



EXPLORING STUDENTS' PERCEPTIONS ON INTEGRATION OF ENTREPRENEURIAL-MOTIVATED-APPROACH IN CONTEXTUAL TEACHING AND LEARNING OF SENIOR SECONDARY CHEMISTRY: A NOTE FOR EDUCATION STAKEHOLDERS

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Abstract

The approach to chemistry teaching in Nigeria senior secondary schools has continued to portray the subject as being abstract and esoteric giving room for students' difficulties in achievement and self-reliance. This study provides valuable insights for stakeholders involved in education, shedding light on the potential benefits and challenges associated with integrating Entrepreneurial-Motivated-Approach (EMA) in the contextual teaching and learning of chemistry at senior secondary school level. The study adopted an interpretative-ethnographic design using focus group. Purposeful sampling technique was adopted to select eight senior secondary II chemistry students drawn from two intact classes which form both the experimental and control groups in the two sampled senior secondary schools in Education District V, Lagos State. The experimental group was taught with EMA while the control group was taught with lecture method. Both groups were taught the same concepts for a period of six weeks. A Focus Group Discussion Protocol (FGDP) which was validated by the two experts in measurement and evaluation was used to collect data for the study. The audio recording of the FGD was made and the quotations from students were presented in textual descriptions arranged in themes. Findings revealed that EMA is effective in enhancing students' learning of chemistry concepts than the lecture method because it promotes better understanding of concepts and develops entrepreneurial self-reliance skills among learners. The study concluded that EMA is a viable tool for promoting students' learning and entrepreneurial skills for self-sustenance. The study recommended the adoption of Entrepreneurial-Motivated-Approach in the teaching of chemistry concepts to students at senior secondary schools and also the introduction of subject-based entrepreneurship across all subjects at all levels of education to enable learners acquire necessary skills for self-survival.

Keywords:

Chemistry, Entrepreneurial-Motivated Approach, contextual teaching and learning, stakeholders, students' perceptions.

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Introduction

Chemistry is a discipline that is too broad and constantly evolving to be limited by a single definition. From a perspective that lays a strong emphasis on the structure, characteristics, and transformations of substances and materials, chemistry can be understood. According to Helmentine (2017) and Bagley (2017) chemistry is the study of matter, its characteristics, how and why compounds interact with energy and how they combine or separate to generate new substances. Ezeliara (2009) stated that chemistry is the cornerstone of scientific literacy standing smack in the intersection of physics and biology, and the fact that chemistry acts as a bridge between nearly all other sciences and a wide range of other human endeavours is its true significance. For this reason, chemists frequently refer to chemistry as the “mother of all sciences” and the “core science.”

The aims and objectives of chemistry teaching in Nigeria senior secondary schools according to Federal Government of Nigeria through the instrumentality of the Nigerian Educational Research and Development Council are to:

- i. ease the transition from secondary to university level education via the application of scientific ideas and methods learned in chemistry
- ii. provide the students with basic knowledge in chemical concepts and principles, through efficient selection of content and sequencing.
- iii. show how chemistry relates to other subjects.
- iv. show how chemistry relates to industry, daily life, risks, and advantages in section.
- v. offer a course that is sufficient for students who are not going on to higher education while still serving as a reasonable basis for a post-secondary course. (Nigerian Educational Research and Development Council, NERDC, E-Curriculum, 2021).

The Nigerian senior secondary chemistry curriculum covers three classes; SS 1 to SS 3 and was developed around four themes which are: chemistry and industry, the chemical world, chemistry and environment and the chemistry of life. In selecting the contents, three major issues shaping the development of nation worldwide and the influence on the world of knowledge today were identified (James, 2016). These are globalization, information communication technology and entrepreneurship. The desire that Nigeria be identified with the contemporary development worldwide called for the organization of the contents of the curriculum around these four themes. In essence, the curriculum is packaged with content that leads to self-actualization by students. In addition, the curriculum's emphasis is on locally accessible resources and actual practice. This will help the students develop an inquiry-based mind-set. If the curriculum is executed properly, it will help students study chemistry and its many applications to the fullest extent possible.

