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Science Teachers Strategies for Developing Entrepreneurial Skills through Teaching and Learning of Science in Higher Institutions in Nigeria

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Abstract: This research took a descriptive survey approach which investigated science teachers' strategies for developing entrepreneurial skills through teaching and learning of sciences in higher institution in Nigeria. The research was conducted in Ebonyi state, Nigeria. The population consisted of all the science lecturers in the four (4) federal higher institutions in Ebonyi state. Stratified sampling method was used to select 15 science lecturers in various science departments making the total sample to be 60 science lecturers, while each school served as strata. Four (4) research questions and two hypotheses guided the study, while 20 itemed questionnaire structured by the researchers served as instrument for data collection. The instrument was subjected to validation and an internal consistency was calculated using Cronbach Alpha with value to be 0.84. The research questions were answered using mean and standard deviation while research hypotheses were treated using Z- test at p<0.05. Results indicated that most science teachers in the higher institutions in Ebonyi State had the knowledge and competency necessary for developing skills for entrepreneurship among students in higher institutions of learning with item mean to 3.66 as against 2.5 which serves as the cut off mark. The result also x-rayed that lack of science equipment and materials are the major factors militating against skills acquisitions and development among science students in the higher institutions of learning. The hypotheses value 2.30 and 2.14 which is greater than the critical value of >=1.96 showed that the null hypotheses of no significant influence of science teachers teaching strategies on science students skill acquisition and no significant influence of infrastructural facilities in skill acquisition were reject and alternate accepted. Based on the findings, recommendations were made, which included that modern facilities should be provided in the classrooms and laboratory to enhance hands-on learning amongst science students. This will help in skills acquisition and development thus fostering entrepreneurship.

Keywords: *Entrepreneur, Skills, Science & Student.*

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I. INTRODUCTION

Science teaching has to do with impacting scientific knowledge to students. Okoli (2018) explained that this scientific knowledge is derived from observation, study and experimentation carried out in order to determine the nature or principle of what is being studied. Attamah (2023) in the same view updated that scientific knowledge is accumulated through observation, collection and analysis of data and this knowledge allows us to develop new technology, solve practical problems and make informed decisions.

An entrepreneur is one who undertakes the risk of organizing and managing a business. The entrepreneur looks inward into their environment to identify problems confronting people(or business opportunities) and introduces new products and services for the purpose of making profit (Ugwoke and Abidde, 2014). Moemeke (2013) stated that an entrepreneur is, therefore, not only an innovator but also a lifelong learner, a creative person, an initiator, and a potential industrialist. Thus, the destiny of nations lies with the entrepreneurs since they shape, actualize, and bring the developmental dreams and economy of any nationto reality.

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In the view of Akinbode (2009), entrepreneurship education produces graduates with sufficient training to make them creative and innovative in identifying new business opportunities and provide graduates with training in risk management to alleviate and minimize uncertainty. In agreement with the above assertion, Ikeme and Onu (2006) stated that entrepreneurship education provides the graduate with adequate training that will enable them to be creative and innovative. The importance of entrepreneurship development to the economy has been the subject of increased attention in Nigeria and the world-over in recent years. Gibson (2011) defined entrepreneurship as the process of using private initiative to transform a business concept into a new venture or to grow and diversify an existing venture or enterprise with a great potential. Entrepreneurship is viewed as the engine driving the economy of any nation by generating new businesses, fresh industrialists and employment. Agbionu (2008) opined that entrepreneurship involves a process aimed at creating wealth for the purpose of individual wellbeing and development of society at large. Innovative and entrepreneurial skill acquisition in Nigeria entails focusing on what should be done to bridge the gap between the school and labor market, where the learner will work after graduation, so as to be self-reliant in the society.

