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Original Research Article

Assessment of the Effectiveness of Practical Chemistry Concepts on Secondary School Students' Awareness and Interest of Entrepreneurship Skills in Kwara State, Nigeria

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Abstract: Entrepreneurship skills are veritable tool that can be used to assist students in confronting numerous problems and create wealth towards becoming self-reliant. Inability of chemistry student in understanding the basic scientific principle might contributed to little or no knowledge on how chemistry concepts could be translated into different materials and products inform of Entrepreneurship skill acquisition this might be one of the reason that contributed to unemployment which have a negative consequence on Nigeria economy. This study assess the effectiveness of practical chemistry concepts on students' achievement and entrepreneurship skills among secondary school in Kwara State. The three concepts used were saponification, cosmetology and colour pigmentation to determine the awareness, interest and learning achievement. The study is quasi-experimental and descriptive survey design type. The population consisted of (23, 984) SSII senior secondary chemistry students. The sample consist 110 of two intact classes. Two instruments were used for data collection chemistry student achievement test (CAT), Interest and awareness (IAQ) questionnaire. A pilot test was conducted for (20) non participants with the reliability co-efficient of (0.82) and (0.83) respectively. The research questions were answered using descriptive statistics while the hypothesis was tested using inferential statistics at 0.05. The results revealed that chemistry students have strong awareness, interest and have significant influenced on student achievement. From the result it was recommended that education stake holders must see how entrepreneurship should be part and core course and see how innovation could be introduce in the teaching of chemistry entrepreneurship skills acquisition.

Keywords: Unemployment, Education, Entrepreneurship, Chemistry.

INTRODUCTION

Nigeria today is observed and characterize with numerous challenges raging from insecurity, poverty, social crimes and unemployment all were recognize to play a significant threat to our national socioeconomic and political development. It is assumed that, the Nigeria government's inability to meet the socioeconomic need and aspirations of its citizen might be in result of the astronomical population growth to the apparent increasing in population. Since the nation's population may continue to be on the increase, there is need for the government to diversify its approaches to human capital development and tailor it towards job creation which might be a starting point for development. As rightly noted by, Alada, *et al.*, 2017; Adedo, *et al.*, (2022) that development of a nation and its citizen does not occur in a vacuum, but can be actualized through advancements in science and technology education.

This was rightly stated in Federal Republic of Nigeria FRN (2014) in National Policy on Education that education is an instrument for national development and also interaction of person and ideas at all aspect. Obi 2010; Adigun 2013; Taiwo and Onasnya (2024) remarked that training and re-retraining of the skills, attitudes and experience that will make one productive and self-reliance become crucial for national development. This suggests that the rate of unemployment in Nigeria can be mitigated if is well attended to by the concerned stakeholders. it is sad to note that the continuous ever increase in unemployment rate in Nigeria has assumed a daunting trajectory that might be the sole administrator of others challenges. This is based on the explicating report of the Nigeria Bureau of Statistics (NBS, 2021) that the soaring youth unemployment rate between years 2017 – 2021 is alarming.

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Table 1: Percentage of youth unemployment among some coutries of the world

South Africa	Nigeria	Greece	Spain	Sweden	Italy	Iran	Turkey	UK	Japan
61%	53%	29%	29%	29%	23%	22%	19%	19%	5.7%

(Source: Foundation for Investigative Journalism (2023)

In a way of achieving this a renewed policy direction in the education sector must be done since development of a nation has been seen depending solely on its advancement in education. Education is a vital instrument of development and a change in all human endeavours be it social, political, economic, scientific or technological and it is the only means by which a society fulfils its needs (Yahaya, 2023). This means that our education must be tailored toward given answer to demand and aspiration of its citizen through activities skills.

The aspect of laying emphasise on theoretical teaching is becoming unproductive this is because the reality have shown that our present education programme does not focus on developing students' skills in sciences, the scientific skills include observation, classification, measurement, prediction, controlling variables, interpretation, communication and drawing conclusion. Education is sees as the tools for integration of individuals effectively into a society so that the individual can achieve self-realization, promote unity and strive for social, economic, political, scientific, cultural, technological process and develop national consciousness this shows that any nation or country that produce better education for all will be able to meet the global competiveness (Adedo, Umar & Adesoji 2022).