The teaching of chemistry as a science subject therefore engages learners in discovering those conditions and factors that determine or cause the occurrence of a particular event using scientific methods of experimental and observation. According to Ababio (2016), chemistry involves doing experiments and learning how to record observations, make exact calculations, and draw logical inferences; these activities teach chemists' minds to lean toward scientific approaches. Abdu (2010) affirmed that chemistry is a course that touches the lives of the



citizenry through utilization of industrial products in agriculture, medicine, household cooking and cleansing materials, building, road constructions that could provide various job opportunities to the unemployed graduates.

In view of the above, Holsinger and Cowell (2000) recommended changing the focus of the curriculum in secondary schools from strictly academic to pre-vocational training in light of the aforementioned in order to place secondary education in a growing economy. They also emphasized that for the best positioning, planners and political leaders should aim to rationally integrate secondary schools into this matrix to prepare youths for full-time wage-sector jobs, as well as to improve the proficiencies of prospective university candidates and to support national development. Nwakaego and Kabiru (2015) in support of the above identified that the senior secondary Chemistry students in addition to acquiring teaching skills should be able to undertake the productions on commercial scale for self-reliance and self-employment. The focus here relies on acquisition of entrepreneurial skills in every aspect of chemical concepts that is industrially based for the benefit of school and society.

The contextual teaching and learning in senior secondary chemistry therefore should revolutionize the educational landscape by immersing theoretical concepts in real-world contexts. This approach transcends rote memorization, enabling students to grasp the relevance and applicability of chemical principles. By integrating everyday scenarios, experiments, and problem-solving exercises which do not only enhances comprehension but also nurtures critical thinking skills, the senior secondary chemistry becomes a dynamic platform where students actively engage with the subject, fostering a deeper understanding that extends beyond the classroom walls into practical, meaningful applications (Saibu, 2023). Thus, the synergy of entrepreneurship and chemistry education creates a dynamic fusion that transcends traditional academic boundaries. This convergence fosters an environment where scientific knowledge not only coexists but thrives alongside entrepreneurial principles. By intertwining these disciplines, students gain a unique blend of scientific acumen and business-oriented thinking (Saibu, 2023). This synergy empowers future chemists not just to understand the intricacies of chemical processes but also to envision and pursue innovative solutions, fostering a generation equipped to navigate the intersection of science and entrepreneurship.

According to Hilario (2017), Entrepreneurial-Motivated-Approach is a teaching and learning approach that aims at bringing together creative and innovative ideas coupled with managerial and organizational skills in order to combine people, money and resources to meet an identified need and create wealth for livelihood. Similarly, Dawson (2017) defined Entrepreneurial-Motivated-Approach as a project-based learning (PBL) strategy that enables students to identify issues in the real world and come up with solutions to them. In essence, learning occurs when students put in a lot of effort to research and answer to challenging but real questions, problems, or difficulties. In this context, an Entrepreneurial-Motivated-Approach is a strategy that enhances students' initiative-taking skills and desire to absorb novel academic subjects by involving them in real-world market-oriented concepts, all of which will result in improved academic performance.



Johansen (2014) emphasized that the introduction of entrepreneurial-based teaching aims to increase academic performance, to develop students' skills to study new subjects, and to educate them with some fundamental skills like practical market skills. Further, literature revealed that an entrepreneurially oriented approach might be a useful strategy for enhancing academic achievement and school motivation (Muhammed, 2019; Shazia et al., 2016; Muhammed, 2015). Consequently, Nanik and Wara (2016) stated that, when successfully implemented, the Chemo-Entrepreneurship teaching approach led to better students' achievement and improved life skills. Isa (2019) and Adediran et al. (2015) in similar studies argued that entrepreneurial education significantly affects students' ability to rely on themselves. More so, according to Distor (2018), integration of entrepreneurship education in all subject areas can help students develop the information, skills, and competence they need to succeed in school and in life.

Statement of Problem

The main objectives of teaching chemistry as a required subject for science students in senior secondary schools are to give the students the opportunity to advance their knowledge and expertise in chemical science and to focus their efforts in a way that will benefit them and society at large (Nwaleke & Okoli, 2019). Unfortunately, there is a disconnection between knowledge of students in school chemistry and their everyday experiences in the society.