Science teaching provides an avenue that trains an individual to develop competent skills to become productive by engaging them in minds-on and hands-on exercise during practical and theoretical classes (Attamah 2023). According to Blenker, Dreisler, Faegemann & Kjeldsen (2008), competencies are the knowledge, skills and behaviour that will enable an employee to meet established performance criteria. In the light of the above statement, a student possesses competency if he or she has the combination of observable and measurable knowledge, skills, abilities and personal attributes that contribute to enhanced student's academic performance and ultimately result in the achievement of educational goals.

In view of the foregoing, this study seeks to investigate the strategies that should be used by science teachers to foster the development of entrepreneurial skills and competencies on science education students in higher institutions to enable them secure employment in or be self-employed on graduation in Ebonyi state, Nigeria.

Science educators need to produce graduates who are well equipped with the necessary skills and competencies for creativity, innovation and self-reliance. However, it has continued to bother the minds of Science education lecturers that in this 21st century, the society still witnesses a mismatch between the training students received and the activities educators expected them to perform. In view of the foregoing, this study seeks to investigate the strategies used by science teachers in the higher institutions to foster entrepreneurial skills among science education students to enable them to secure employment in modern organizations or be self-employed on graduation.

It does appear that despite the clamor for self-reliance and job creation in Nigeria,the curriculum of science education in the country seem not to given enough attention to quality, relevance, and functionality of students after graduation. This is evident in students that have graduated from the universities that are unable to secure employment and are not yet self-reliant (Double Gist, 2017).

Indeed for a long time now, there has been a soaring of unemployment especially among university graduates in Nigeria. Every year many Nigerian graduates are churned out of universities without a corresponding ready labor market to absorb them. In 2009, it was 11.85, 19.7% in 2010, 21.1% in 2011 and 23.9% in 2012; …and in 2021, 35%, (NBS, 2022). The inability of youths to secure gainful employment often leads to a feeling of inadequacy which makes them vulnerable to social ills and high crime rates. These scenarios can be observed in Ebonyi state.

Consequently, there is the need to investigate the teaching strategies used by science teachers in higher institution to foster entrepreneurial skills , and also understand the extent to entrepreneurial skills are imparted to science education students for job creation.. Specifically, the study is designed to identity the innovative and entrepreneurial skills needed in science education for job creation, the teaching strategies required for the acquisition of the innovative, and entrepreneurial skills and the factors that militate against the acquisition of entrepreneurial skills for science education students for job creation in Ebonyi state , Nigeria.

➢ *Research Questions:*

To guide this study, the following research questions were proposed:

- What are the entrepreneurial skills needed by higher institution science students for self-reliance\establishment?
- What teaching strategies/ competence are required by science teachers to foster the acquisition of innovative and entrepreneurial skills by science students in higher institutions in Ebonyi state, Nigeria?
- What are the technological and infrastructural facilities necessary for fostering the acquisition of entrepreneurial skills for self-reliance among sciences students in higher institutions in Ebonyi state, Nigeria?
- What are the teaching strategies necessary for fostering the acquisition of entrepreneurial skills for self-reliance among science students in higher institutions in Ebonyi state, Nigeria?

➢ *Hypotheses:*

The following hypotheses were put forward to guide this study:

- There is no significant influence of infrastructural facilities on entrepreneurial skills acquisition by science students in higher institution in Ebonyi state, Nigeria.

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- Science teachers teaching strategies have no significant influence on acquisition of entrepreneurial skills by science students in higher institutions in Ebonyi state, Nigeria.

II. RESEARCH METHODOLOGY

This study adopted descriptive survey research design. The population of the study comprised of all science lecturers in federal higher institutions in Ebonyi state, Nigeria. The total sampling for the study was 60 science teachers randomly selected from the schools, while each of the school served as a stratum. A structured questionnaire was the major instrument for data collection with reliability coefficient of 0.89. The instrument was structured to elicit information on the degree of agreement and disagreement with the item statement based on the a four point likert scale of Strongly Agree (SA)=4, Agreed (A)=3, Disagree (D)=2 and Strongly Disagree (SD)=1. A face to face method of administration was used by the researchers to ensure a hundred percent (100%) return. Mean and standard deviation was used to answer the research question with agreement level to be 2.50 while below indicated disagreement, while Z-test was used to test the hypotheses at $p<0.05$.

