



## Identification of Entrepreneurial Skills Components in Chemistry Curriculum of Senior Secondary School in Anambra State

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### Abstract

Unemployment rate in Nigeria is serious national problem hence Nigeria included entrepreneurial skills for self-employment in her educational curriculum. This study investigated identification of these skills in Chemistry by chemistry teachers. Five research questions, five null hypotheses and a descriptive survey design guided the study. The study was carried out in Awka Education zone with all the 64 chemistry teachers from the 61 secondary schools. Data was collected with IESCC (Identification of Entrepreneurial Skills Components in Chemistry). Mean scores were used to answer research questions, while null hypotheses were tested using  $X^2$  (chi-square). From the analysis, the researcher found out that: 1. Teachers are not aware of these entrepreneurial skills and therefore could not identify them. 2. There is significant difference in all the hypotheses based on location. 3. Students graduate from secondary schools without acquiring the required skills. Based on the above, three recommendations, limitations and suggestions were given.

### Introduction

The rising rate of unemployment in Nigeria and world at large has become a topic of interest in the world today. According to world statistics in Bakere (2013), the rate of unemployment among the youths exceeds 38 percent. Among the most affected strata of the population are the secondary school leavers and rural dwellers who account for 75 million among the population of over 150 million people. Yomi Kazeem (2017), stated that the solution of unemployment in Nigeria is not in sight. According to Uka (2015), the implication of this scenario is that if the rate of unemployment is not checked, it could escalate into youth involvement in all forms of social vices. Viewing from the perceptive of the recent events in the Middle East where unemployment and poverty among others play a key role in the uprising, one can only conclude that Nigerian's unemployment poses a threat to its development, security and peaceful coexistence. There is no doubt that unemployment causes poverty and poverty is one of the major causes of social vices such as armed robbery, destitution, prostitution, political thuggery, rebellion and so on which Nigeria is currently facing. Because the wealth or poverty of a nation depends on her quality of education, National Policy on Education (FGN, 2014), stated that education maximizes the creative potential and skills of the individual for self-fulfillment and general development of the society. Ikemba (2016), referred to Secondary School Education as Education for career development which aims at providing trained manpower in the applied science, technology, and

commerce at the sub professional grades. The problem with Nigerian educational programme is that too much emphasis is laid on certificate rather than the knowledge and skills to be acquired by the holders of the certificate. Okojie (2008), in line with this statement stated that undergraduates struggle hard to attain the 'Golden fleece' which is certificate rather than the knowledge and skills which would make them self-reliant. Okojie added that this is not unconnected to our masters that handed down a lot of theoretical disciplines through our educational programmes in which they lay much emphasis on theories rather than a combination of practice that will enable the recipient acquire appropriate skills for self-reliance and become good entrepreneurs on graduation. However, the NPE (2017), have designed a functional education for the promotion of a progressive and united education hence she stated that school programmes should be relevant, practical and comprehensive and that its goals among other things should develop appropriate skills, mental, physical abilities and competencies to empower the individual to live in and contribute positively to the society and promote functional education for skill acquisition, job creation and poverty reduction. This call for entrepreneurship skill acquisition programmes to improve citizens' employability. Entrepreneurship is a power of vision, change and creation. It requires application of energy and passion to the creation and implementation of new ideas and creative solutions (Samuel 2014). Skill is the ability to do "something" well, usually gained through training experience (Encata Dictionaries 2009). Entrepreneurship skills are those skills which when

acquired enables an individual to be self - reliant. However, entrepreneurship skills may not be efficiently and effectively acquired without the knowledge of scientific concepts, process of science and scientific attitudes which are components of science education taught in schools. By implication, Nigeria educational programmes should be loaded with opportunities for science education. This means that for Nigeria to advance well in technology, she must be well rooted in science.

Science which comes from a latin word “scientia” meaning knowledge, is a process, content and product which its education foster a culture of scientific thinking and use of evidence based reasoning for decision making, confidence, knowledge and skills for contribution to the increasing complex scientific and technological world. Science is divided into pure and applied sciences. The main branches of pure science include biology, chemistry, physics agriculture, health science and physical education.

