



Factors Affecting Students' Enrollment in Chemistry Education in Rivers State Universities

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Abstract

This study investigated the factors influencing students' enrolment into chemistry education programmes in tertiary institutions in Rivers State, Nigeria. Specifically, it examined the impact of socio-economic factors, career guidance and awareness, students' perception of chemistry, parental expectations and societal views, secondary school science experiences, and gender-related factors on students' choice of chemistry education. The study adopted a descriptive survey research design and employed purposive sampling to select 100-level and 400-level students in Chemistry Education of the Science Education departments. Data were collected using a structured questionnaire. The reliability coefficient was estimated using Cronbach's Alpha and was found to be $r = 0.81$. Data were analyzed using descriptive statistics, including percentages, means, and standard deviations, with a criterion mean of 2.5 for acceptance. Findings revealed that socio-economic factors, career guidance, students' perception, parental expectations, societal views, and secondary school science experiences significantly influenced students' enrolment, while gender-related factors were not significant. The findings show that socio-economic factors, career guidance, students' perception, parental expectations, and secondary school experiences exert a moderate to high influence on students' enrolment into chemistry education, while gender-related factors have a low or negligible effect. The study concludes that targeted interventions in these areas, such as improved career guidance, enhanced secondary school experiences, parental sensitization, and financial support, are essential to increase students' enrolment in chemistry education programmes and address the shortage of qualified chemistry teachers in secondary schools.

Keywords: Chemistry Education, Chemistry Students, University, Enrolment, Socio-Economic, Career Guidance, Secondary School.

Introduction

Chemistry is the branch of science that studies matter, including its composition, structure, properties, reactions, and changes. Its principles underpin advances in medicine, engineering, agriculture, energy, and technology. Chemistry, often called the "central science," is crucial for national development, especially in sectors such as medicine, agriculture, manufacturing, and energy. Abbey-Kalio and Nenalebari (2022) point out that, for the individual, it can equip them with entrepreneurial skills, create jobs and promote socioeconomic empowerment, while for society, it promotes sustainable development and generally welcomes transformation. It connects other scientific disciplines and plays a foundational role in technological advancement. For a country like Nigeria, which seeks to build capacity in science, technology, engineering, and mathematics (STEM), chemistry education remains vital. The knowledge of chemistry is basically acquired at the secondary level of education, and this knowledge is imparted by the chemistry teachers.

Chemistry education concerns the acquisition of pedagogical, content, and technological knowledge regarding the composition, structure, properties, reactions, and changes of matter. According to Emendu (2014), chemistry education can be seen as the acquisition of knowledge or ideas relevant to chemistry. The role of chemistry education is pivotal in the professional growth of chemistry teachers. Abbey-Kalio and Nenalebari (2022) agree that, worldwide, in most science learning and professions, chemistry plays a major role. To strengthen the essence of chemistry education, which is part of science education, the National Policy on Science and Technology Education (Federal Republic of Nigeria, 2018; pg. 15) states that one of its long-term objectives is to ensure that young people entering the Nigerian workforce of the 21st century have the knowledge and skills necessary to promote economic, scientific, and technological development. As highlighted in the Student Handbook of the Department of Science Education, Ignatius Ajuru University of Education (IAUE), amongst the department's listed philosophies are to train professional science education teachers and teacher trainers at the Bachelor's level; produce professional science education teachers for national development; and produce teachers who will provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life at the basic educational level (Department of Science Education, 2022). Chemistry education is a unit in this department. However, in recent years, there has been a noticeable decline in student enrolment in chemistry education programmes in many Nigerian tertiary institutions. This low enrolment is particularly evident in Rivers State, where institutions offering science education programmes are experiencing low interest in chemistry education as a course of study compared to other units like biology education, integrated science education, and computer science education in the Science Education department.

