

## Awareness of Career Opportunities in Chemistry SS Perceived by Secondary School Students: Implications for Career Guidance.

Marcellinus, C. Anaekwe

Department of Science Education, National Open University of Nigeria.

E-mail: [manaekwe@noun.edu.ng](mailto:manaekwe@noun.edu.ng)

### Abstract:

Taking career decision is such a crucial matter that secondary school students need not be left unguided to avoid wrong career choices. The study adopted the descriptive survey research design in which the perceptions of the senior secondary school students on career opportunities available in chemistry were sought. Data were collected using the researchers developed and validated 43-item, 4-point multiple response Questionnaire which had reliability coefficient of 0.78, using the Cronbach Alpha technique. The instrument was administered to three hundred (300) candidates using multi-stage sampling approach from three education zones in Anambra State. Data were analysed using frequency counts and mean ratings. The findings among others, revealed the three foremost career opportunities in chemistry as perceived by the students to include Chemistry teaching in secondary schools (mean = 3.67), Pharmacy (mean = 3.62) and Medicine/Surgery (mean = 3.60). Some recommendations were made, including the provision of qualified counselling personnel in schools

**Keywords:** Awareness, Career Opportunities, Career Guidance, Chemistry, Students' Perception,

### Introduction:

Career could be seen as a job, or profession for which one undergoes regulated education and training over a period of time and which usually follows the person for the whole of his/her life. Making a career decision is not a one-stroke process. It may appear quite easy for some people however; others experience some difficulty along the line. Planning for tomorrow is primarily the responsibility of the parents, teachers and school counsellor. Students need adequate career information in course of their learning experiences. The kind of career the youths pursue can affect their lives in many ways. For example, it can determine where the individual lives and the peer group. It can reflect how much education one will have and determine the amount of money one will earn. People desires for a career are different, many people desire high income; others want adventures while some others want to serve people to make the world a better place. It is on this basis that giving career guidance especially, to the youths becomes a topical issue.

Career choice is one of the most important decisions in the life of an individual. It has far-reaching implications on the individual's future in terms of lifestyle, status, income, security and job satisfaction. Although personal philosophy, achievement and self-image are important factors in this decision, the external environment is also very influential in characterising career and shaping aspirations. The values an individual hold, the successes and failures he/she experiences, the social class in which he/she has developed and his/she interests, strengths and capacities are only some of the factors which could affect his/she selection of a career. Thus, career choice is not merely a decision of a moment but a complex and difficult process spanning for years, if not a lifetime (Bassey, 2010). The consequences of wrong career choice are quite enormous. As a result of wrong career choice, many job-seekers usually find themselves in jobs where they could not satisfy their value needs. When this occurs, they constitute nuisance to themselves, their employers and the society as a whole. They are usually unable to contribute meaningfully to the society and ultimately become liability to the nation. It is possible that some wrong career decisions were founded

on ignorance of available opportunities. To avoid a situation like this, it becomes necessary to create awareness of available career prospects in different school subjects of which chemistry is one. For instance, degrees in the basic and applied sciences could open up a variety of career opportunities as research scientist in your specialist area including analytical scientist, chemist, medical scientist, forensic scientist, pharmacologist, toxicologist, biologist, microbiologist, marine biologist, biochemist, biotechnologist, geneticist, zoologist, physicist, geophysicist, nanotechnologist, astrophysicist, medical physicist and meteorologist (Ogunlade, 2017). It may therefore, not be out of place to give authentic guidance to the students at an appropriate time. Similarly, documentary literature search of relevant textbooks would indicate that there are a number of chemistry-based careers.

Career development occurs in broad sequential stages: starting from childhood till death. The earliest stage is often a non-realistic conceptualisation of one's potentials and the world. But with time, the child begins to be more realistic in appraising himself with potential careers. This second phase normally extends from about the end of primary school to secondary school. The third stage is referred to as realistic choice making. The impact of career development upon the youth is long-term and inestimable. Through the career development process, an individual fashions a work identity which in a long run characterizes the personality of the individual. Thus this study was founded on the theoretical framework of Self-concept Theory of Career Development. By this theory which originated in the USA as well as in other parts of the world, Super cited in Obisike (2019) suggested that career choice and development is essentially a process of developing and implementing a person's self-concept. Accordingly, self-concept was viewed as a product of complex interactions among a number of factors, including physical and mental growth, personal experiences, and environmental characteristics and stimulation. However, recent articulations have called for a stronger emphasis on the effects of social context and the reciprocal influence between the person and the environment.