Chemistry which in one of the most important branch of pure science and also a physical science, deals with the structure, composition, properties and uses of matter and also goes into the preparation of new substances from things around us (Ababio,2005). In the teaching of sciences in secondary schools for example chemistry, students should be taught to develop entrepreneurial skills, to equip young people with the knowledge and skills needed to be self-reliant and job creators not job seekers (entrepreneurs). The knowledge of chemistry is used in the production of good water, drug fabrics for (clothing). Chemistry knowledge is also very important for the production of material for construction of industries, road, automobiles and houses. It is also needed in careers in science and science based discipline like pharmacy, agricultural science, nursing, medicine, textile, fine art, engineering, laboratory technology, geology et cetra. The old senior secondary school science curriculum had been in existence for past three decades but the way they are taught, though they gave fundamental knowledge that serve as a foundation to doing other courses in the universities, but not enough knowledge/skills are got for the expected skills for self-reliant. Hence, the federal government in 2008 launched a new senior secondary school curriculum which contains an array of 35 entrepreneurial skills. The question is, Are chemistry teachers aware of these entrepreneurial skills? To what extent are these entrepreneurship skills components of chemistry



identified in senior secondary school curriculum in Anambra state?

### Statement of the problem.

Acquisition of entrepreneurial skills by graduates of senior secondary schools and higher institutions will help stem the tide of unemployment which is presently getting out of hand in Nigeria especially with the present world economic melt- down. Lack of these skills among school leavers is pinpointed as the major impediments to sustainable development as well as increasing unemployment in the country (Olibie, 2005). This is why the researcher intends to identify entrepreneurship skill components in the chemistry curriculum of the senior secondary school in Anambra State.

### Purpose of the Study

The purpose of the study is to identify the entrepreneurial skills components in the chemistry curriculum in senior secondary schools in Anambra State. More specifically, the study sought to identify the following entrepreneurial skills in the teaching of:

1. Electrolysis and lead accumulator in the chemistry of the senior secondary schools in Anambra State.
2. Gases in the chemistry of the senior secondary schools in Anambra State.
3. Acids and salts in the chemistry of the senior secondary schools in Anambra State.
4. Organic chemistry in the chemistry of the senior secondary schools in Anambra State.
5. Carbonates in the chemistry of the senior secondary schools in Anambra State.

### Research Questions

The following research questions have been formulated to guide the study: What entrepreneurial skills are identified by chemistry teachers in the teaching of:

1. Electrolysis and lead accumulator in the chemistry of the senior secondary schools in Anambra State?
2. Gases in the chemistry of the senior secondary schools in Anambra State?
3. Acids and salts in the chemistry of the senior secondary schools in Anambra State?
4. Organic chemistry in the chemistry of the senior secondary schools in Anambra State?



## 5. Carbonates in the chemistry of the senior secondary schools in Anambra State?

### Methods

The study adopted descriptive survey research design and was carried out in Awka education zone of Anambra State. All the 64 chemistry teachers from the 61 state owned secondary schools in the zone were used. A polytomously scored questionnaire named Identification of Entrepreneurial Skills Components in Chemistry (IESCC) developed by the researcher based on the chemistry topics from where the entrepreneurial skills were identified was used for data collection. In the questionnaire – Identification of Entrepreneurial Skills Components in Chemistry (IESCC), entrepreneurial skills that can be acquired in the teaching of each of the selected chemistry topics were listed and chemistry teachers were required to identify them. The instrument was validated by two lecturers in the faculty of Education, Nnamdi Azikiwe University, Awka. The reliability of the instrument was established using Cronbachs' Alpha technique and the internal consistency coefficient was found to be 0.87. Cronbachs' Alpha was used for the reliability because the responses to the questions are not 'YES' or 'NO' answers. The researcher administered the copies of the questionnaires personally to the chemistry teachers in the schools and after collected all back. Data

collected were analyzed using descriptive statistics of percentages to answer research questions while inferential statistics of  $X^2$  (Chi-square) to test the hypotheses at alpha level of  $\leq 0.05$ . The percentage score greater or equal to fifty ( $\geq$ ) is taken as a good pass mark and therefore accepted while a percentage score less than ( $< 50$ ) is not a good pass mark and therefore rejected.

