International Journal of Science and Technology (STECH)
Bahir Dar- Ethiopia

Vol. 5 (1), S/No11, February, 2016: 66-78
ISSN: 2225-8590 (Print) ISSN 2227-5452 (Online)
DOI: http://dx.doi.org/10.4314/stech.v5i1.7

Developing Entrepreneurial Skills in Female Pre-Service Chemistry Educators through Science Education: A Path to Women Empowerment in Nigeria

Igboegwu, Ekene Nonyem
Department of Chemistry,
Nwafor Orizu College of Education, Nsugbe
Phone: +2348064552325
E-mail:igboegwuekene@gmail.com

Abstract

The study investigated the development of entrepreneurial skills in female pre-service chemistry educators of south-east colleges of education in Nigeria through science education. This study involved only the south east colleges of education. The study employed a descriptive survey design. Simple random sampling by balloting with replacement was used to select 90 final year degree and NCE female pre-service chemistry educators drawn from three South East colleges of education involved in degree programmes. The instrument for data collections was a 41-item structured questionnaire developed by the researchers. The instrument was validated and an internal consistency was calculated using Cronbach alpha and found to be 0.88. Three research questions and two hypotheses guided the study. Data were analyzed using mean and standard deviation to answer the research questions while z-test was used to test the null hypotheses at 0.05 alpha level. The result from the study showed that female pre-service chemistry educators in southeast colleges of education were not

exposed to entrepreneurial skills in science education; poor funding, inadequate science laboratories, lack of materials and equipment were among the hindrances in the acquisition of entrepreneurial skills in science education programmes. Strategies to empower the female pre-service chemistry educators' acquisition of entrepreneurial skills in science education programmes so as to eradicate poverty and improve national development by being self-reliant were suggested. Based on the findings, recommendations were made which include among others that: entrepreneurial skills should be incorporated into science education curricular and also fund should be provided to the colleges of education by the government to procure facilities and materials for teaching entrepreneurial skills incorporated into science education programmes.

Introduction

Every nation of the world is endowed with one natural resources or the other, such as, water and human resources. The contribution of these to the national growth and development depends on the training received by the human resources to put the other resources into effective use, and also on the abundance of technical potential that is based on scientific advances.

Attainment of scientific and technological advancement is dependent on the science education of all citizens. Science education is expected to produce men and women of quality equipped with appropriate knowledge, useful talents, high technical skills groomed with practical dexterity to use their hands, heads and minds to introduce and operate new productive processes for employment generation and self-reliance. According to Ifeakor (2005) science education as integral to successful living must bequeath the young generation life coping skills to be effective citizens.

However, Nigerian science education is said to have failed in the discharge of this duty as graduates of the system are seen roaming the streets with no jobs and the skills to start their own business (Ezeudu, 2008). Thus, the goal of producing highly competent, and productive oriented scientists had remain elusive; the school leavers have therefore remain unproductive. What can be questioned is the proportion of the populace that participate in science education and consequently the number that pursue science education related enterprise.

Several studies (Njoku, 2001; Aguele and Agwagah, 2009) have shown that women are grossly under-represented in science careers. In most societies, especially in developing countries, women and girls are discriminated against in terms of access to life transforming opportunities as education; income generating assets as land, credit facilities and enterprise development. Even few women and girls who managed to acquire education are discriminated against in employment opportunities. Consequently, women and girls are underrepresented in almost all sectors of development, despite the fact that they constitute more than half of the world's

population (NPE revised 2013). According to Okeke (2001) in Igboegwu, Ikokwu and Egbutu (2013) the United Nation summarized the marginalization of the girl-child in particular, and women in general with the following words.

- Women perform two thirds of the world's work
- Women earn one tenth of the world's income
- Women are two thirds of the world's illiterates.
- Women own less than one hundred of the world's property.

The issue of empowering women and girls through access to good quality education is often at the centre of developmental discourse. Since education remaining the most viable avenue for empowerment, women and girls are being sensitized and encouraged to embrace education so as to liberate themselves from poverty, hunger and ignorance. One method of alleviating poverty is through acquisition of entrepreneurial skill and by so doing become an entrepreneur.