Super in Obisike (2019) proposed a life stage developmental framework with the following stages: growth, exploration, establishment, maintenance (or management), and disengagement. In each stage one has to successfully manage the vocational developmental tasks that are socially expected of persons in the given chronological age range. For example, in the stage of exploration (ages around 15 to 24), an adolescent has to cope with the vocational developmental tasks of crystallisation (a cognitive process involving an understanding of one's interests, skills, and values, and to pursue career goals consistent with that understanding), specification (making tentative and specific career choices), and implementation (taking steps to actualise career choices through engaging in training and job positions). One noticeable missing link which has been reeling out some undercurrent blows in the Nigerian educational system particularly the secondary school level is the near lip-service being paid to the vocational guidance of the students. Although the FRN (2013) recognised the provision of guidance and counselling services as one of the essential educational support services in the Nigerian education system however, the extent of upholding the tenets of this provision is a matter of concern to this paper. Although there are a handful of trained teacher counsellors in schools, the extent of performance of the statutory roles of a counsellor especially that of vocational guidance of the students is quite skeletal in comparison to the totality of students and secondary schools in the country. The fate of the students in the other numerous schools without a designated and, or functional school counsellor to guide the career aspiration of the students is also a matter of grave concern. Similarly, it is even doubtful the extent students are aware of the existence of such opportunities to enable them make wise career choice in course of their studies. The consequence of the above scenario is that students, even at the point of registering and seeking for admission into universities seem unaware of the career opportunities available to

them as well as the subject combinations that they needed to offer that would lead them to a particular career. The problem of this study therefore, was to determine the extent of awareness of career opportunities in chemistry as perceived by senior secondary three, (SS3) students

### Research Questions:

The following research questions guided the study:

- i. To what extent are students aware of the career opportunities available in chemistry?
- ii. To what extent are students aware of the subject requirements for pursuing such careers at tertiary institutions?
- iii. What opportunities are provided to guide students in making wise career choice?

### Methodology:

This study adopted the descriptive survey research design whereby the perception of SS3 Chemistry students on their awareness of career opportunities in chemistry were sought for. The sample for the study consisted of three hundred (300) SS3 chemistry students out of a population of one thousand eight hundred and fifty-six (1856). This group of students were considered appropriate for the study because they are considered to have gone through the length and breathe of chemistry curriculum and secondary school chemistry experiences for us to reckon with the wealth of their perception. Multi-stage sampling technique was used to select samples for the study. Three education zones (Aguata, Awka and Onitsha) were selected randomly from the six education zones in Anambra State in the first instance. The second stage involved selection of schools that are non-coeducational in nature so that the experiences of both male and female students would be taken into consideration. In the third stage, sixty candidates (comprising 30 males and 30 females) were selected randomly from each of the boys' and girls' schools.

Thus, a total sample of (3 Education Zones x 2 single sex school x 60 candidates), three hundred and sixty (360) SS3 chemistry students from three education zones of Anambra State were sampled for the study. However, only 300 of them who fully completed their questionnaires actually participated in the study. The researcher constructed and validated a 43-item, 4-point multiple response questionnaire which was used to collect data for the study. To ensure that the items in the questionnaire are valid, the initial draft was presented to three experts in Science Education and Guidance and Counselling for scrutiny. The comments and suggestions of the experts were considered in the final draft of the instrument. The Cronbach Alpha technique of determining reliability was used to ascertain the reliability of the instrument. A reliability index of 0.78 was obtained for the instrument. This value was considered adequate and hence, reliable for the study. The researcher also consulted the 2018/2019 JAMB Guidelines for Admissions and Programmes in Nigerian Tertiary Institutions to sieve out appropriate UTME subject combinations for the enlisted chemistry-related careers. The researcher was assisted by willing and reliable research assistants who made the data collection procedure very smooth across all the schools used for the study. The research questions were analyzed using frequency counts and mean ratings. Items with mean value of 2.50 and above were accepted as positive perception/ awareness while, items with mean values less than 2.50 were rejected as signifying negative perception/awareness.

### Results:

The results of the study were presented in line with the research questions.