### Results.

The data collected were analyzed and the summaries were presented in tables to highlight the findings. The presentation was sequentially done starting with the answer to the research questions and then the testing of hypotheses.

**Research Question 1:** What entrepreneurial skills are identified by chemistry teachers in the teaching of electrolysis and lead accumulator in chemistry of the senior secondary schools in Anambra state?

**Table 1: Frequencies and percentages on the entrepreneurial skills identified by chemistry teachers in the teaching of electrolysis and lead accumulator in chemistry of the senior secondary schools.**  
NB: NI below means NOT IDENTIFIED.

| S/N | Skills  | frequency | %    | Remark |
|-----|---|-----------|------|--------|
| 1   | Electroplating                                    | 28        | 43.8 | NI     |
| 2   | Purification of metals                            | 26        | 40.6 | NI     |
| 3   | Extraction of metals                              | 20        | 31.3 | NI     |
| 4   | Preparation of gases e.g $O_2, H_2, Cl_2$ .       | 14        | 21.9 | NI     |
| 5   | Preparation of important compounds e.g Na, Ca, Cu | 14        | 21.9 | NI     |
| 6   | Manufacturing of battery                          | 26        | 40.6 | NI     |
| 7   | Charging of battery                               | 26        | 40.6 | NI     |
| 8   | Patching of battery containers                    | 10        | 15.6 | NI     |
| 9   | Charging acids in batteries                       | 18        | 28.1 | NI     |
| 10  | Testing charged batteries                         | 22        | 34.4 | NI     |

Table 1 shows that with below 50% bench mark, none of the ten entrepreneurial skills embedded in the teaching of electrolysis and lead accumulator in chemistry of the senior secondary schools could be identified by majority of the teachers of chemistry in secondary schools.

**Research Question 2:** What entrepreneurial skills are identified by chemistry teachers in the teaching of

gases in chemistry of the senior secondary schools in Anambra state?

**Table 2: Frequencies and percentages on the entrepreneurial skills identified in the teaching of gases in chemistry of the senior secondary schools**

| S/N | Skills | frequency | % | Remark |
|-----|--------|-----------|---|--------|
|-----|--------|-----------|---|--------|



|    |   |    |      |    |
|----|---|----|------|----|
| 1  | Air condition   | 16 | 25.0 | NI |
| 2  | Filling a refrigerator with gas                         | 16 | 25.0 | NI |
| 3  | Storing liquid gases in cylinder                        | 24 | 37.5 | NI |
| 4  | Corking drink bottles under pressure                    | 26 | 40.6 | NI |
| 5  | Producing carbonate drinks                              | 26 | 40.6 | NI |
| 6  | producing of fire extinguisher                          | 38 | 59.4 | NI |
| 7  | production of rising agent in bakery                    | 16 | 25.0 | NI |
| 8  | preservation of fruits                                  | 28 | 43.8 | NI |
| 9  | producing of refrigerated food                          | 18 | 28.1 | NI |
| 10 | manufacturing of ammonia gas (NH <sub>3</sub> )         | 2  | 3.1  | NI |
| 11 | Preparation of HCl                                      | 28 | 43.8 | NI |
| 12 | Production of rocket fuel                               | 24 | 37.5 | NI |
| 13 | Production of oxy-hydrogen flame                        | 22 | 34.4 | NI |
| 14 | Filling balloon   | 20 | 31.4 | NI |
| 15 | Production of oxy-acetylene flame                       | 14 | 21.9 | NI |
| 16 | Production of oxy-coal                                  | 26 | 40.0 | NI |
| 17 | Production of liquid oxygen                             | 24 | 37.5 | NI |
| 18 | Production of beaching powder                           | 28 | 43.8 | NI |
| 19 | Production of photographic material                     | 0  | 0.0  | NI |
| 20 | Treatment of water                                      | 0  | 0.0  | NI |
| 21 | Refrigeration of food                                   | 46 | 71.9 | NI |
| 22 | Production of trioxonitrates (v)                        | 20 | 31.3 | NI |
| 23 | Production of ammonia                                   | 32 | 50.0 | NI |
| 24 | Production of fertilizer                                | 2  | 3.1  | NI |
| 25 | Production of food                                      | 0  | 0.0  | NI |
| 26 | Cooling agents  | 18 | 28.1 | NI |
| 27 | Production of trioxonitrate(v) acid (HNO <sub>3</sub> ) | 24 | 37.5 | NI |
| 28 | Production of fertilizer                                | 32 | 50   | NI |
| 29 | Production of liquid ammonia                            | 12 | 18.8 | NI |
| 30 | Production of stain remover in garments                 | 16 | 25.0 | NI |
| 31 | Carbon (iv) oxide (CO <sub>2</sub> )                    | 26 | 40.6 | NI |
| 32 | Preparation of hydrogen gas                             | 30 | 46.9 | NI |
| 33 | Production of oxygen gas(O <sub>2</sub> )               | 16 | 25.0 | NI |
| 34 | Production of chlorine gas (CL <sub>2</sub> )           | 26 | 40.6 | NI |
| 35 | Production of nitrogen gas(N <sub>2</sub> )             | 2  | 3.1  |    |