Furthermore, it is quite obvious that the senior secondary chemistry curriculum is enriched with skills that could be acquired by students for life sustenance after graduation (Saibu, 2023). The teaching of chemistry in secondary schools is expected to produce students that are capable of being self-employed and employers of labours. Such students are expected to be independent, self-reliant and also have great passion for chemistry, but today the reverse is the case because the teaching of chemistry in secondary schools is devoid of regular hands-on practical activities in most classrooms; and majority of topics taught lack the necessary demonstrations (Oludipe, et al., 2022; Dike & Avwiri, 2020).

It therefore becomes imperative to encourage and emphasize the teaching of chemistry through activity-based approach in which Entrepreneurial-Motivated-Approach is one. It is based on this premise that this study investigated students' perceptions on potential benefits and barriers associated with integrating entrepreneurial-based approach in the contextual teaching and learning of chemistry at senior secondary school level.

Research Questions

The study answered the following research questions.

- i. How effective is the EMA in teaching of the chemical concepts?
- ii. Of what benefit(s) is the teaching approach to you developing your self-reliance skills?
- iii. What problem(s) did you faced when exposed to the strategy in teaching chemical concepts?
- iv. How do you think the teaching and learning of chemistry can be improved upon?



Methodology

This study adopted an interpretative-ethnographic design using focus group. A simple random sampling technique was adopted to select eight senior secondary II chemistry students (four each) from two intact classes which form both the experimental and control groups in the two purposively sampled senior secondary schools with similar characteristics in terms of chemistry teachers' qualifications, functional chemistry laboratories, students' population and location in Ojo Zone of Education District V, Lagos State. The experimental group was taught with EMA and while the control group was taught with lecture method. A Focus Group Discussion Protocol (FGDP) which was validated by the two experts in measurement and evaluation was used to collect data for the study. The FDGP contained the four questions on the perception of students' on integration of EMA in contextual teaching and learning of chemistry.

The students in experimental group were taught the concepts of chlorine and saponification using Entrepreneurial-Motivated-Approach which consisted of classroom activities (lecture discussion with integration of EMA and demonstration), laboratory activity, product-making activity (skills and competence in entrepreneurship), and presentation activity (group discussion on the output/product). The treatment packages contained six lessons which lasted for six weeks (three lessons for the concept of chlorine and three lessons for concept of saponification). In the classroom activities, the students were taught the two concepts of using lecture discussion integrated with EMA, demonstration and guided discovery methods to enable them understand the basic principles of the concepts vividly. This was followed by the students' laboratory practical production of bleach from the concept of chlorine and liquid soap from the concept saponification as entrepreneurship products. The group discussion on the output/products and presentation of the products were done by the students to provide opportunities for them to practice marketing skills and competence in entrepreneurship. However, the control group was taught the chlorine and saponification using the lecture method.

A single Focus Group Discussion involving eight chemistry students; four students from experimental group and four students from control group was conducted at the end of the lessons. This comprised a step-by-step discussion on the students' views about integration and impact of the teaching approaches and this was audio and tape recorded.

Results

The views and responses across groups; experimental group (EMA) and control group (CM) on the research questions raised were quoted and synthesized by identifying the emerging themes that are relevant to the study for interpretation and reporting of the key findings. The main themes arising from the discussion are: effectiveness of the teaching strategies used, benefits of the teaching strategy in developing self-reliance skills, problems faced by students when exposed to the strategy used in chemistry teaching and suggested ways to improve the teaching strategy. Triangulation was used to assure the credibility of the qualitative data acquired, and the Researchers double-checked it by giving it to a specialist in qualitative researches to make sure the interpretations contained the necessary themes pertinent to the



study. However, in this analysis students were represented by their *Pseudo Names* across the groups.

Theme 1: Effectiveness of the Teaching Strategy used

“Entrepreneurial teaching approach enhanced good understanding of chemistry concepts. The lesson is very interesting as it encouraged participatory and collaborative learning.” (Bolu, EMA group).

“Entrepreneurial strategy is very effective because it is practical oriented. It makes learning real (Mariam, EMA group).”

“The teaching strategy is very effective because it creates more awareness about the topic by relating chemistry to what the students use at home. (Dada, EMA group).”

“Entrepreneurial-Motivated-Approach enables learners to see the demand required for the production and what learners see the more chance of remembering (Olaide, EMA group).”

“The teaching strategy used is partially effective because the teacher enlightened learners on how to make bleach and soap but no production but it’s not practical oriented (James, CM group).”