An entrepreneur is one who organizes, operates and assumes the risk in a business venture in expectation of making profit. Entrepreneurship is the act of exercising entrepreneurial skills. For one to acquire these entrepreneurial skills he/she must possess entrepreneurial competencies. These include; a combination of motivation, vision with judgment determination, optimism, courage, endurance, communication and the power of creating cooperation which finds market opportunities (Ezeudu, 2008).

Entrepreneurial skills therefore, involves skills in setting up small business ventures such as making of body creams, production of soaps, dyes, insectides, herbicides, pesticides, sewing institute, shops, animal farms and so on, such small business ventures when properly managed yield profit which will help alleviate poverty.

Science education equip those who acquire it with relevant knowledge and skills to enable them make useful living as well as become useful members of the society in which they live, inorderwords, science education help in the development of entrepreneurial skills. Science education students therefore, choose their course of study from any of the following: physics education, chemistry education, biology education, mathematics education, basic science education, computer science education physical and health education. Students are expected to choose from any of these subject options and for the purpose of this study, only chemistry education students are used. There is need to find out if entrepreneurial skills are developed at the completion of their programme. Entrepreneurship education for the female is important, so that in the place of increasing unemployment, the young female graduates from the education system can fall back on the entrepreneurial skills acquired while in school. In this way, they become self-reliant, thereby, contributing to the national

development, instead of roaming the streets endlessly in search of non-existing jobs. It is against this background that this paper addresses the issue of acquisition of entrepreneurial skills through science education in south-east colleges of education by female pre-service chemistry educators for the attainment of national development.

This study was conducted to:

1. Ascertain whether female pre-service chemistry educators in south-east colleges of education in Nigeria are exposed to entrepreneurial skills.
2. Identify the hindrances to acquisition of entrepreneurial skills by female pre-service chemistry educators in south-east colleges of education.
3. Suggest strategies for enhancing female acquisition of entrepreneurial skills through science education in South-east colleges of education in Nigeria.

Research Questions

1. What entrepreneurial skills are female Degree and NCE pre-service chemistry educators in south-east colleges of education in Nigeria exposed to through science education programmes?
2. What are the hindrances to acquisition of entrepreneurial skills by female Degree and NCE pre-service chemistry educators in south-east colleges of education in Nigeria?
3. What are the strategies for enhancing acquisition of entrepreneurial skills by female Degree and NCE pre-service chemistry educators in south-east colleges of education in Nigeria?

Hypotheses

1. There is no significant difference in the mean responses of female Degree and NCE pre-service chemistry educators in south-east colleges of education on their exposure to entrepreneurial skills in science education in south-east colleges of education.
2. There is no significant difference in the mean responses of female Degree and NCE pre-service chemistry educators in south-east colleges of education on hindrances to acquisition of entrepreneurial skills in science education.

Research Methods

A descriptive survey design was employed for the study. The study was carried out in south-east colleges of education of Nigeria involved in degree programmes. The population comprised all the final year female pre-service chemistry educators numbering four hundred and thirty-five Degree and NCE students in the six south-east

colleges of education. Using purposive sampling technique, three colleges of education where selected for the study and ninety final year female Degree and NCE pre-service chemistry educators were selected from the three colleges of education using simple random sampling technique by balloting without replacement. Hence, fifteen students each were chosen from degree programme and NCE programme from each of the three selected colleges of education given a total of 45 pre-service chemistry educators.

The instrument for data collection was a 41- items structured questionnaire based on a 4 point-likert type scale developed by the researchers. The questionnaire was titled "Questionnaire on female pre-service chemistry educators' acquisition of entrepreneurial skills" (PCEES). The questionnaire sort to elicit information on exposure of female undergraduate students to entrepreneurial skills in colleges of education, hindrances to acquisition of entrepreneurial skills and strategies for empowering female students to acquire entrepreneurial skills.

The questionnaire was validated by two science educators and two lecturers in measurement and evaluation departments from Nwafor Orizu College of Education, Nsugbe and Nnamdi Azikiwe University Awka respectively. The comments and suggestions of these experts were used in building up the final draft of the instrument. The instrument was trial-tested on 100 female undergraduate chemistry education students drawn from state and federal universities who were not involved in the study. The result was used to determine the reliability of the instrument using Cronbach alpha technique. A reliability index of 0.88 was established. The questionnaire was administered to the 90 respondents with the help of two research assistants. The female students were to indicate the extent they agree with items in the questionnaire. The questionnaires were retrieved on the spot. The research questions were answered using mean and standard deviation. A mean of 2.50 and above indicated that the respondents agreed with the items on the questionnaire while a mean of 2.49 and below indicated that the respondents disagreed with the items on the questionnaire. The null hypotheses were tested using z-test statistics at $P<0.05$.