**Research Question 1:** To what extent are students aware of the career opportunities available in chemistry?

**Table 1: Mean Responses on Awareness of Career Opportunities in Chemistry.**

(NB: STA=Strongly Aware; MA=Moderately Aware; SLA=Slightly Aware; NA=Not Aware)

CAREER DOMAINS/ ITEMS		RESPONSES						Mean	Remark
S/N	Teaching Service:	STA	MA	SL	NA	N			
1	Chemistry Teaching in Secondary Schools	201	99			300	3.67	Positive	
2	Chemistry teaching in COEs	180	100	20		300	3.53	Positive	
3	Chemistry teaching in Polytechnics	170	110	20		300	3.50	Positive	
4	Chemistry teaching in Universities	150	100	50		300	3.33	Positive	
5	Chemistry Lab Assistant	150	140	10		300	3.47	Positive	
6	Chemistry Lab Technology	150	120	30		300	3.40	Positive	
<b>Health Service</b>									
7	Medicine/Surgery	180	120			300	3.60	Positive	
8	Pharmacy	185	115			300	3.62	Positive	
9	Biochemistry	120	100	20	60	300	2.93	Positive	
10	Chemistry	150	150			300	3.50	Positive	
11	Nutritionists/Dieticians	30	50	150	70	300	2.13		
12	Nursing	130	80	50	40	300	3.00	Positive	
13	Medical Assistants	100	120	50	30	300	2.97	Positive	
14	Medical Lab Technology	100	120	50	30	300	2.97	Positive	
<b>Food Processing/Agro-Allied Services</b>									
15	Food technology	40	50	100	110	300	2.07	Negative	
16	Agricultural Scientist	30	50	120	100	300	2.03	Negative	
17	Agronomy	60	40	100	100	300	2.20	Negative	
18	Forestry	20	60	100	120	300	1.93	Negative	
<b>Extractive Service</b>									
19	Mining Engineering	30	20	130	120	300	1.87	Negative	
20	Geology	20	60	120	100	300	2.00	Negative	

Cluster Mean=2.89 moderately positive

From table 1, the mean ratings ranged from 1.87 to 3.67. All the items had mean values greater than the cut-off point of 2.50, except items 15, 16, 17, 18, 19 and 20 whose mean values were less than the cut-off point. This means that the respondents were not aware of those items as chemistry-related career opportunities, while the items with mean values greater than the cut-off point were perceived positively as chemistry-related career opportunities. In general, it was evident that the three foremost career opportunities in chemistry as perceived by the students included Chemistry teaching in secondary schools (mean = 3.67), Pharmacy (mean = 3.62) and Medicine/Surgery (mean = 3.60). The cluster mean value of 2.89 could be interpreted to mean that the respondents were moderately positive on their perception of the extent of awareness of chemistry-related career opportunities.

**Research Question 2:** To what extent are students aware of JAMB subject combinations for Core chemistry-related courses?

**Table 2: Mean Responses on the Extent of Awareness of JAMB Subject combinations.**

CAREER DOMAINS/ITEMS		Subject Combinations			RESPONSES				
S/N	Teaching Service:	Subject combinations for chemistry-related course			ST	MA	SL	NA	mean
					A		A		

21	Chemistry Education	English, Maths/ physics, chemistry, biology	190	100	10		3.60
22	Science Lab technology	English, Maths / physics, chemistry, biology	180	80	25	15	3.41
<b>Health Service</b>							
23	Medicine & Surgery/ Veterinary Medicine	English, physics, chemistry, biology	200	100			3.67
24	Pharmacy/Radiography	English, physics, chemistry, biology	220	80			3.73
25	Biochemistry	English, physics, chemistry, biology	120	98	43	39	3.00
26	Chemistry	English, chemistry and two of Maths, physics and biology	101	99	60	40	2.87
27	Food Science	English, Maths/physics, chemistry and Agricultural science	79	40	101	100	2.46
28	Nursing	English, physics, chemistry, biology	102	100	78	20	2.95
29	Medical Laboratory science	English, physics, chemistry, biology	73	50	97	80	1.66
<b>Food Processing/Agro- Allied Services</b>							
30	Food science and technology	English, chemistry Maths/ physics and Agric science	70	70	85	75	2.45
31	Agricultural/ Computer/Electrical/Electronic/Civil/Petroleum/Chemical Engineering	English, Maths, physics and chemistry.	80	13	120	87	2.29
32	Agronomy/Agricultural Extension	English, chemistry, biology/Agric and physics/Maths	46	40	154	60	2.24
33	Forestry	English, chemistry, biology or Agric and Maths/physics.	50	55	100	95	2.20
<b>Extractive Service</b>							
34	Mining Engineering	English, Maths, physics, chemistry, Geography	22	50	98	130	1.88
35	Geology	English, and any three of Maths, physics, chemistry, biology, Geography	30	17	100	153	1.75