Table 2 indicates with 50% bench mark, only four out of the 35 entrepreneurial skills embedded in the teaching of gases in chemistry of the senior secondary schools could be identified by majority of the teachers of chemistry in secondary schools. Also three of them were not identified by any of the 64 teachers.

**Research Question 3:** What entrepreneurial skills are identified by chemistry teachers in the teaching of

acids and salts in chemistry of the senior secondary schools in Anambra state?

**Table 3: Frequencies and percentages on the entrepreneurial skills identified by chemistry teachers in the teaching of acids and salts in chemistry of the senior secondary schools**

| S/N | Skills   | frequency | %    | Remark |
|-----|--|-----------|------|--------|
| 1   | Production of trioxonitrate (v) acid (HNO <sub>3</sub> ) | 16        | 25.0 | NI     |
| 2   | Production of fertilizer                                 | 22        | 34.4 | NI     |



|    |   |    |      |    |
|----|---|----|------|----|
| 3  | Production of liquid  | 18 | 28.1 | NI |
| 4  | Production  | 40 | 62.5 | NI |
| 5  | Productions of fertilizers                                  | 2  | 3.1  | NI |
| 6  | Productions of exclusives                                   | 24 | 37.5 | NI |
| 7  | Refrigeration   | 30 | 46.9 | NI |
| 8  | Production of dyes  | 10 | 15.6 | NI |
| 9  | Production of chemical as Hc,H <sub>2</sub> SO <sub>4</sub> | 12 | 18.8 | NI |
| 10 | Production of acid- lead accumulator                        | 16 | 25.0 | NI |
| 11 | Productionof soap   | 20 | 31.3 | NI |
| 12 | Productions of detergents                                   | 42 | 65.6 | NI |
| 13 | Productions of cosmetics                                    | 12 | 18.8 | NI |
| 14 | Productionof antiseptic/germicide                           | 12 | 18.8 | NI |
| 15 | Softening hard water  | 20 | 31.3 | NI |
| 16 | Production of fertilizer/chemicals                          | 14 | 21.9 | NI |

Table 3 reveals that with bench mark of 50%, only two out of 16 entrepreneurial skills embedded in the teaching of acids and salts in chemistry of the senior secondary schools could be identified by majority of the teachers of chemistry in secondary schools.

**Research Question 4:** What entrepreneurial skills are identified by chemistry teachers in the teaching of

organic chemistry in chemistry of the senior secondary schools in Anambra state?