“Though the teacher taught in same way as that of normal class using all his abilities but there is need to make the lesson more of learners-centred (Saheed, CM group).”

Finding 1

Entrepreneurial-Motivated-Approach is more effective in enhancing students’ learning of chemistry concepts than the conventional method because it promotes better understanding of concepts; it is practical oriented and make chemistry real; creates more awareness about the topic by relating chemistry to what the students use at home; and enhanced collaborative and participatory learning.

Theme 2: Benefits of the teaching strategy in developing chemistry students’ self-reliance skills

“The approach helps in developing entrepreneurial self-reliance skills among learners. It brings about self-industrialization and self-reliance where learners do not need to depend on anybody in future (Bolu, EMA group).”

“The strategy enhances small scale enterprise because an individual with this kind of production idea can venture into the business. It also helps develop the economy system of the country to become more sustainable (Olaide, EMA group).”

“Entrepreneurial-Motivated-Approach is interesting as it helps learners to know how to produce soap and bleach for individual and societal benefits. So, it brings about self-employment (Mariam, EMA group).”



“.....encourages learners to manage resources most especially their finance. It is an innovation in chemistry because instead of learners going to buy bleach and soap, they can produce it themselves for use. It also creates self-employment (Dada, EMA group).”

“..... only little knowledge about production was learnt so it is difficult to be self-reliance from it. There is need to learn more about it so that learners will be able to make bleach and soap for future (James, CM group).”

“..... learnt about making of soap theoretically. Practical activities for self-sustenance must be incorporated (Saheed, CM group).”

“I can produce my own liquid soap by getting the materials needed although it may not be perfectly made (Zainab, CM group).”

“The teaching has made me know and understand the materials required for producing bleach and liquid soap. Practical aspect is required (Deolu, CM group).”

Finding 2

Entrepreneurial-Motivated-Approach helps in developing entrepreneurial self-reliance skills among learners; encourages the growth of small-scale enterprise; helps learners to manage resources most especially their finance; and fosters economy sustainability.

Theme 3: Problems faced by students when exposed to the strategy

“..... the apparatuses/reagents required to make production possible are limited thereby resulting in limited production in a large quantity (Bolu, EMA group).”

“Non-conductive laboratory environment, limited laboratory space, inadequate laboratory equipment and needed infrastructures were major challenges (Dada, EMA group).”

“The theory was good but the practical aspect is a problem due to lack of apparatus to produce the soap and bleach (Mariam, EMA Group).”

“The materials in making soap and bleach are not available in school; the researcher provided it (Olaide, EMA group).”

“..... inability to use appropriate chemicals and identification of the chemicals that are used to produce the products was a problem (Saheed, CM group).”

“..... I cannot really identify the chemical used in each substance (Zainab, CM group).”

“Teaching was well taught but no apparatus for making soap like SLS, soda ash, soap and so on (James, CM group).”

“..... understand the saponification value was a major challenge (Deolu, CM group).”

**Finding 3**

Non conducive laboratory environment, limited laboratory space, inadequate laboratory equipment/reagents and needed infrastructures were major challenges students faced during practical activities.

Theme 4: Suggested ways to improve the teaching and learning of chemistry

“Need to provide enabling learning environment that will be much cooler for students to assimilate what they practise (Bolu, EMA group).”

“There is saying that all work and no play, make Jack a dull boy. The entrepreneurial practical makes learning to be fun for the students. Teacher should teach on how to apply concepts taught to daily life activities. This should be encouraged (Dada, EMA group).”

“Teacher should not only base his teaching on theory alone but also to perform regular experiments because seeing is believing and what you see, you won’t forget (Mariam, EMA group).”

“Teaching can be improved only when the process discussed be put into practical learning will be easier for students (James, CM group).”

“Laboratory with high capacity should be provided for experiment due to large class size and there is need to provide adequate equipment for entrepreneurial practical activities (Zainab, CM group).”

“..... the strategy can be improved by allowing students to identify the chemical used in making those products and by carrying out the practical (Deolu, CM group).”

“..... laboratory should be made standard and the environment conducive. This will make it easier to carryout practical (Saheed, CM group).”

Finding 4

There is need to provide conducive learning environment and provision of standard laboratory for practical activities; teacher should teach on how to apply concepts taught to daily life activities; laboratory with high capacity should be provided for experiment due to large class size; need to provide adequate equipment for entrepreneurial practical activities; and teacher should not only base his teaching on theory alone but also perform regular experiments.