III. RESULTS

The findings of this research work were presented in tables according to research questions and hypotheses.

Table 1 Mean Rating and Standard Deviation of Entrepreneurial Skills Needed by Higher Institution Science Students for Self-Reliance / Establishment.

S/N	Items on entrepreneurial skills needed by Science students for self-reliance/ establishment	Mean $\overline{X}$	Standard Deviation SD	Decision
1	A good observational skill is an important skill for science students.	3.62	1.23	Agree
2	Ability to perform hands-on exercises is necessary for science students.	3.45	0.94	Agree
3	Science students' ability to understand science process skills.	4.12	0.84	Agree
4	Ability to perform minds on exercises by Science students	4.02	0.60	Agree
5	Ability to demonstrate simple science practical is necessary.	3.81	1.20	Agree
	Grand mean	**3.80**		

The result from table 1 showed that, the respondents agreed these skills are important for entrepreneurship and self-reliance by science students with high means above 2.50 and grand mean of 3.8 which indicated strongly agree.

Table 2 Mean Rating and Standard Deviation on Competencies Possess by The Science Teachers for Developing Entrepreneurial Skills in Higher Institution Science Students

S/N	Items on Competencies possess by Science teachers as strategies for developing entrepreneurial skills	Mean $\overline{X}$	Standard Deviation SD	Decision
1	Science teachers possess the required subject matter competencies	3.62	1.23	Agree
2	Science teachers possess professional pedagogical competences	3.45	0.94	Agree
3	Science teachers possess the science process skills	4.12	0.84	Agree
4	Science teachers possess interpreting data skill	3.92	0.60	Agree
5	Science teachers are in good friendly relations with students	3.21	1.20	Agree
	Grand mean	**3.66**		

Results in table 2 reveled that most science teachers possess the necessary competencies needed to foster entrepreneurial skills in science students in Ebonyi State Nigeria with all the mean above 2.50 and grand mean of 3.66.

Table 3 Means Scores and Standard Deviation of Availability of Technological and Infrastructural Facilities for Developing Entrepreneurial Skills Among Higher Institution Science Students.

S/N	Items on availability of technological and infrastructural facilities for developing entrepreneurial skills	Mean $\overline{X}$	Standard Deviation SD	Decision
1	Well-equipped science laboratories (physics, chemistry & biology) present	2.30	0.95	Disagreed
2	livestock farms and zoological centers	1.34	0.96	Disagreed
3	Meteorological center available	2.23	1.05	Disagreed
4	Computers with internet connectivity available in the school	2.50	1.21	Agreed
5	There is well equipped instrumentation laboratory	2. 21	1.14	Disagreed
	Grand mean	**2.17**		

Results from table 3 indicated that most technological infrastructural facilities necessary for developing entrepreneurial skills amongst science students in higher institutions are not available with mean falling below the decision mark of 2.50. Only computers with internet facility indicated slightly available with mean 2.50.

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Table 4 Mean Rating Scores and Standard Deviation of the Strategies Adopted by Science Teachers to Ensure Effective Entrepreneurial Skills Development by Science Students

S/N	Items on Strategies Adopted to ensure Effective Entrepreneurial Skills Biology	Mean	Standard Deviation SD	Decision
1	Use of inquiry approach in teaching and learning of science	3.89	1:23	Agree
2	Use of guided discovery technique	3.66	1.16	Agree
3	Use of field/excursion teaching Strategies	3.42	1.08	Agree
4	Use of demonstration methods	4.15	1:09	Agree
5	Use of practical methods	4.04	1:05	Agree
	Grand mean	**3.78**		

Results from table 4 showed all the respondents agreed that above teaching strategies fosters skills acquisitions amongst science students with all their means above 2.50.

➢ *Hypothesis 1:*

There is no significant influence of infrastructural facilities on acquisition of entrepreneurial skills by science students in higher institution in Ebonyi state, Nigeria.