Enrolment refers to the process by which students formally register, enter, or gain admission into an academic programme or institution, indicating their commitment to participate in the teaching–learning activities of that programme. Nnagbogu and Nnamani (2021) view enrolment as the number of students offered admission. In the context of higher education, Dokubo and Deebom (2017) add that enrolment reflects the number of students who choose and are accepted into specific courses or fields of study, serving as an important indicator of students' interest, institutional attractiveness, and the overall demand for particular academic disciplines. According to Abbey-Kalio and Nenalebari (2022), in spite of the benefits that accrue to knowledge in chemistry education, it is strange to know that fewer students are studying chemistry education in Nigerian Universities. One of the critical consequences of this trend is the shortage of qualified chemistry teachers at the secondary school level. Many schools, including public and private ones, are unable to recruit specialists in chemistry, often leading to underqualified teachers handling the subject or combining it with other sciences, thus reducing teaching effectiveness and student interest. Research studies indicate that there is a shortage of qualified teachers to teach chemistry in schools around the world (Subair & Talabi, 2015). This shortage of qualified chemistry teachers is a result of a number of factors, which include poor remuneration of teachers by the government and even the private sector, poor working conditions, inadequate facilities to aid work, low enrolment of students into colleges of education and universities to study chemistry education. (Aina & Ayodele, 2018). According to Nnagbogu and Nnamani (2021), the high demand for qualified and competent chemistry teachers is one that should consequently result in an increase in the number of students' enrolment into chemistry education. Understanding these enrolment patterns is essential, because without a steady pipeline of motivated chemistry education students, the shortage of competent chemistry teachers in secondary schools will continue to impede the effective delivery of science education across the country.

Multiple factors have been identified as contributing to this low enrolment and the students' perception of chemistry. As cited in Adolphus (2019), for most underdeveloped and developing countries, gender-defined roles, differentiations, and beliefs are very strong in communal lifestyles, and so women in such societies are often groomed early in life to be better homemakers and mothers and are encouraged to choose subjects like home management. According to Harbor and Anah (2025), gender disparity in enrolment remains a major challenge in Nigeria's tertiary education sector, with Rivers State offering a clear example of how socio-cultural, economic, and institutional factors shape unequal access. Despite its economic strength, driven largely by oil and gas activities, the state still struggles to achieve balanced enrolment between male and female students in universities, polytechnics, and colleges of education. National data from the NUC (2022) show that female students make up slightly less than half of total tertiary enrolment, with significant variations across regions and disciplines. The gap is even more evident in public polytechnics and technical colleges, where cultural stereotypes continue to frame these areas as male-dominated (Okeke, 2020).

Furthermore, parental perceptions, including perceptions of teaching as a low-status profession, have contributed to the declining interest in science education, especially chemistry. Secondary school experiences, such as lack of laboratory resources, poorly trained teachers, and minimal career counselling, can also negatively impact students' willingness to pursue chemistry education. Odi (2014) suggests that factors such as socio-economic status, parents, teachers, gender, environment, and employment opportunities contribute to the low enrolment of students into chemistry education. Okoro (2013) opines that if poor enrolment of students in chemistry education is allowed to continue, it will reach a stage where no student will enrol in chemistry education in Nigerian colleges of education. Abbey-Kalio and Nenalebari (2022) suggest that chemistry education must be made popular and be given serious attention. In view of these interconnected challenges, this study aims to assess the major factors affecting students' enrolment into chemistry education programmes in universities in Rivers State. Findings from this research will guide policy reforms, institutional interventions, and awareness campaigns aimed at improving enrolment and addressing the chemistry teacher deficit in secondary schools.

Specifically, the objectives of the study were to:

1. identify the socio-economic factors influencing students' choice of chemistry education.
2. evaluate the effect of career guidance on students' enrolment into chemistry education programmes.
3. assess the influence of students' perception of chemistry as a subject on their enrolment decisions.
4. explore the impact of parental influence on students' choice of chemistry education.
5. investigate the effect of secondary school science experience on the decision to enrol in chemistry education.
6. assess gender-related factors influencing enrolment into chemistry education.

The following research questions guided the study:

1. Are there socio-economic factors that influence students' decisions to study chemistry education?
2. Does career guidance affect students' enrolment into chemistry education programmes?
3. Are there ways in which students' perception of chemistry as a subject influences their decision to enrol in chemistry education?
4. Do parental expectations about chemistry affect students' enrolment in chemistry education?
5. How does students' secondary school experience in science, particularly chemistry, affect their decision to pursue chemistry education?
6. Are there gender-related factors that influence students' enrolment into chemistry education programmes?

Methodology

This study adopted a descriptive survey research design to gather data from students at selected tertiary institutions in Rivers State. The target population comprised all undergraduate students enrolled in the chemistry education unit of the Science Education Department at Rivers State-owned universities, totalling one hundred and forty-three (143) students. The sample size comprised fifty-three (53) chemistry education students. To select participants for the study, the study adopted a purposive sampling technique. This sampling method is appropriate because it allows the researcher to intentionally select individuals who are most likely to provide relevant and rich data, based on their current level of experience in the programme. The justifications for using purposive sampling are as follows. 100-level students were selected to understand the early factors that influenced their choice of chemistry education, and 400-level students were included because they have had more exposure to the programme and can reflect on the factors that sustained or changed their initial decision.