Education objectives is spelt out what is needed to be acquired at specific time, outline what to be learned, dictate the type and nature of behaviours that learners should develop, encompassing cognitive, affective, and psychomotor aspects in the science curriculum and enlist the subject which includes Biology, Chemistry, Physics, Integrated Science, Technology, Computer Science, and Mathematics. These were referred to science education subjects. Opataye, 2012; Matazu & Isma'il, 2024; Omorongbe and Ewansiha, 2013; Adedo *et al.,* 2018 as well has Adedo and Olubunmi (2024) sees Science education as preparing for citizens and a process which can take place in different forms depending on the type that is needed at a particular time with the aim of instilling scientific and technology values in learner.

Nigerian tertiary institutions, in particular, have a critical role to play in the country's transformation by developing capacity and generating new knowledge that fosters creativity and innovation, thereby stimulating economic, technological, and social progress (Isma'il *et al.,* 2023; Rufai, 2011; Sabaand & Jimoh, 2018). However we cannot lose our sight for the fact that in any teaching-learning situation both the teacher, student and curriculum planner are the tree pivots of education system, thus institutions play a crucial role in helping individuals understand their functions, limitations, potentials, capabilities, fulfilment, and frustrations. As part of science subject chemistry might be in the best way to provide the appropriate skills needed.

It is therefore good news that an average individual with sufficient amount of chemistry or biochemistry background coupled with a sound idea with interest can become job creators rather than job seekers. It is notice that the awareness, interest and inability of the chemistry student in translating some of the chemistry concepts into products and materials as an innovation was not ascertain, Innovation ideals is to add to the existing knowledge by add more value and enhance effectiveness it is therefore a great concern that secondary school chemistry graduates came out of schools with mere certificates that are almost useless in most labour markets and industries making them to be job dependant.

Chemistry is one of the most important branches of science, which enables learners to understand what happens around them. It is a core subject for medical sciences, textile science, agricultural science, synthetic industry, printing technology, pharmacy, and chemical technology (Jegede, 2007) noted by Omoniyi and Ominowa (2019) recognized chemistry as a critical subject for scientific and technological advancement, emphasizing its role in individual and national development. Applying chemistry concepts in material production offers a pathway for developing scientific skills, engaging learners in cognitive processes that enhance understanding and performance. while Babalola & Umar (2023) see that chemistry encompasses a plethora of fundamental principle and concepts that possess far-reaching application in addressing mundane challenges, there by facilitating critical thinking, self-growth and societal development.

Professional chemists with training in entrepreneurship skills can initiate a commercialization of their innovative skills in chemistry to acquire great financial profits, become job creators and contribute positively to the national economy especially in global economic recession period through products production. The mismatched gap between chemistry education curriculums seem to be the entrepreneurship orientation and skill competencies. Kuratkos. 2005; Odiagbe and Otemuyiwa 2021; Taiwo and Onasanya 2024; Adedo and Olubunmi (2024) stated that entrepreneurship is a vision, change and creation, process that involves exploring idea generation, The call for the integration of entrepreneurship into chemistry education is termed chemistry entrepreneurship with the aims of producing chemists that can convert the understanding of chemistry

concepts knowledge into products and materials learning.

Accordingly, Federal Government of Nigeria (FGN, 2013) give that entrepreneurship education at the senior secondary education level is the teaching and learning at the post basic geared towards inculcating entrepreneurial skills in the learners towards becoming self-reliance. As such, an intending/potential chemistry entrepreneur is expected to have some entrepreneurial competencies skills. The interest and awareness on the innovation gain in chemistry concepts can be transcend into entrepreneurship by chemistry students were noticed but not utilize.

This is why the researcher aims to assess the effectiveness of practical chemistry concepts on secondary school students awareness and interest of entrepreneurship skills, this concepts include saponification concept (in soap making), textile production (tie and dye), and cosmetology production (pomade production). The objective is to ensure that, by the end of the study, each student might acquire one or two entrepreneurial skills that can enable them to be self-employed and contribute positively to the society.

