



(RESEARCH ARTICLE)



Factors responsible for low enrolment in chemistry as perceived by chemistry education students in Ignatius Ajuru University of Education, Port Harcourt, Rivers State, Nigeria

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Abstract

This paper highlighted some factors responsible for low enrolment in Chemistry as perceived by Chemistry students in Ignatius AJURU University of Education, Rivers State. The study adopted an opinion survey design using Chemistry Education students as the subjects out of which 120 students were randomly selected. Five research questions were stated to guide the study. A 25 item questionnaire covering five enrolment factors with a reliability index ($r = 0.87$) was used. Data collected were analyzed using mean, standard deviation and Chi – square. The results showed that all five factors under study (parental and peer group influences abstractness of some Chemistry concepts, students background knowledge and phobia of danger/hazard associated with chemical substances) have positive and high relationship with students enrolment in Chemistry Education. It was concluded that these factors significantly affect students' low enrolment in Chemistry Education. Therefore, it was recommended amongst others that School guidance and counseling should regularly organize career guidance to students on their choice of career and parents should not interfere in their children choice of career but leave the students to choose career based on interest and passion.

Keywords: Enrolment; Chemistry; Parental; Peer; Career; Hazard

1. Introduction

Chemistry is one of the physical Science subjects studied in Nigerian Schools. The study mainly deals with invisible particles (ions, atoms and molecules) and their reactions. In Nigeria, Chemistry is included in the School curriculum from the secondary School because of its many very important roles as a central science subject. As a requirement for admission into tertiary institutions, it is expected that a student score a credit pass in the subject at secondary level. Some Chemistry related fields of study in the tertiary level are Biological sciences, engineering medicines etc. The study of Chemistry is beneficiary to both individual and the society. For the individual it can equip him with entrepreneurial skills, create job and socioeconomic empowerment while to the society sustainable development and generally, welcome transformation. The unique nature of the subject offers the learner with ample advantages. According to Sabina, (2001), good background knowledge in Chemistry Education can turn a Chemistry graduate into a Chemistry teacher, lecturer or professor in Chemistry. More so, a graduate in Chemistry can become self-reliant by the acquisition of science process skills he can as well become an employer of labor as he goes into production of essential products such as soap production, production of germicide, insecticide, fungicide, production of paint, perfumes, pomade just to mention a few.

Our day to day living even in the homes involves practices in Chemistry. Xing and Rojewski (2018) pointed out some of these practices which include cooking of food; laundry done at home involves the use of soap and detergents. Likewise

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Okon (2017) mentioned, fermentation processes example pap can be process from corn (maize), fufu can be process from cassava and other similar processes, the melting of ice block, boiling of water, cooking with fire wood, distillation of palm wine, production of African beauty (black) soap etc.

In the past and presently, knowledge in Chemistry has brought about a lot of development of technologies for military power, building and construction as well as in transportation improvement in agricultural practices such as in the farming process as well as in the farm products for preservation of food and in other industries example in the pharmaceutical industry a lot of fine drugs are produce and consumed by man for better health care and also for livestock in agriculture.

Every individual has potentials that he is endowed with and so his capable of learning anything presented to him as is determines by him and so it is with the various subjects and skills. There is therefore no need for differential enrolment in one course to another. However, the reality of the situation is different especially as observed in Chemistry compared to the other science courses in Ignatius Ajuru University of Education.

In spite of the benefits accrue to knowledge in Chemistry Education, it is strange to know that there are fewer students studying Chemistry Education in Nigerian Universities. If we must utilize the benefits of as provided by knowledge in Chemistry particularly for the development of our society, then Chemistry Education must be given proper place as a course of learning in Nigerian Universities. All over the world, in most of the science learning and professions, Chemistry has a major role to play. Chemistry Education must be made popular and be given serious attention; this is the main reason why the low enrolment in Chemistry Education should not be allowed to continue. An opinion survey conducted in line with the enrolment pattern in the science courses in Ignatius Ajuru University of Education in Rivers State gave a result that is most revealing of the real situation. The table below shows an un mistakable form that from 2021 – 2017 academic session out of four departments in the faculty of science, the enrolment in Chemistry is not only the least but also dwindling:-

Table 1 Students' enrolment in the faculty of natural and applied sciences

Session	Biology	Human Kinetics	Computer	Chemistry
2012	62	40	95	43
2013	73	60	100	21
2014	85	72	86	30
2015	95	51	98	31
2016	102	125	205	48
2017	200	125	205	50

This table is a true representation of what is going on as a low and dwindling enrolment of students in Chemistry Education and not an assumption. Based on the current enrolment strength the enrolment in sciences can generally be said to be low not withstanding among the sciences Chemistry is even the lowest.