**Table 4: Frequencies and percentages on the entrepreneurial skills identified by chemistry teachers in the teaching of organic chemistry in chemistry of the senior secondary schools.**

| S/N | Skills                               | frequency | %    | Remark |
|-----|--------------------------------------|-----------|------|--------|
| 1   | Production of ink                    | 20        | 31.3 | NI     |
| 2   | Production of polish                 | 32        | 50.0 | NI     |
| 3   | Production of carbon paper           | 18        | 28.1 | NI     |
| 4   | Production of lubricant and solvents | 18        | 28.1 | NI     |
| 5   | Production of paraffin wax           | 14        | 21.9 | NI     |
| 6   | Production of alcohol                | 26        | 40.6 | NI     |
| 7   | Production of oxyacetylene fame      | 20        | 31.3 | NI     |
| 8   | Production of hunter's lamp          | 20        | 31.3 | NI     |
| 9   | Productions of bows, cup, etc.       | 28        | 43.8 | NI     |
| 10  | Production of methylated spirit      | 0         | 0.0  | NI     |
| 11  | Production of Alcoholic drink        | 24        | 37.5 | NI     |
| 12  | Production of sterilizer             | 28        | 43.8 | NI     |
| 13  | Production of fuel                   | 20        | 31.3 | NI     |
| 14  | Production of light                  | 16        | 25.0 | NI     |
| 15  | Production of margarine              | 12        | 18.8 | NI     |
| 16  | Production of soaps                  | 32        | 50.0 | NI     |
| 17  | Production of paint                  | 34        | 53.1 | NI     |
| 18  | Production of detergent              | 14        | 21.9 | NI     |
| 19  | Production of Food                   | 22        | 34.4 | NI     |
| 20  | Production of ethanol                | 6         | 9.4  | NI     |

Table 4 shows with 50% bench mark, only three out of the 20 entrepreneurial skills embedded in the teaching of organic chemistry in chemistry of the senior secondary schools could be identified by majority of

the teachers of chemistry in secondary schools. Also one of them was not identified by any of the 64 teachers.



**Research Question 5:** What entrepreneurial skills are identified by chemistry teachers in the teaching of carbonates in chemistry of the senior secondary schools in Anambra state?

**Table 5: Frequencies and percentages on the entrepreneurial skills identified by chemistry teachers in the teaching of carbonates in chemistry of the senior secondary schools**

| S/N | Skills                   | frequency | %    | Remark |
|-----|--------------------------|-----------|------|--------|
| 1   | Production of coal ta    | 32        | 50.0 | NI     |
| 2   | Production of coal gas   | 22        | 34.4 | NI     |
| 3   | Production of Fertilizer | 14        | 21.9 | NI     |
| 4   | Production of Chemical   | 22        | 34.4 | NI     |
| 5   | Production of Coal       | 2         | 3.1  | NI     |

Table 5 reveals that with bench mark of 50%, only one out of five entrepreneurial skills embedded in the teaching of carbonates in chemistry of the senior secondary schools could be identified by majority of the teachers of chemistry in secondary schools.

**Ho 1:** There is no significant difference in the entrepreneurial skills identified by teachers in the

teaching of electrolysis and lead accumulator in chemistry of the senior secondary schools in Anambra state based on school location

**Table 6: Chi square on the entrepreneurial skills identified by teachers in the teaching of electrolysis and lead accumulator in chemistry of the senior secondary schools based on school location**

| S/N | Skills   | Urban | Rural | Cal. $X^2$ | df | Crit. $X^2$ | Remark |
|-----|--|-------|-------|------------|----|-------------|--------|
| 1   | Electroplating                                       | 6     | 22    | 1.104      |    |             | NI     |
| 2   | Purification of metals                               | 10    | 16    | 2.314      |    |             | NI     |
| 3   | Extractions of metal                                 | 0     | 20    | 11.383     |    |             | NI     |
| 4   | Preparation of gases e.g $O_2$ , $H_2$ , $Cl_2$      | 2     | 12    | 1.698      |    |             | NI     |
| 5   | <b>Preparation of important compounds e.g Na, Ca</b> | 0     | 14    | 7.012      |    |             | NI     |
| 6   | Manufacturing of battery                             | 4     | 22    | 3.516      |    |             | NI     |
| 7   | Charging of battery                                  | 4     | 22    | 3.516      |    |             | NI     |
| 8   | Patching of battery containers                       | 2     | 8     | 0.387      |    |             | NI     |
| 9   | Changing acid in batteries                           | 4     | 14    | 0.432      |    |             | NI     |
| 10  | Testing charged battery                              | 0     | 22    | 13.118     |    |             | NI     |
|     | Total  | 32    | 172   | 44.48      | 9  | 14.68       | S      |