A structured questionnaire titled the Chemistry Education Enrolment Factors Questionnaire (CEEFAQ) was used, employing a 4-point Likert-type scale with Strongly Agree (SA) 4 points, Agree (A) 3 points, Disagree (D) 2 points, and Strongly Disagree (SD) 1 point. It included sections on demographics, socio-economic factors, students' perceptions, parental influence, secondary experience, and gender. The questionnaire underwent face and content validation by three (3) experts in the Science Education Department. Reliability was estimated using Cronbach's alpha, yielding $r = 0.81$. A criterion mean of 2.5 was set, and items with means below this threshold were regarded as unacceptable, while those above were accepted. Descriptive statistics (percentages, means, and standard deviations) were used to analyse the data.

Results

Table 1: Percentage, mean and standard deviation on socio-economic factors

S/N	Item Statement	SA %	A %	D %	SD %	Mean	SD	Remark
1	My parents' income level affected my decision to choose chemistry education because it determined the financial support available for my studies.	26.4	22.6	34	17	2.58	1.06	Agree
2	I chose to study chemistry education due to my parents' educational background and their desire for me to surpass their level of education.	30.2	24.5	32.1	13.2	2.72	1.05	Agree
3	Financial challenges influenced my decision to study a course in education as it is more affordable or accessible compared to other core science courses.	24.5	18.9	47.2	9.4	2.58	0.97	Agree
4	I chose to study chemistry education due to my parents' occupation, as they wanted me to have better opportunities than they had.	18.9	15.1	45.3	20.8	2.32	1.02	Disagree
Mean						2.55		Accepted

The grand mean of 2.55 indicates that socio-economic factors, particularly parental income, educational background, and financial challenges, influence students' decisions to study chemistry education

Table 2: Percentage, mean and standard deviation on career guidance and awareness

S/N	Item Statement	SA %	A %	D %	SD %	Mean	SD	Remark
1	I received proper career guidance before studying chemistry education.	22.6	34	24.5	18.9	2.60	1.04	Agree
2	Career talks in my secondary school helped me understand the benefits of a chemistry education programme.	26.4	30.2	28.3	15.1	2.68	1.03	Agree
3	I was aware of job opportunities in chemistry education before choosing the course.	24.5	30.2	34	11.3	2.68	0.98	Agree
4	Career counselling from individuals and online helped clarify the relevance of chemistry education in society.	35.8	30.2	26.4	7.5	2.94	0.97	Agree
5	I chose chemistry education because I had information on its career potential	26.9	42.3	23.1	7.7	2.88	0.90	Agree
Mean						2.76		Accepted

The grand mean of 2.76 shows that career guidance and awareness of career opportunities influence students' enrolment in chemistry education.

Table 3: Percentage, mean and standard deviation on students' perception

S/N	Item Statement	SA %	A %	D %	SD %	Mean	SD	Remark
1	I consider chemistry to be a challenging subject.	35.8	41.5	17	5.7	3.08	0.87	Agree
2	Chemistry is understandable when it is properly explained by the teacher.	64.2	24.5	7.5	1.9	3.57	0.75	Agree
3	Positive experiences with chemistry at my secondary school motivated me to study chemistry education.	30.2	39.6	15.1	15.1	2.85	1.03	Agree
4	I enrolled in chemistry education because I believe the subject is important for development.	37.7	43.4	7.5	11.3	3.08	0.96	Agree
Mean						3.15		Accepted

The grand mean of 3.15 indicates that students' perceptions of chemistry, especially its importance and understandability when properly taught, influence their decision to study chemistry education.

Table 4: Percentage, mean and standard deviation on parental expectations and societal views

S/N	Item Statement	SA %	A %	D %	SD %	Mean	SD	Remark
1	My parents supported my decision to study chemistry education.	43.4	34	15.1	7.5	3.13	0.94	Agree
2	My parents just wanted me to get education and have a degree irrespective of the course of study.	28.3	24.5	28.3	18.9	2.62	1.10	Agree
3	My parents wanted me to study a more "prestigious" course than chemistry education.	26.9	28.8	26.9	17.3	2.65	1.06	Agree
4	Society respects people who study and teach chemistry.	28.3	28.3	26.4	17	2.68	1.07	Agree
Mean						2.77		Accepted

The grand mean of 2.77 suggests that parental support, expectations, and societal perceptions influence students' decisions to enroll in chemistry education.