Discussion of Findings

Findings from the Focus Group Discussion revealed that a majority of students believed that Entrepreneurial-Motivated-Approach is more effective in enhancing students’ learning of chemistry concepts than the conventional method because it promotes better understanding of concepts; it is practical oriented and make chemistry real; creates more awareness about the topic by relating chemistry to what the students use at home; and enhanced collaborative and participatory learning (Findings 1). In agreement with this, Koehler (2013) emphasized that



entrepreneurial method created an innovative learning domain in science lessons. Similarly, Ezeudu et al. (2013) stressed that the importance of entrepreneurship was understood better when it was applied to chemistry lessons. Mainier et al. (2014) concluded that the experiment with bleach makes a bridge connection between the everyday world and the teaching of chemical properties and chemical reactions. Nzewi (2020) contended that collaborative learning environments and active student participation improve student learning. Nzewi also emphasized that such an environment should be free from boredom or filled excitement.

Furthermore, students believed that Entrepreneurial-Motivated-Approach is major derive in developing self-reliance skills among learners encourages the growth of small-scale enterprise; helps learners to manage resource most especially their finance; and fosters economy sustainability (Findings 2). Uwaleke and Okoli (2019) corroborate the above in their finding that the use of laboratory approach enhances students' acquisition of production skills in bleach making. Kareem et al. (2015) result also concluded that entrepreneurship education has positive impact on self-reliance. In support of the view of the students, Aja-Okorie and Adali (2013) in their research on achieving youth empowerment through repositioning entrepreneurial education in Nigerian Universities said that people exposed to entrepreneurship frequently express that they have more opportunity to exercise creative freedom, higher self-esteem and an overall greater sense of control over their own lives.

Students further believed that there are constraints facing the teaching and learning of chemistry education in secondary schools. These include inadequate workshop and laboratories equipment/apparatus/reagents, overcrowded classrooms, students' poor attitude to learning, poor funding from government, inadequate power supply, and inadequate qualified teachers in the areas among others (Findings 3). In support of this, Ogunmade and Saibu (2017) asserted that a number of elements can affect students' understanding of chemistry, such as teachers' lack of laboratory equipment or inadequate subject knowledge, ineffective teaching strategies, poor students' attitudes toward chemistry, an unfavourable learning environment, and dominant socio-cultural influences. In addition, Owolabi et al. (2013) findings revealed that there is non-availability of resource materials in teaching science and the few materials available were not sufficiently utilized. Likewise, Adesoji and Oginni (2012) identified student's aptitude indices viz background in science, poor mathematical ability and poor practical skills as major challenges.

The students therefore advocated the need to provide enabling learning environment and provision of standard laboratory for practical activities (Findings 4.4). Chemistry teachers should teach students on how to apply concepts taught in classroom to daily life activities; laboratory with high capacity should be provided for experiment due to large class size; need to provide adequate equipment for entrepreneurial practical activities; and teacher should not only base his/her teaching on theory alone but also perform experiment because seeing is believing and what you see, you won't forget.



Conclusion and Recommendations

The study concluded that the integration of an Entrepreneurial-Motivated-Approach in the contextual teaching and learning of senior secondary chemistry yields a myriad of positive impacts. Students emerge not only with a profound understanding of chemical principles but also equipped with the invaluable skills of innovation, critical thinking, and practical application. This innovative approach fosters a learning environment that mirrors the complexities of the real world, preparing students for the challenges and opportunities they will encounter in future academic pursuits and professional endeavors. Ultimately, the positive impact of this integration extends beyond the classroom, empowering a new generation of scientifically literate and entrepreneurially-minded individuals poised to make meaningful contributions to both scientific and business domains. However, the study emphasized that there are some challenges inherent in chemistry teaching using this approach. Thus, the study recommended the:

1. Adoption of Entrepreneurial-Motivated-Approach in the teaching of chemistry concepts to students at senior secondary schools.
2. Introduction of subject-based entrepreneurship across all subjects at all levels of education to enable learners acquire necessary skills for self-survival.
3. Provision of conducive learning environment and standard laboratory for students' practical activities.
4. Teaching of application of concepts taught in class to daily life activities of the learners.



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