**Ho 2:** There is no significant difference in the entrepreneurial skills identified by chemistry teachers in the teaching of gases in chemistry of the senior secondary schools in Anambra state based on school location

**Table 7: Chi square on the entrepreneurial skills identified by chemistry teachers in the teaching of gases in chemistry of the senior secondary schools based on school location**

| S/N | Skills                               | Urban | Rural | Cal. $X^2$ | df | Crit. $X^2$ | Remark |
|-----|--------------------------------------|-------|-------|------------|----|-------------|--------|
| 1   | Air conditioning                     | 2     | 14    | 2.576      |    |             |        |
| 2   | Filling a refrigerator with gas      | 0     | 16    | 8.348      |    |             |        |
| 3   | Storing liquid gases in cylinder     | 4     | 20    | 2.494      |    |             |        |
| 4   | Corking drink bottles under pressure | 6     | 20    | 0.552      |    |             |        |
| 5   | Producing of carbonate drink         | 4     | 22    | 3.516      |    |             |        |
| 6   | Producing of fire extinguisher       | 6     | 32    | 7.041      |    |             |        |



|    |   |     |     |         |
|----|---|-----|-----|---------|
| 7  | Production of rising agent in bakery                          | 0   | 16  | 8.348   |
| 8  | Preservation of fruit   | 8   | 20  | 0.005   |
| 9  | Production of refrigerated food                               | 4   | 14  | 0.432   |
| 10 | <b>Manufacturing of ammonia gas (NH<sub>3</sub>)</b>          | 0   | 2   | 0.808   |
| 11 | Preparation of Hcl  | 10  | 18  | 1.418   |
| 12 | Production of rocket fuel                                     | 4   | 20  | 2.494   |
| 13 | <b>Production of oxy-hydrogen flame</b>                       | 4   | 18  | 1.640   |
| 14 | Filling ballon  | 0   | 14  | 11.383  |
| 15 | <b>Production of oxy-acetylene flame</b>                      | 0   | 14  | 7.012   |
| 16 | Production of oxy-coal  | 4   | 22  | 3.516   |
| 17 | Production of liquid oxygen                                   | 6   | 18  | 0.186   |
| 18 | Production of bleaching power                                 | 4   | 24  | 4.716   |
| 19 | <b>Production of photographic material</b>                    | 0   | 0   | 0.000   |
| 20 | Treatment of water  | 0   | 0   | 0.000   |
| 21 | Refrigeration of food   | 10  | 36  | 3.299   |
| 22 | <b>Production of trioxonitrate (V) acid (HNO<sub>3</sub>)</b> | 0   | 20  | 11.383  |
| 23 | Production of ammonia   | 6   | 26  | 2.783   |
| 24 | Production of fertilizer                                      | 0   | 2   | 0.808   |
| 25 | Production of food  | 0   | 0   | 0.000   |
| 26 | Cooling agent   | 2   | 16  | 3.586   |
| 27 | <b>Production of trioxonitrate (V) acid (HNO<sub>3</sub>)</b> | 4   | 20  | 2.494   |
| 28 | Production of fertilizer                                      | 10  | 22  | 0.309   |
| 29 | Production of liquid ammonia                                  | 0   | 12  | 5.779   |
| 30 | <b>Production of stain remover in garments</b>                | 0   | 16  | 8.348   |
| 31 | Carbon (IV) oxide (CO <sub>2</sub> )                          | 6   | 20  | 0.552   |
| 32 | Preparation of hydrogen gas (H <sub>2</sub> )                 | 4   | 26  | 6.112   |
| 33 | Production of oxygen gas (O <sub>2</sub> )                    | 2   | 14  | 2.576   |
| 34 | Production of chlorine gas (CL <sub>2</sub> )                 | 4   | 22  | 3.516   |
| 35 | Production of nitrogen gas (N <sub>2</sub> )                  | 0   | 2   | 0.808   |
|    | Total   | 144 | 584 | 118.858 |

**Ho3:** There is no significant difference in the entrepreneurial skills identified by chemistry teachers in the teaching of acids and salts in chemistry of the senior secondary schools in Anambra state based on school location