Saponification is the process used in soap making, Soap is a cleaning surface active agent, According to Roman Legend Soap was discovered by washer women following a heavy down pour (rainfall) on MON SAP (MOUNT SOAP) which is an important sacrificial alter that was located on a mountain. The rain mixed with the remains of previous animal's sacrifices, wood ash and animals' fat at the base of the altar. Thus the 3 major substances require for soap formation/making soap accidentally come together. Yusuf (2012) Fat and alkali (of potassium or sodium carbonate and potassium/sodium carbonate searched from the wood ash) which usually called Lye that brings a chemical reaction which is called saponification.

Source: (Adedo and Sheu 2025). A section during saponification production of (Liquid soap) at Government Day School Ojagboro, Ilorin Kwara State

Textile is a process used in production of different clothes and its coloration with design on it (tie and dye). Dyeing is a process of imparting colour to a textile or materials through the dye (colour). This colour normally had been obtained from flowers, nuts, berries, vegetables, plants and animals. After dyeing of cloth, the dye can still be removed if you don't want it that process is called STRIPPING. This can be done using sodium hydrosulphite, hydrogen peroxide or sodium hypochlorite. In preparation of trying to impart colour on cloth the impurity can still be further removed through the process called KIER using dilute caustic soda solution or in other alkali, While the systematic way of using rope to tie in making design on the clothe is called TIE(Random 2011).

Source: (Adedo and Sheu 2024). A section during Kampala production at Government Day School Ojagboro, Ilorin Kwara State

Cosmetology is the process used in the production of different kind of creams that can be used for skin and hair treatment. Cosmetology was first know in 1926 from the word kosmetikos means beauty treatment and was later define as a skill or work of treating the skin, hair and nails, manicures//pedicures with or applying cosmetics, as in a beauty shop this is done through fermentation reaction with addition of oil and other chemistry materials.

Source: (Adedo and sheu 2024). A show case of cosmetology production at Government Day School Ojagboro, Ilorin Kwara State

Statement of the Problem

Lack of basic scientific knowledge by the chemistry student and inability to recognize the potential advantages of utilizing their acquired knowledge as an innovative in practical chemistry concepts by understanding the scientific phenomena and principles underlying the exploration of certain concepts into product and useful materials for essential household items as entrepreneurship skills this might have contributed to unemployment and have negative consequence on political and socio-economy wellbeing of the country. The astronomical increase in population, high demand in the yearnings and aspiration of people, and high drop out of secondary school leaver might also be part of challenges contributing as a threat to national economy. The primitive theoretical approach in teaching chemistry concepts might have contributed to inability of the student to understanding basic scientific phenomenon, principle and the ideal behind exploration in chemistry concept deriving as a contributory factors to unemployment, poverty and social crimes, It is assumed that the exploration of acquire knowledge of chemistry concepts can be utilized as a driving force to promote entrepreneurship skills thereby making an individuals to job creator not job seeker.

Objectives of the Study

The purpose of this study is to assess the effectiveness of practical chemistry concepts on secondary school students' awareness and interest of entrepreneurship skills in Kwara State, Nigeria. The specific objectives of the study is to:

1. assess the effectiveness of practical chemistry concepts on secondary school students' awareness of entrepreneurship skills in Kwara State
2. assess the effectiveness of practical chemistry concepts on secondary school students' interest of entrepreneurship skills in Kwara State

Research Questions

The following research questions were raised to guide the study:

1. What is the mean effectiveness of practical chemistry concepts on secondary school students' awareness of entrepreneurship skills in Kwara State?
2. What is the mean effectiveness of practical chemistry concepts on secondary school students' interest of entrepreneurship skills in Kwara State?

RESEARCH METHODOLOGY

This study adapted a pre-test, post-test, control group, quasi-experimental and descriptive research design of survey type. Three chemistry concepts were used which includes saponification concepts, tie & dye and cosmetology. The state have sixteen local government area divided into four senatorial zone, two zone was randomly selected and one local government each was selected from the two local government using random sampling, One school each was selected from the two local government, with two intact class. The population of the study consisted of all (SSII) chemistry students in public senior secondary school with a sample of (110) chemistry students. Students' Awareness and Interest of Entrepreneurship Skills Questionnaire (SAIESQ) was used in the study. The instrument was

validated by two experts in Science Education and Research, Measurement and Evaluation. A pilot test was conducted on 20 senior secondary school student who are not part of the study. Cronbach alpha method of reliability was used to determine the internal consistence of the instrument which generate a co-efficient of reliability of 0.82. The collected data were analysed using descriptive statistics of mean and standard deviation.