Table 5 The Z- Test Table Showing the Influence of Infrastructural Facilities on Skills Acquisition

Different mean X Variation)	N	SD	z-cal	z-crit	P<0.05
2.30		0.95			
1.34 2.23 2.50 2.42	60	0.96 1.05 1.21 1.14	2.03	1.96	Significance

The result from the z-test indicated that the calculated z-score of 2.03 is higher than the critical value of 1.96, thus the null hypothesis was rejected, and consequently the alternate hypothesis stands. This implies that infrastructural facilities influences science student's entrepreneurial skill acquisition.

➢ *Hypothesis 2:*

There is no significant influence of teachers teaching strategies on acquisition of entrepreneurial skills by science students in higher institution in Ebonyi state, Nigeria.

Table 6 The Z- Test Table Showing the Influence of Teachers Teaching Strategies on Entrepreneurial Skills Acquisition by Science Students.

Different mean X Variation)	N	SD	z-cal	z-crit	P<0.05
3.89		1.23			
3.66 3.42 4.15 4.04	60	1.16 1.08 1.09 1.05	2.07	1.96	Significance

From table 6 results showed that z-cal is bigger than the z critical thus the null hypothesis is rejected and the alternate stands. This indicates that science teachers teaching strategies influences their students entrepreneurial skills acquisition in higher institution in Ebonyi state, Nigeria.

IV. DISCUSSION

From the study, the respondents agreed that all the skills listed are needed by science students to foster entrepreneurship and self-reliance with, students ability to understand science process skills taking the lead having a mean 4.12. This showed that almost all the respondent agreed the item is necessary foe entrepreneurial skill development amongst science students. Understanding science process skill is a very important step in technological development of an individual (Attamah 2014). Students can practice science only when they are able to understand the process. The study also revealed that there are certain competencies required by science teachers to be able to foster entrepreneurial skills among higher institution science students. The respondents agreed with all the items selected by having mean scores of above 2.5 with science teachers possession of science process skills having the highest mean of 4.12 which indicated strongly agree. This study agreed with Onwuachu and Okoye (2014) in their study Biology teachers strategies for developing entrepreneurial skills through teaching and learning of Biology in secondary school. This study also agreed with Attamah et.al (2020) who stated that teachers attitude greatly influence students' academic output/ achievement. When a teacher has the right attitude and qualities, it in no small measures influences the students learning abilities positively. From the study it was seen that the right teaching strategies fosters science students to acquire entrepreneurial skills for self-reliance and development after their school days. Onwuachu and Okoye

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(2014) stated in line with this result that acquisition of entrepreneurial skills is an open door for individuals and also for national development. Akpomi (2008) concurred by saying that if students acquires the right skills, attitude and knowledge, they will on leaving the school be self-employed and also be employers of labour. Also from the study, it was revealed that technological facilities significantly influenced entrepreneurial skill acquisition in higher institution students in Ebonyi state, Nigeria. The result goes in consonance with Attamah (2024) who stated that utilization of teaching facilities helps students to develop critical and creative thinking as they engage in minds-on and hands-on exercises during science lessons. Bathsheba (2020) in the same line of argument is of the opinion that availability and utilization of teaching learning facilities is very useful in science teaching because it helps in explaining abstract science concept and also makes science students " to do" science instead of just learning science.

V. CONCLUSION

The Nigeria of today is faced with a lot of youth/ graduate unemployment as seen in many graduate rooming the street looking for white collar job and other engage in many social vices. This challenges has affected the economic growth o he country adversely. This present day the urgent need to focus on entrepreneurial skill acquisition for our students in the higher institutions is the key for challenging the global economy for sustainable development. Teachers' teachings strategies and competencies influenced entrepreneurial skill acquisition amongst science students in higher institution of Ebonyi State. Also technological facilities play a good role in fostering entrepreneurial skill acquisition in higher institution science students of Ebonyi State. This will go a long way in improving the economic growth of the individual and the country at large; also help to curb social vices among youths.

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