**Table 8:** Chi square on the entrepreneurial skills identified by chemistry teachers in the teaching of acids and salts in chemistry of the senior secondary schools based on school location

| S/N | Skills  | Urban | Rural | Cal. X <sup>2</sup> | df | Crit. X <sup>2</sup> | Remark |
|-----|---|-------|-------|---------------------|----|----------------------|--------|
| 1   | Production of trioxonitrate (v) acid(HNO <sub>3</sub> ) | 4     | 12    | 0.103               |    |                      |        |
| 2   | production of fertilizer                                | 4     | 18    | 1.640               |    |                      |        |



|    |  |    |     |        |    |       |   |
|----|--|----|-----|--------|----|-------|---|
| 3  | production of liquid ammonia                                   | 2  | 16  | 3.586  |    |       |   |
| 4  | <b>production of stain remover in garments</b>                 | 6  | 34  | 9.090  |    |       |   |
| 5  | production of fertilizer                                       | 0  | 2   | 0.808  |    |       |   |
| 6  | Production of explosive  | 8  | 16  | 0.515  |    |       |   |
| 7  | Refrigerator   | 4  | 26  | 6.116  |    |       |   |
| 8  | Production of dyes   | 0  | 10  | 4.638  |    |       |   |
| 9  | Production of chemicals:HCl/<br>H <sub>2</sub> SO <sub>4</sub> | 2  | 10  | 0.959  |    |       |   |
| 10 | Production of acid-lead accumulator                            | 0  | 16  | 8.348  |    |       |   |
| 11 | Production of soap   | 4  | 16  | 0.950  |    |       |   |
| 12 | Production of detergents                                       | 6  | 36  | 11.576 |    |       |   |
| 13 | Productionof cosmetics   | 6  | 6   | 3.496  |    |       |   |
| 14 | Production of antiseptic/germicide                             | 4  | 8   | 0.196  |    |       |   |
| 15 | Softening hard water   | 2  | 18  | 4.728  |    |       |   |
| 16 | Production of fertilizer/chemicals                             | 0  | 14  | 7.012  |    |       |   |
|    | Total  | 52 | 258 | 63.757 | 15 | 22.31 | S |

**Ho4:** There is no significant difference in the entrepreneurial skills identified by chemistry teachers in the teaching of organic chemistry in chemistry of the senior secondary schools in Anambra state based on school location

**Table 9: Chi square on the entrepreneurial skills identified by chemistry teachers in the teaching of organic chemistry in chemistry of the senior secondary schools based on school location**

| S/N | Skills  | Urban | Rural | Cal. X <sup>2</sup> | df | Crit. X <sup>2</sup> | Remark |
|-----|---|-------|-------|---------------------|----|----------------------|--------|
| 1   | Production of ink                             | 2     | 18    | 4.728               |    |                      |        |
| 2   | Production of polish                          | 10    | 22    | 0.309               |    |                      |        |
| 3   | Production of carbon paper                    | 2     | 16    | 3.586               |    |                      |        |
| 4   | <b>Production of lubricants and solvent</b>   | 2     | 16    | 3.586               |    |                      |        |
| 5   | Production of paraffin wax                    | 0     | 14    | 7.012               |    |                      |        |
| 6   | Productionof alcohol                          | 8     | 18    | 0.151               |    |                      |        |
| 7   | Production of oxyacetylene-flame              | 2     | 18    | 4.728               |    |                      |        |
| 8   | Production of hunter's lamp                   | 2     | 18    | 4.728               |    |                      |        |
| 9   | Productionof bowl, cups, e.t.c.               | 6     | 22    | 1.104               |    |                      |        |
| 10  | Production of methylated spirit (pure spirit) | 0     | 0     | 0.000               |    |                      |        |
| 11  | Production of alcoholic drink                 | 8     | 16    | 0.515               |    |                      |        |
| 12  | Production of sterilizer                      | 4     | 24    | 4.716               |    |                      |        |
| 13  | Productionof fuel                             | 0     | 20    | 11.383              |    |                      |        |
| 14  | Productionof light                            | 6     | 10    | 0.928               |    |                      |        |
| 15  | Production of margarine                       | 0     | 12    | 5.779               |    |                      |        |
| 16  | Productionof soap                             | 10    | 22    | 0.309               |    |                      |        |
| 17  | Productionof paint                            | 6     | 28    | 3.939               |    |                      |        |
| 18  | Production of detergent                       | 2     | 12    | 1.698               |    |                      |        |
| 19  | Productionof food                             | 0     | 22    | 13.118              |    |                      |        |
| 20  | Production of ethanol                         | 0     | 6     | 2.591               |    |                      |        |