Results

The results were presented in Tables below:

Research Question 1

What entrepreneurial skills are female Degree and NCE pre-service chemistry educators in south-east colleges of education in Nigeria exposed to through science education programmes?

Table 1: Mean Rating and Standard Deviation Responses of Female Pre-service Chemistry Educators on Extent on Exposure to Entrepreneurial Skills in Science Education.

S/N	Items	Degree Students N=45			NCE Students N=45		
	To want extent are you exposed to the following entrepreneurial skills during teaching and learning of chemistry?	X	SD	Decision	X	S.D.	Decision
1	Ethanol production from palm wine, cassava, potatoes and other stem tubers.	2.36	0.93	Low extent	2.27	0.87	Low extent
2	Soap and detergent making from seeds of palm, groundnut and coconut oils.	1.27	0.45	low extent	1.20	0.41	low extent
3	Fish culture and farming from the study of pH and buffer solutions.	1.27	0.45	Low extent	1.08	0.22	Low extent
4	Production of pomade from carbonated materials of shelled animals or cocoa and cashew nuts.	0.41	0.11	low extent	1.68	0.24	low extent
5	Production of body creams, lotions from organic materials.	1.60	0.87	Low extent	2.30	0.56	Low extent
6	Production of petroleum jelly from organic materials.	1.00	0.00	low extent	1.10	0.31	low extent
7	Production of coconut oil and groundnut oil from coconut and groundnut seeds.	1.23	0.43	Low extent	1.30	0.48	Low extent
8	Making of pulp and paper from gmelina plants.	1.57	0.50	low extent	1.13	0.35	low extent
9	Production of fibres from plantain or banana plant peels.	1.80	0.66	Low extent	1.54	0.48	Low extent
10	Production of base from plantain peels.	1.58	0.50	low extent	2.30	0.53	low extent

11	Production of additives from plant acids and dyes.	1.86	0.97	Low extent	1.75	0.63	Low extent
12	Production of HNO_3 acid from cocoyam.	1.88	0.94	Low extent	2.42	0.50	Low extent
13	Making of reagents from bark of trees and flowery seeds of organic materials.	1.92	0.88	Low extent	2.47	0.55	Low extent
14	Glass-making from glazed sand and clay.	2.18	0.86	Low extent	2.10	0.54	Low extent
15	Making of plastic containers from waste polythene bags and styrene from the study of polymer and vulcanization.	1.79	0.94	Low extent	2.28	1.51	Low extent
16	Making of shoe polish from carbon, cam wood and red-clay.	1.77	0.93	Low extent	2.20	1.48	Low extent
17	Baking of bread, cakes and biscuits.	1.90	0.82	Low extent	2.08	1.44	Low extent
18	Production of paints	1.92	0.88	Low extent	2.38	1.54	Low extent
19	Production of perfumes and deodorants.	1.85	0.86	Low extent	2.30	1.52	Low extent
20	Making of beads, and weaving of clothes and dyeing of textile materials.	2.11	0.85	Low extent	2.18	1.48	Low extent
21	Setting up of fish pond, poultry, piggery or other animal farm.	2.12	0.85	Low extent	1.98	1.41	Low extent
22	How to source for fund for setting up a small business enterprise.	1.55	0.86	Low extent	2.19	1.48	Low extent
23	How to start and manage a small business enterprise on graduation.	1.80	0.81	Low extent	1.98	1.46	Low extent
24	How to repair/service simple electrical home appliances.	2.16	1.47	Low extent	2.11	1.45	Low extent
25	Carrying out minor electrical connections or wiring in the home.	1.78	0.82	Low extent	1.14	1.07	Low extent