Table 5: Percentage, mean and standard deviation on students' secondary school experience

S/N	Item Statement	SA %	A %	D %	SD %	Mean	SD	Remark
1	I had a strong interest in chemistry during secondary school.	41.5	28.3	17	13.2	2.98	1.07	Agree
2	My secondary school chemistry teacher was inspiring and made chemistry easy to comprehend.	41.5	28.3	15.1	15.1	2.96	1.09	Agree
3	My success in chemistry at secondary level influenced my enrolment decision.	26.4	35.8	22.6	15.1	2.74	1.02	Agree
4	I had access to practical chemistry activities in secondary school.	26.4	26.4	24.5	22.6	2.57	1.12	Agree
5	My secondary school experience made me more confident to study chemistry education.	30.2	30.2	18.9	20.8	2.70	1.12	Agree
Mean						2.79		Accepted

The grand mean of 2.79 indicates that students' secondary school experiences, including their interest in chemistry and teachers' influence, contribute to their decision to study chemistry education.

Table 6: Percentage, mean and standard deviation on gender factor

S/N	Item Statement	SA %	A %	D %	SD %	Mean	SD	Remark
1	I believe gender does not affect one's ability to study chemistry education.	69.2	17.3	5.8	7.7	3.48	0.918	Agree
2	Chemistry is often seen as a male-dominated course.	16.9	18.9	35.8	28.4	2.10	1.067	Disagree
3	I chose this course partly to challenge gender stereotypes in science education.	13.2	18.9	37.7	30.2	2.15	1.008	Disagree
4	People of the same gender as I influenced the encouragement I received to pursue a degree in chemistry education.	10.8	15.1	37.7	36.4	2.05	1.085	Disagree
Mean						2.45		Unaccepted

The grand mean of 2.45 indicates that gender-related factors generally do not significantly influence students' enrolment in chemistry education, suggesting that students largely perceive chemistry education as suitable for both genders.

Discussion

The purpose of this study was to examine the factors influencing students' enrolment in chemistry education programmes at tertiary institutions in Rivers State. The results were analysed using mean ratings, benchmarked against a criterion mean of 2.5. Items with weighted means above 2.5 were accepted, while those below were rejected. The findings are discussed in relation to the six research questions. The results in Table 1 indicate that socio-economic factors, such as parental income, education level, and financial challenges, significantly influenced students' enrolment in chemistry education, with a mean of 2.55, above the criterion mean of 2.5. Respondents agreed that parental income and education level encouraged their choice, while financial challenges also played a role in their decision-making. Parental occupation recorded a slightly lower influence but remained relevant to enrolment considerations. These findings align with the results of Dokubo and Deebom (2017), who examined gender disparity in technical education in Rivers State and found that poverty and socio-cultural factors, including cultural and religious beliefs, contributed to the low enrolment of female students in technical programmes. Similarly, in the present study, socio-economic constraints such as limited family income and parental educational background influenced students' decisions to pursue chemistry education. This underscores the importance of addressing socio-economic barriers and providing targeted support, such as scholarships and financial assistance, to enhance enrolment in science education programmes.

Results from Table 2 indicate that career guidance significantly affects students' enrolment in chemistry education (mean = 2.76). Respondents agreed that career talks, counselling, information about career pathways, and awareness of job opportunities guided their decision. The high means (2.60–2.94) across the items show that career information is a major determinant, suggesting that students often need clarity about prospects before selecting chemistry education. This finding aligns with the view of Aina and Ayodele (2018), who remarked that students' interest contributed to the decline in enrolment in science education programmes. The results presented in Table 3 reinforce this position by showing that proper career guidance, exposure to career talks, and awareness of job opportunities played a central role in sustaining students' interest in chemistry education. Since interest is closely tied to students' understanding of career prospects, the provision of effective career counselling appears to counter the loss of interest highlighted by Aina and Ayodele (2018).

The findings in Table 3 align with Abbey-Kalio and Nenalebari (2022), who reported that many chemistry concepts are perceived as difficult, leading students to shy away from studying chemistry because they believe they cannot

excel in the subject. In the present study, students agreed that chemistry is a challenging subject (Mean = 3.08), yet they also acknowledged that it becomes understandable when properly taught (Mean = 3.57). This shows that while the perception of difficulty persists, as highlighted by Abbey-Kalio and Nenalebari (2022), such perceptions do not necessarily discourage enrolment if students experience good teaching and positive learning environments. Therefore, although the belief that chemistry is difficult can negatively affect enrolment trends, the high acceptance of items in Table 4 suggests that effective teaching, meaningful learning experiences, and the perceived importance of chemistry can counter this misconception. Addressing the perception of difficulty, rather than allowing it to shape students' choices, is essential for improving enrolment in chemistry education programmes.