Cluster Mean = 2.29 slightly aware

From table 2, the mean ratings ranged from 1.75 for item 35 to 3.73 for item 24, ie Pharmacy/radiography. All the items had mean values greater than the cut-off point of 2.50, except items 27, 29, 30, 31, 32, 33, 34 and 35 whose mean values were less than the cut-off point. This means that the respondents were not aware of the JAMB subject-combinations of those chemistry-related careers, while the items with mean values greater than the cut-off point the respondents were aware of the JAMB subject-combination of those chemistry-related careers. In general, it was evident that the three foremost chemistry –related careers whose JAMB subject- combinations the respondents are very much aware of included Pharmacy/Radiography (mean = 3.73), Medicine/Surgery (mean = 3.67) and Chemistry education (mean = 3.60). The cluster mean value of 2.29 could be interpreted to mean that the respondents were slightly aware of JAMB subject-combinations for the chemistry-related careers. In addition to the basic SSCE ordinary level requirement of 5 credits including English language and mathematics at not more than two sittings, the prospective candidate is expected to apply for UTME and sit for appropriate subject combinations to be eligible for consideration in the applied course.

Research Question 3: What opportunities are provided to guide students in making wise career choice?

**Table 3: Mean Responses on Opportunities provided Students to make Career Choice.**

(NB: SA = Strongly Agree, AG = Agree, DA = Disagree, SD = Strongly Disagree)

S/N	Opportunities provided to enable students make wise Career choice				Responses			
	SA	AG	DA	SD	Mean	Remark		
36	Career Information in Chemistry	130	120	30	20	3.20	Accept	



	Curriculum						
37	Career information in chemistry textbooks	120	140	25	15	3.22	Accept
38	Excursion /Field trips to chemistry-based industries/establishments	150	130	10	10	3.40	Accept
39	Organisation of Career Week in schools	180	80	10	30	3.67	Accept
40	Invitation of Guest speakers/Mentors during Science Week	100	120	40	40	2.93	Accept
41	Membership of Science/*JETS Club	100	90	60	50	2.80	Accept
42	Vocational Guidance by School Counsellors	20	60	100	120	1.93	Reject
43	Career Clinic by school Counsellor	15	55	80	150	1.78	Reject

**\*JETS = Junior Engineers, Technicians and Scientists**

Table 3 shows the mean responses of the chemistry students as to the opportunities provided to them in school to make wise career decisions. The mean values ranged from 1.78 for item 43, that is organizing career clinic by the school counsellor to 3.67 for item 39, which is Organizing Career week in schools. All the items except items 42 and 43 had mean values less than the cut-off point of 2.50 hence, the two items were rejected. This implies that the two items were not perceived by the respondents as being contributory to their making of wise career decisions.

### Discussion:

Research question 1 sought to determine the extent the respondents are aware of the career opportunities available in chemistry. Result presented in table one indicated that the three foremost career opportunities in chemistry as perceived by the students included Chemistry teaching in secondary schools (mean = 3.67), Pharmacy (mean = 3.62) and Medicine/Surgery (mean = 3.60). The career opportunities which they perceived as least aware included Mining Engineering (mean = 1.87), Forestry (mean = 1.93) and Geology (mean = 2.00). The cluster mean value of 2.89 could be interpreted to mean that the respondents were moderately positive on their perception of the extent of awareness of chemistry-related career opportunities. From this table still, it would be seen that all the items in the career domains of Food Processing/Agro-allied Services and Extractive Services were not perceived as chemistry-related careers, while the reverse was the case for all the careers in the Teaching and Health Services. A possible explanation could be that whereas the teaching and Health services had more direct impact on the students, the food processing/agro-allied services and extractive services may appear distanced and not impacting greatly on the daily lives of the respondents. This may also be an indirect reference to the paucity of food processing/agro-allied and extractive industries in their environment and by implication a call on government and industrialists to spread the localization of industries in the society.

Research question 2 sought to determine the extent students are aware of the JAMB subject-combinations for pursuing chemistry-related careers at tertiary institutions. Result as presented in table 2 indicated that the three foremost chemistry-related careers whose JAMB subject-combinations the respondents are very much aware of included Pharmacy/Radiography (mean = 3.73), Medicine/Surgery (mean = 3.67) and Chemistry Education (mean = 3.60). On the other hand, the respondents are not aware of the JAMB subject combination of some chemistry-related careers including Medical Laboratory science (mean = 1.66), Geology (mean = 1.75) and Mining Engineering (mean = 1.88). The cluster mean value of 2.29 could be interpreted to mean that the respondents were slightly aware of JAMB subject-combinations for the chemistry-related careers. Items which recorded a mean value of 2.50 and above implies that the respondents were aware of the career as chemistry-related. Nevertheless, the respondents may be constrained by other challenges in making out a career in this discipline: such as competitive nature of such courses by a good number of students, varying cut-off points across educational institutions and other subjective

considerations during the admission process. Items which recorded a mean value less than 2.50, implies that the respondents were not aware of the career opportunity as being chemistry-related. This implies that the candidate may not even consider it as a possible option in the first instance.