26	Servicing and maintenance of electrical appliances, GSM phones.	1.83	0.89	Low extent	1.21	1.10	Low extent
27	Making of confectionery sweets, candy, ice-creams, chocolates.	2.00	0.74	Low extent	2.34	1.53	Low extent
28	Production of starch, yam or plantain flours.	2.21	1.49	Low extent	2.41	0.87	Low extent
29	Preservation of vegetables (toma-toes, peppers, melon, okra etc.	2.41	0.87	Low extent	1.57	0.50	Low extent
30	Making of insecticides and air fresheners.	1.88	0.94	Low extent	2.32	0.53	Low extent
	Grand Mean	**1.96**	**1.40**		**2.06**	**1.43**	

From Table 1, items 1-30 have mean ratings below the criterion mean of 2.50 for the respondents. Thus, the respondents perceived to disagree with the items on the questionnaire. This implies that they are not exposed to almost all the items in the questionnaire as indicated by their grand mean (Degree students = 1.6, NCE students = 2.06)

Research Question 2

What are the hindrances to acquisition of entrepreneurial skills by female Degree and NCE pre-service chemistry educators in south-east colleges of education in Nigeria?

Table 2: Mean Ratings and Standard Deviations on Responses Relating to Hindrances to Female Degree and NCE Pre-service Chemistry Educators to Acquisition of Entrepreneurial Skills.

S/N	Items	Degree Students N = 45 X	SD	Decision	NCE Students N = 45 X	SD	Decision
31	Acquisition of entrepreneurial skills are not included in the NCCE curriculum.	2.82	0.98	Agreed	2.68	0.68	Agreed
32	Lack of facilities in laboratories or workshops for teaching entrepreneurial skills.	2.82	0.88	Agreed	2.63	1.15	Agreed

33	Ill-equipped laboratories and workshops for practical activities.	2.83	0.89	Agreed	2.98	0.91	Agreed
34	Lack of trained lecturers to teach entrepreneurial skills.	2.08	2.84	Disagreed	2.16	0.72	Disagreed
35	Poor funding by the government and the schools for entrepreneurial skills in science education.	2.72	1.65	Agreed	2.68	0.89	Agreed
36	Lack of provision of resources for acquisition of entrepreneurial skills.	2.72	1.65	Agreed	3.26	1.81	Agreed
	Grand mean	**2.67**	**1.63**		**2.73**	**1.65**	

From Table 2 the mean rating of item 34 for respondents (both NCE and degree) was less than the criterion mean of 2.50, thus, the respondents disagreed with the statement as hindrances to acquisition of entrepreneurial skills. Items 31, 32, 33, 35 and 36 have mean rating of above 2.50 thus, the respondents agree with the statements as hindrances to acquisition of entrepreneurial skills.

Research Question 3

What are the strategies for enhancing acquisition of entrepreneurial skills by female Degree and NCE pre-service chemistry educators in south-east colleges of education in Nigeria?

Table 3: Mean Ratings and Standard Deviation on Responses on Strategies for Enhancing Female Degree and NCE Pre-service Chemistry Educators' Acquisition of Entrepreneurial Skills.

S/N	Items	Degree Students N = 45 X	SD	Decision	NCE Students N = 45 X	SD	Decision
37	Government should fund science education so that colleges can provide facilities for teaching entrepreneurial skills.	2.75	0.48	Agreed	3.22	0.45	Agreed
38	Inculcate entrepreneurship education in NCCE curriculum.	3.10	0.30	Agreed	3.00	0.64	Agreed

39	Make entrepreneurship education mandatory for all students in the college before certificate.	3.15	0.53	Agreed	3.12	0.43	Agreed
40	The colleges should introduce students industrial work experience scheme to ensure that the females are given opportunities to acquire relevant skills.	2.80	0.42	Disagreed	2.55	0.50	Disagreed
41	The colleges should ensure that relevant instructional materials for effective instruction for entrepreneurial skills are provided.	2.57	0.50	Agreed	2.51	0.49	Agreed
	Grand mean	**2.87**	**1.70**		**2.88**	**1.70**	

Table 3 revealed that the mean rating of all the items of the respondents were above the criterion mean of 2.50, thus accepting the strategies for enhancement of acquisition of entrepreneurial skills of female Degree and NCE pre-service chemistry educators in the colleges of education.

Hypothesis 1

There is no significant difference in the mean responses of female Degree and NCE pre-service chemistry educators on exposure to entrepreneurial skills in science education in south-east colleges of education.

Table 4: Z-test on the Mean Scores of Female Degree and NCE Pre-service Chemistry Educators on the Exposure to Entrepreneurial Skills.