This paper is of the opinion that several factors including parental and peer group influences, students perception of Chemistry concepts as abstract in nature, students poor background knowledge in Chemistry and phobia to danger/hazard associated with chemical substances:

Every student comes from a family which is his home and in most cases it is the parent that fend for the child of which some parents have a way to play with the psychology of the child and also see it as an advantage to interfere in the child's affair even when it has to be in an important subject such as career choice (Whiston & Keller, 2004), opine that the greatest influence among the factors that are responsible for low enrolment is that of parental influence. Other times parents would like that their children take after them in their career, Olayinka (2014), said that sometimes parents set up standard worthy of emulation for their children which serves as motivating factor. In the same vein Mourish (2014) reported that parents' attitude influence the way their children would go. Choice of career should not be based on just moral of parents but should be motivated by interest and passion of the students. In education and learning generally, it is observed that students learn better when their interest and opinion about what they learn is respected.

Influence of peer group is a very possessing and compelling factor and when once one is engulfed by it, it becomes very difficult to set loose from it. Oduh, Agboola and Eibhalemen (2020), explained that it is impossible to go against a peer group whose cardinal rule seems to be “conformity to rejection” to go against the rules of the peer is regarded as “outcast” or non-member”. The peer group virus is worse than an infectious disease or an addiction, too strong to overcome. So this has the tendency of greatly influencing the students’ choice of career. This can be a likely factor capable to result in low enrolment in Chemistry Education in Universities.

Interest or attitude toward any issue in life will equally determine one perception about it. Some students view Chemistry as difficult because they assume that the concepts in Chemistry are abstract in nature as such cannot be easily assimilated. This reason makes them to shy away from offering Chemistry as a course of learning. Gabel (1998) opined that Chemistry is difficult to learn because it deals with specialized language, mathematics and abstract conceptual nature and the content to learn about is also voluminous. According to Osborn and Collins (2001), students find Chemistry difficult and unrelated to their real world. Some students may have viewed Chemistry in the manner above. Maybe the teachers they have early experienced did not bring the learning home by applying familiar objects for presentation of these concepts. Other times students have heard others’ comments on finding the subject matter difficult to learn of which themselves have not experienced but run into judgment based on these perceptions. However, this cannot deter a serious mind from putting up right attitude towards learning the subject.

There are students who at the foundation level were not exposed to adequate background knowledge in Chemistry either the Schools they attended did not have qualified Chemistry teachers or adequate facilities to present Chemistry in its interesting manner and so assume that they are not qualified to study Chemistry in the high school. Kalu (2014) opined that low enrolment in Chemistry Education is due to mirage and poor background knowledge of the students at the secondary school level.

The learning of Chemistry is associated with a lot of hazards. In learning of Chemistry, a lot of safety measure is required and this should not be neglected by the teachers so as not to expose the learners as well as the teachers to chemical related hazards some of which are toxic, poisonous and even some life threatening. However, we should not be ignorant of the fact that nothing good comes easy is the language of the brave mind (scientific attitude) a scientist indeed but the feeble hearted will easily fizzle out of slightest puzzle which does not produce solution. Woldeamanuel, Atagana and Engida, 2014 opined that what makes the learning of Chemistry difficult is due to the hazard associated to it. Therefore, students’ shying away from offering Chemistry is dependent on parental and peer influences, students’ perception of Chemistry concepts as difficult, fear of being exposed to hazards amongst others. Relevant questions to ask here are: Do parents or peer group play any role in students’ choice of career? Do Chemistry students perceive Chemistry concepts as difficult? Are the hazards associated with chemical materials frightening students from offering the subject? This study therefore seeks to investigate factors responsible for low enrolment in Chemistry by Chemistry Education students in Ignatius Ajuru University of Education. Specifically, the study is to ascertain:

- Parental factor influence on students’ enrolment in Chemistry Education.
- Peer group influence on students’ enrolment in Chemistry Education.
- Effect of students’ perception of Chemistry concepts as difficult on enrolment in Chemistry Education.
- If students’ background knowledge in Chemistry affects students’ enrolment in Chemistry.
- If students’ perception of exposure to chemical hazards affects students’ enrolment in Chemistry.

Research Questions

- Do parental factors influence students’ enrolment in Chemistry Education?
- Does peer group influence affect students’ enrolment in Chemistry Education?
- Does students’ perception of Chemistry concepts as difficult influence students’ enrolment in Chemistry Education?
- Does students’ background knowledge in Chemistry affect students’ enrolment in Chemistry Education?
- Does students’ perception of exposure to chemical hazards affect students’ enrolment in Chemistry Education?