Research question 3 sought to determine the opportunities provided to guide students in making wise career choice. Result as presented in table 3 indicated that the three most outstanding opportunities provided included Organisation of career week in schools (mean = 3.67); Excursion /Field trips to chemistry-based industries/establishments (mean = 3.40) and Career information in chemistry textbooks (mean = 3.22). On the other hand, only two items were perceived as not contributory to making of wise career choice. They included Vocational Guidance by School Counsellors (mean=1.93) and Organising Career Clinic by school Counsellor (1.78). That these two items were perceived as not being contributory to the respondents' making of career decisions may be as a result of a number of factors. In the first instance, the students may not be interested in entering the Counsellor-Counselee relationship or ready to disclose their vocational aspiration and, or challenges to the appropriate personnel in order to get the desired attention. This view was corroborated by Suutari (2018) who reported a positive relationship between interests and career choice; it has also been investigated that individuals with better academic performance are able to make better judgments about themselves and to easily disclose their career challenges. Again, school curricular and co-curricular programmes abound which are meant to expose the secondary school students to career prospects in different field of endeavour.

On the other hand, the schools concerned may not have a functional Counsellor or that the counsellor is ill-equipped in the performance of the expected roles. These observations call for enlightenment on the part of the students, provision of qualified counselling personnel in schools and enhancing their capacity through seminars and other retraining programmes. There is also the need for counsellors and chemistry teachers to collaborate in the discharge of their duties to the students

### **Implications for Career Guidance:**

The findings of this study have far-reaching implications on the career guidance of the students. In the first place, one cannot give what he/she has not. Again, a blind man cannot lead another person successfully. There is no gain saying the fact that, schools should have at least a well- trained and functional Counsellor. The Counsellor would then liaise with teachers in other subject areas to attend to the specific career needs of the students. Important school career for a such as career week and career clinic may not be effectively conducted if left only at the hands of the school counsellor. Therefore, there is need for a team approach in conducting the school counselling affairs.

A situation whereby final year secondary school chemistry students are unaware of chemistry-based careers points to a need for aggressive public enlightenment on career-related issues in schools. Since it is out of the abundance of the heart that the mouth speaks, it would sound unreasonable to expect one to make a choice out of a null set. Therefore, the prospective school-leavers should be well informed of available career options in their fields of endeavour to enable them make a wise career choice out of the possible options.

The findings of this study also have implication for delocalisation of industries in the society. It is not out of place in our society to see that industries are centred on the urban areas while none exist in the rural areas. The implication of this development is that students, especially those in rural settings are unaware of some industrial-based career in their subject domain. Thus, decentralisation of industries would make for even development of the society and better career awareness in the society. This in a long run would minimise rural-urban drift with attendant social vices in the urban cities.

**Conclusion:**

This study sought to determine the perception of secondary school students on the awareness of career opportunities available to them in chemistry. Specifically, the study determined the students' level of awareness in terms of career opportunities available in chemistry, entry requirements for pursuing such careers at tertiary institutions and opportunities provided for students to make wise career choice. Three research questions guided the study. The study adopted the descriptive survey research design in which the perception of the final year senior secondary school students on career opportunities available in chemistry was sought. Data were collected using a 43-item, 4-point multiple response Questionnaire which was developed and validated by the researcher. The instrument had a reliability coefficient of 0.78, using the Cronbach Alpha technique. This value was adjudged reliable and adequate for the study. The instrument was administered to three hundred (300) candidates using multi-stage sampling approach from three education zones in Anambra State. Data were analyzed using frequency counts and mean ratings. The findings revealed among others that the three foremost career opportunities in chemistry as perceived by the students to include Chemistry teaching in secondary schools (mean = 3.67), Pharmacy (mean = 3.62) and Medicine/Surgery (mean = 3.60). Concerning the extent the respondents are aware of UTME subject-combinations, Pharmacy/radiography (mean = 3.73), Medicine (mean = 3.67) and Chemistry Education (mean = 3.60) ranked highest. On the opportunities provided to enable students make wise Career choice the following were identified: Organization of career week in schools (mean = 3.67); Excursion /Field trips to chemistry-based industries/establishments (mean = 3.40) and Career information in chemistry textbooks (mean = 3.22).

**Recommendations**

In view of the above findings, the following recommendations were made:

- i. General enlightenment of the students on the importance of career counselling in schools.
- ii. provision of qualified counselling personnel in schools.
- iii. Capacity building of school counsellors through seminars and other retraining programmes.
- iv. Need for counsellors and chemistry teachers to collaborate in the discharge of their duties to the students

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