12.17	0

Discussion

Predictive Strength of Social Competence on Secondary School Students Academic Achievement in Chemistry.

The study found that the students' social competence scores had a moderate positive predictive value on their achievement scores in chemistry. This was further reinforced with

the findings that the predictive strength of the students' social competence on their academic achievement in chemistry was statistically significant. This is consistent with the findings of Okoli and Usang's (2025) study, which examined social intelligence as a predictor of secondary school students' academic achievement in chemistry in Cross River State and discovered that social intelligence was a strong predictor of chemistry achievement. Implying that students' social competence is a strong predictor of the students' academic achievement in chemistry. Additionally, the results are consistent with those of Santos et al. (2022), who conducted a cross-cultural multilevel study to examine social and emotional competencies as predictors of youth student engagement. They discovered that social and emotional competencies were significant predictors of student engagement regardless of the country-level variables. Consequently, the researchers submit that if the students' social competence is fostered within the school, their academic achievement especially in chemistry will be enhanced.

Predictive Strength of Social Competence on Male and Female Secondary School Students Academic Achievement in Chemistry.

The study's findings demonstrated that the social competency scores of both male and female students strongly and somewhat predicted their chemical achievement scores. This was further supported by the results showing that social competence was a statistically significant predictor of both male and female students' academic success in chemistry. This suggests that social competence is a reliable indicator of students' academic success without regard to gender. The results are consistent with those of Ofosu-Koranteng et al. (2025), who examined gender-based differences in digital competency among students studying economics in a Ghanaian university, and found a moderate overall level of digital competence among the students, with relatively high skills in “communication and collaboration (CC) and data and information literacy (DIL). Thus, justifying the capability of social competence in predicting students' academic achievement positively. Furthermore, the finding is in line with that of Kuranchie and Addo (2021), who looked at teenagers' social competence and found differences in the group according to community, gender, and the kind of parents they lived with. The findings indicated that the majority of the adolescents showed moderate levels of social competence in social settings. This is indicative that a well-cultured school environment that boost students' social competence is capable of influencing their academic achievement positively.

Conclusions

In line with the findings, the researcher concluded that the students' social competence is a strong predictor of their academic achievement in chemistry. Additionally, social competence and chemistry digital literacy skills of male and female strongly predicted their academic achievement in Chemistry. Implying that, encouraging students to develop strong social competency and chemistry digital literacy skills by their classroom teachers can enhance and improve their academic achievement in Chemistry.

Recommendations

The study's conclusions led to the following suggestions being made:

1. because social competency has been shown to be a strong predictor of students' success in chemistry, teachers should give it careful consideration.
2. In order to support students' social competence in chemistry, the Federal Ministry of Education should make sure that only certified and properly educated teachers are hired to teach the subject.
3. When making judgments on teaching-learning activities, secondary school administrators, guidance counselors, and council members should prioritize the social competency of the students.

The study's limitations

During the study, the following restrictions were noted.

There were no notable limitations beyond the researcher's control encountered in the course of carrying out this study.

Article Publication Details

This article is published in the **International Journal of Multidisciplinary Department**, ISSN 3108-2718 (Online). In Volume 2 (2026), Issue 4 July-Aug)

The journal is published and managed by **IJRGP**.

Acknowledgements

We sincerely thank the editors and the reviewers for their valuable suggestions on this paper.

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