RESULTS

Research Question One: What is the mean effectiveness of practical chemistry concepts on secondary school students' awareness of entrepreneurship skills in Kwara State?

Table 1: Mean and standard deviation of the effectiveness of practical chemistry concepts on secondary school students' awareness of entrepreneurship skills

	N	Mean	Std. Deviation
Pre-test Awareness Group A	63	35.4762	9.03730
Post-test Awareness Group A	63	62.7460	13.24090
Pre-test Awareness Group B	47	35.0000	8.90652
Post-test Awareness Group B	47	40.0638	10.17868
N	110		

Table 1 showed that the post-test awareness mean scores of the experimental group A ($\bar{x}$ = 62.7460) and the Pre-test Awareness mean scores ($\bar{x}$ = 35.4762) indicating a shift in the awareness of group A. This showed that there is a great effectiveness of practical chemistry concepts on secondary school students' awareness of entrepreneurship skills in Kwara State.

Research Question Two: What is the mean effectiveness of practical chemistry concepts on secondary school students' interest of entrepreneurship skills in Kwara State?

Table 2: Mean and standard deviation of the effectiveness of practical chemistry concepts on secondary school students' interest of entrepreneurship skills

	N	Mean	Std. Deviation
Pre-test Interest Group A	63	36.5238	9.17972
Post-test Interest Group A	63	66.6190	14.17800
Pre-test Interest Group B	47	36.6596	9.20276
Post-test Interest Group B	47	40.4255	10.19762
N	110		

Table 2 showed that the post-test interest mean scores of the experimental group A ($\bar{x}$ = 66.6190) and the Pre-test interest mean scores ($\bar{x}$ = 36.5238) indicating a shift in the interest of group A. This showed that there is a great effectiveness of practical chemistry concepts on secondary school students' interest of entrepreneurship skills in Kwara State.

DISCUSSION OF FINDINGS

The finding revealed that in research questions 1 & 2 the result indicated that student have strong awareness and strong interest, this showed that when student exposed to practical concepts it will gives more awareness and interest of chemistry concepts to entrepreneurship skill acquisition. This is in line with Anderson (2007) learning science is a greater activity that brooding the understanding level it is the best when student involved in science practical experiment have a greater effectiveness on achievement. Rincy and Santhiyavalli (2019) view that having aware of entrepreneurship there is a significant association between respondents' inbuilt awareness towards entrepreneurship success and the various demographic factors such as gender, age, place of residence and stream of study plays a role. In other words, being aware of what type of activities and actions are involve in the process of becoming an entrepreneur is likely going to have an impact in terms of promoting entrepreneurship skills acquisition.

CONCLUSION

The study assess the effectiveness of practical chemistry concepts on secondary school students' awareness and interest of entrepreneurship skills in Kwara State, Nigeria. Based on the findings of the study, it was concluded that practical chemistry concepts has a great effectiveness on secondary school students' awareness and interest in entrepreneurship skills in Kwara State.

Recommendations

The following recommendations was made in the study:

1. Government and education stakeholders need to develop a comprehensive framework on how entrepreneurship skills acquisition will be part of core course in the school curriculum.

2. Chemistry teachers need to see how some practical chemistry concepts skills could be translated into entrepreneurship skills acquisition.
3. Chemistry entrepreneurship education course should be see beyond outside the classroom teaching.
4. Attention should be given to the training and retraining of chemistry teachers to be acquainted with some of the scientific concepts that can be translated into entrepreneurship skills acquisition in secondary schools' syllabus.
5. Secondary school curriculum should be made to recognize entrepreneurship towards a professional development of the teachers towards enrichment as a course offer,
6. The concern stakeholder in education to take responsibilities in the financing through assistance and grants to any students who have acquired entrepreneurship skills to start and set up a business after the completion of programme that would inevitably stimulate economy growth and reduce job dependence.

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