2. Material and methods

The study adopted opinion survey research design to determine factors responsible for low enrolment in Chemistry Education in Ignatius Ajuru University of Education in Port Harcourt, Rivers State. A population of 515 out of which a sample size of 160 Chemistry Education students of the Chemistry department was involved in the study.

Questionnaire was a modified 4-point Likert type scale of strongly agreed (SA) 4-points, Agreed (A) 3-points, Disagreed (D) 2-points and Strongly Disagreed (SD) 1-point. The instrument was validated by 2 experts from the department of the same University and the reliability coefficient was estimated using Cronbach Alpha and was found to be $r = 0.87$. Also a criterion mean of 2.5 was set and an item whose mean falls below is regarded as unaccepted while a mean above is accepted.

3. Results

3.1. Research question 1

Do parental factors influence students' enrolment in Chemistry Education?

Table 2 Mean and standard deviation on parental factors

S/N	Item Statement	Mean	Standard Deviation	Criterion Mean	Remark
1	I did not choose Chemistry because of my parents lack of interest in the subject	2.54	1.084	2.50	Agree
2	My parents lack of finance discouraged me from studying Chemistry	2.76	0.926	2.50	Agree
3	Lack of encouragement from my parents discouraged me from taking up the course.	2.54	0.986	2.50	Agree
4	It was my parents that choose my course	2.35	1.105	2.50	Disagree
5	My parents said Chemistry does not guaranty easy job employment	2.54	1.060	2.50	Agree
	Weighted Mean	2.55			Agree

Table 2 revealed that out of the 5 parental factor items 4 items are of agreement. The weighted mean value (2.55) also measured up with the criterion mean value (2.50), therefore parental factors influences students' enrolment in Chemistry Education.

3.2. Research question 2

Table 3 Mean and standard deviation on parental factors

S/N	Item Statement	Mean	Standard Deviation	Criterion Mean	Remark
1	I chose to offer science because of my friends area in science	2.59	0.974	2.50	Agree
2	I opted out of chemistry because my friends scared me of the calculations in chemistry	2.46	1.076	2.50	Disagree
3	My friends made me to belief that chemistry is just for special group of people	2.58	1.081	2.50	Agree
4	My friends frightened me against offering chemistry that it is abstract and does not relate to the real world of the learner	2.48	1.031	2.50	Disagree
	Weighted Mean	2.53			Agree

Does peer group influence affect students' enrolment in Chemistry Education?

Table 3 revealed that 2 agreed and 2 disagreed over the peer group factors while the overall weighted value (2.53) is greater than the criterion mean value of 2.50, therefore, peer group factor is responsible for low enrolment of students in Chemistry Education in Ignatius Ajuru University of Education.

3.3. Research question 3

Does students' perception of Chemistry concepts as difficult influence students' enrolment in Chemistry Education?

Table 4 Mean and standard deviation on perception of Chemistry concepts as difficult

S/N	Item Statement	Mean	Standard Deviation	Criterion Mean	Remark
1	I chose not to study chemistry because it is a difficult subject	2.62	1.063	2.50	Agree
2	Chemistry most times does not teach about what can be seen with the naked eyes	2.52	0.970	2.50	Agree
3	I do not choose to offer chemistry because it is hard to understand concepts	2.57	0.950	2.50	Agree
4	My interest in chemistry is that its activities relate to our daily lives activities	2.68	1.014	2.50	Agree
5	My secondary school teacher does not draw illustration from true life experiences during chemistry teaching	2.62	0.972	2.50	Agree
6	My secondary school had no facilities for the learning of chemistry	2.64	0.887	2.50	Agree
7	My secondary school teacher does not engage us in learning activities during teaching of chemistry	2.63	0.888	2.50	Agree
	Weighted Mean	2.61			Agree

Table 4 shows that mean value on students' perception of Chemistry concepts as difficult had all 7 responses as agreed. The weighted mean value (2.61) as well is higher than the criterion mean value (2.50), hence, students' perception of Chemistry as difficult to understand is a factor responsible for low enrolment in Chemistry Education in Ignatius Ajuru University of Education.

3.4. Research question 4

Does students' background knowledge in Chemistry affect students' enrolment in Chemistry Education?