|       |    |     |        |    |       |   |
|-------|----|-----|--------|----|-------|---|
| Total | 70 | 334 | 74.908 | 19 | 30.14 | S |
|-------|----|-----|--------|----|-------|---|

**Ho5:** There is no significant difference in the entrepreneurial skills identified by chemistry teachers in the teaching of carbon and its compounds in chemistry of the senior secondary schools in Anambra state based on school location

**Table 10: Chi Square on the entrepreneurial skills identified by chemistry teachers in the teaching of carbonates in chemistry of the senior secondary schools based on school location**

| S/N | Skills                   | Urban | Rural | Cal. X <sup>2</sup> | df | Crit. X <sup>2</sup> | Remark |
|-----|--------------------------|-------|-------|---------------------|----|----------------------|--------|
| 1   | Production of coal tar   | 8     | 24    | 0.309               |    |                      |        |
| 2   | Production of coal gas   | 6     | 16    | 0.012               |    |                      |        |
| 3   | Production of fertilizer | 4     | 10    | 0.002               |    |                      |        |
| 4   | Production of chemical   | 0     | 22    | 13.118              |    |                      |        |
| 5   | Production of coal       | 0     | 2     | 0.808               |    |                      |        |
|     | Total                    | 18    | 74    | 14.249              | 4  | 9.49                 | S      |

### Discussion

The identification of the entrepreneurial skills in selected chemistry topics as seen from tables 1-5 by teachers of chemistry in area of study is very low (8/78 or 10.3%). This is in agreement with Arokwu and Nwafor (2018) who found out in their study that the entrepreneurship education in Nigerian secondary school is at low level. Ogunleye (2007) said that the hallmark of an effective chemistry teacher is the knowledge and skills for selecting different strategies or mixing them in the classroom teaching of chemistry in order to develop entrepreneurship capabilities in students. Will this happen when the teachers are not aware of the entrepreneurial skills and hence identify the skills? No.

### Summary of the Findings

The inability of the chemistry teachers in the area of study to identify the entrepreneurial skills embedded in the chemistry topics they are teaching indicates that they are not aware that these skills are embedded in the topics. However, the findings contradict Ibezim (2016), Arokoyan and Obunwo (2014) and Okwukwe (2016). The study contradicts Okwukwe (2016) that secondary school education offers the opportunity for acquisition of entrepreneurial skills for self-reliance.

### Conclusion

Teachers in secondary schools in Anambra State are not aware of the entrepreneurial skills components in the Chemistry curriculum of senior secondary schools and therefore could not identify them. On the other hand, the result of the statistical test of the hypotheses in the tables showed that there is significant difference between the identification of the entrepreneurial skills

components based on location which means that the level of identification differs slightly in the urban and rural secondary schools.

### Educational implication of the study

The study has the following educational implications:

The result reveals that chemistry teachers in Anambra State could not identify the entrepreneurial skills components in the chemistry curriculum of senior secondary schools in Anambra State. This implies that most chemistry teachers are not aware of those entrepreneurship skills components as embedded in the chemistry topics in the senior secondary schools and therefore unable to identify them and also do not teach them

### Recommendations.

Based on the results of the findings and the implication of this research work, the following recommendations are made:

1. Ministry of Education should organize seminars, workshops and conference to orientate and re-orientate the chemistry teachers to create awareness and to instill the awareness in them about these entrepreneurial skills embedded in the chemistry topics;
2. Excursion to industries in the chemistry related entrepreneurial skills should be encouraged;
3. The curriculum planners should review the chemistry curriculum to ensure that these chemistry's related skills are spelt out and emphasized as topics and sub-topics;



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