The results in Table 4 align with the findings of Nnagbogu and Nnamani (2021), whose study found that students generally disagreed that their parents wanted them to study chemistry education, but agreed that their parents preferred them to study a different course. Similarly, the present study shows that while students reported some level of parental support (Mean = 3.13), many also acknowledged that their parents desired a more "prestigious" course than chemistry education (Mean = 2.65). This pattern supports Ugwuoke's (2018) conclusion that many parents do not want their children to pursue teaching-related courses. Together, these findings suggest that although some parents express general support for their children's education, parental expectations and societal values continue to steer students away from programmes such as chemistry education, which are often perceived as less prestigious. This underscores the importance of sensitising parents and society to the relevance of chemistry educators to national development, as negative parental attitudes may contribute to declining enrolment in the field.

The results in Table 5 indicate that secondary school science experiences positively influenced students' decisions to enroll in chemistry education. These findings contradict Nnagbogu and Nnamani (2021), who concluded that secondary school chemistry teachers do not significantly influence students' enrolment in chemistry education at the tertiary level. According to their study, teachers neither actively motivated students nor served as role models capable of influencing students to choose chemistry education. In contrast, the present study shows that many students perceived their chemistry teachers as inspiring and instrumental in making chemistry understandable. This suggests that, while some students may not have received strong encouragement from teachers, those who did were positively influenced in their choice of programme. However, the results also align with the work of Akram, Ijaz, and Ikram (2017), who reported that teachers have a direct influence on students' choice of discipline at higher levels of education. Students' agreement in this study that inspiring teachers and positive learning experiences influenced their enrolment aligns with the findings of Akram et al. (2017). Good instructional delivery, teacher motivation, and exposure to practical work appear to contribute significantly to students' decisions.

The results in Table 6 indicate that gender-related factors were not a major influence on students' enrolment in chemistry education, as the weighted mean of 2.45 falls below the acceptance criterion of 2.5. Students agreed that gender does not affect one's ability to study chemistry (Mean = 3.48), and they disagreed that chemistry is male-dominated or that they chose the course to challenge gender stereotypes. This suggests that, for the current cohort, enrolment decisions were largely independent of gender considerations. However, these findings can be countered by the results of Dokubo and Deebom (2017), who examined gender disparities in technical education in Rivers State. Their study revealed a preference for male students and low enrolment of female students in technical education programmes. In summary, the study found that socio-economic factors, career guidance, students' perception of chemistry, parental expectations, and secondary school science experiences all had a significant influence on students' enrolment in chemistry education programmes, with means above the criterion of 2.5. Among these, students' perception of chemistry, career guidance, and secondary school experiences were the strongest factors affecting enrolment. In contrast, gender-related factors were found to have little influence, as indicated by a mean below the criterion. Overall, the findings highlight that while most personal, institutional, and societal factors positively shape students' decisions to study chemistry education, gender stereotypes are not a major barrier in this context.

Conclusion

In conclusion, this study has shown that students' enrolment in chemistry education programmes at tertiary institutions in Rivers State is influenced by a combination of socio-economic factors, career guidance, students' perceptions of chemistry, parental expectations, societal views, and secondary school science experiences. These factors collectively shape students' decisions and highlight where interventions are needed to boost enrolment. Although gender did not appear to be a significant determinant in this study, addressing socio-economic and perceptual barriers remains crucial.

Enhancing awareness, providing adequate resources, and creating supportive learning environments will not only improve enrolment in chemistry education but also help reduce the shortage of qualified chemistry teachers in secondary schools, thereby contributing to the overall development of science education in Rivers State.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Government and institutions should offer scholarships, grants, or allowances to students from low-income families to reduce socio-economic barriers to enrolment in chemistry education.
2. Secondary schools and tertiary institutions should strengthen career guidance programmes and organise career talks, seminars, and mentorship initiatives focused on chemistry education. Online platforms and career fairs should also be leveraged to provide students with up-to-date information on job opportunities and career pathways in chemistry education.
3. Chemistry educators should adopt innovative teaching methods, including practical demonstrations, interactive lessons, and real-life applications, to make chemistry more engaging and less intimidating.
4. The Science Teachers Association of Nigeria (STAN) should sensitise parents to the importance of science teachers for national development, encouraging their children to pursue chemistry education.
5. Secondary schools should equip chemistry laboratories, provide sufficient practical resources, and train teachers to deliver quality instruction that motivates students to pursue chemistry education.
6. The government should put in place policies that ensure equal opportunities for male and female students in chemistry education, including scholarships, mentoring, and leadership programmes targeted at females. Awareness campaigns should also be organised by non-governmental organisations (NGOs) and private parastatals to eliminate residual gender stereotypes, emphasising that chemistry education is equally suitable for all genders.

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