Table 5 Mean and standard deviation on effect of students' background knowledge in Chemistry on students' enrolment in Chemistry Education

S/N	Item Statement	Mean	Standard Deviation	Criterion Mean	Remark
1	I do not know much about concepts chemistry to have chosen to offer the subject	2.64	1.091	2.50	Agree
2	In my secondary school chemistry practical was only done few times before our external exam	2.58	1.058	2.50	Agree
3	My secondary school teacher attitude did not encourage me to offer chemistry	2.64	0.986	2.50	Agree
4	The way my chemistry teacher behaves give me the impression that the society does not regard chemistry teachers	2.64	1.091	2.50	Agree

5	I feel it will be difficult to attain to the height of the profession easily	2.67	0.982	2.50	Agree
6	Chemistry professions pay little compared to related science professions	2.78	1.006		
	Weighted Mean	2.66			Agree

Table 5 shows the mean values for 6 items on students' background knowledge as factor responsible for low enrolment in Chemistry Education and all of these responses are in agreement. Therefore, students' background knowledge in Chemistry is a factor responsible for low enrolment in Chemistry Education in Ignatius Ajuru University of Education.

3.5. Research question 5

Does students' perception of exposure to chemical hazards affect students' enrolment in Chemistry Education?

Table 6 Mean and Standard deviation on students' perception of exposure to chemical hazards

S/N	Item Statement	Mean	Standard Deviation	Criterion mean	Decision
1	Safety measures can never be a guaranteed with continuous exposure to chemical when learning chemistry	2.63	1.004	2.50	Agree
2	One's life span is threatened due to steady exposure to poisons from chemicals	2.70	1.017	2.50	Agree
3	Fear of being deformed by Chemicals damages scared me out of the subject	2.36	0.977	2.50	Agree
	Weighted Mean	2.56			Agree

Table 6 shows the effect of 3 responses on students' perception of exposure to chemical hazards as a factor responsible for low enrolment in Chemistry Education. All 3 responses are in agreement that students' perception of exposure to hazard is a low enrolment factor.

4. Discussion

From table 1 above the mean value on parental influence is 2.55 which is greater than the criterion mean of 2.50 this means that parents influence students' in the choice of career so the low mean value is an indicator that most of the parents do not consider their children offering Chemistry Education and this resulted into low enrolment in the subject area. Roe (2006) explains that choice of career of students is partly influenced by the behavior of the parents and the condition of the environment.

Also from table 2, the peer group influence gave a mean (2.53) slightly higher than the criterion mean (2.50) meaning that peer group has influence over the choice of career which factor caused the drifting away from offering Chemistry Education hence, the record of low enrolment in the subject area, according to Kirt (2000) peer group are compelling. Table 3 on Chemistry concepts perceived as difficult showing all 7 items as agree is a strong indication that a lot of students shy away from offering Chemistry because they think the subject is difficult for them to excel in the subject area. It is clear that this understanding is hard in swaying students' from enrolment in Chemistry, this has adverse effect and this orientation must be abused in other to influence students into this subject area Bojuwoye (2003) found that fall in enrolment in sciences particularly Chemistry and Physics is due to difficulties students encounter in studying the subjects.. Furthermore, table 4 another table that has high number of items (6) and all the items had agreement for the responses indicating that students have background knowledge of Chemistry they think is inadequate for them to succeed in studying the subject at tertiary level. This of course explains that most of the secondary schools students attend do not have qualified teachers and or good conditions to equip students in the learning, Emmanuel (2013) observed that greater percentage of teachers employed were not professional qualified to teach and so were not to be employed in the first instance because teachers experience are unique quality for teaching effectively. More so, table 5 though with just 3 items but also gave a mean value (2.56) which is higher than the criterion mean (2.50) in favor of chemical hazard associated with learning Chemistry as a Science subject posing threat and scaring students away from

the subject. This is also due to students' orientation which if well directed could be overcome but for now a factor for low enrolment in the offering of the subject.

Recommendations

Based on the findings of the study, the following recommendations were made:

- Teacher-student relationship should be strengthened, this will create opportunity for teachers to guide and counsel students on proper career choice.
- Chemistry teacher learn to present lesson in a manner that is appealing to students by use of real objects to illustrate concepts.
- Chemistry teachers as well as the authority concern should put learning materials such as laboratory and equipment in place and such be utilized in learning.
- Orientation on laboratory safety and precaution measures should be ensure in Science learning.

5. Conclusion

The issue of low enrolment in the study of chemistry was underlined in this article. Some of the causes accountable for low intake of students in chemistry as observed by students offering chemistry in Ignatius AJURU University of Education, Rivers State were identified. The factors identified in the study include parental and peer group influences, abstractness of some chemistry concepts, students background knowledge and phobia of danger/hazard associated with chemical substances. Therefore, students seeking for admission should adequately guide and counseling regularly organized to enable students have proper perspective on their choice of career and parents should not interfere in their children choice of career but rather leave them to choose based on their interest.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest existed between the authors.

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