Source of variation	N	X	SD	df	Z-cal	Z-crit	P<0.05
Degree Female Students	45	2.06	1.43	88	0.09	1.96	Not Significant
NCE Female Students	45	1.96	1.40				

Table 4 shows that z-calculated is 0.09 as against z-critical which is 1.96. therefore, z-calculated is less, hence, the null hypothesis of no significant difference is not rejected.

Hypothesis 2

There is no significant difference in the mean responses of female Degree and NCE pre-service chemistry educators in south-east colleges of education on hindrances to acquisition of entrepreneurial skills in science education.

Table 5: Z-test Result of the Mean Scores of Female Degree and NCE Pre-service Chemistry Educators on Hindrances to Acquisition of Entrepreneurial Skills in Science Education.

Source of variation	N	X	SD	df	Z-cal	Z-crit	P<0.05
Degree Female Students	45	2.73	1.65				Not
				88	0.30	1.96	Significant
NCE Female Students	45	2.67	1.65				

Table 5 shows that z-calculated is 0.30 lower than the z-critical (1.96), therefore, the null hypothesis of no significant difference in accepted.

Discussion

The findings showed that the female Degree and NCE pre-service chemistry educators in south-east colleges of education used in this study are not exposed to entrepreneurial skills. For science education to be relevant, qualitative and knowledgeable skills acquired through it must be employable, useful and functional in the world of work or industry. Unfortunately, the products from most of the colleges of education are finding it difficult to secure gainful employment because their curriculum programmes were not focused on modern imperatives necessary for meeting the demands of globalization. A reform in science education curriculum is therefore pertinent, so that in this era of increasing unemployment the young female graduates from science education (chemistry in particular) can fall back on the entrepreneurial skills they had acquired while in school to make a living, thereby, helping in the growth and development of the nation instead of roaming the streets endlessly in search of non existing jobs (Ezekwesili, 2006).

Okoli and Ifeakor (2010) stated that research evidence shows a wide gap between the certificates some of the graduates from Nigerian institutions of higher learning carry about and what they can do in terms of applicability. This statement buttresses the need for a reform in the curriculum of Nigerian institutions of higher learning. The findings of this study further revealed that poor funding of colleges of education, inadequate infrastructures like laboratories, workshops were among the hindrances to acquisition of entrepreneurial skills. However, there are strategies which when applied would enhance the acquisition of entrepreneurial skills in education. Some of these strategies include; government funding of colleges of education for provision of facilities and materials for entrepreneurial skills in science education, making entrepreneurial education compulsory in colleges of education in order to empower the students through acquisition of entrepreneurial skills.

Conclusion

The researcher are of the view that the acquisition of entrepreneurial skills should be a reform agenda in colleges of education. This will help the undergraduates from the colleges of education system particularly female pre-service chemistry educators to acquire skills that will enable them to be self-reliant and self-employed, should they fail to secure a paid employment on graduation. Through such skills acquired while in school, the female students will be able to set up small business enterprise and by so doing promote women empowerment for national development.

Recommendations

Based on the findings of the study, the following recommendations were made:

- Entrepreneurial skills should be incorporated into science education curricular.
- Acquiring entrepreneurial skills should be made a compulsory requirement for the award of certificate.
- Government should provide fund to the colleges of education for provision of facilities and materials for the teaching of entrepreneurial skills.
- Reformation of NCCE (Nigerian Commission for Colleges of Education) curricular is pertinent for inculcation of entrepreneurial skills.

References

Aguele, I.I. & Agwagah, U.U. (2009). Female participation in science, technology and mathematics (STEM) education in Nigeria and national development. *Journal of Social Science,* 15(2) 121-126.

Ezeudu, F. (2008). Restructuring our science, technology and mathematics (STM) education for entrepreneurship *49th Annual Conference Proceeding of Science Teachers Association of Nigeria,* 268-272

Ifeakor, A. C. (2005). Enhancing professional STM teachers role in lifelong education: Strategies and needs for teachers' performance. *46th Annual Conference Proceedings of STAN,* 129-133

Igboegwu, E.N. & Ikokwu, P.I.I, & Egbutu, R.N. (2013). Introducing gender mainstreaming into stem curriculum: strategies for achieving millennium development goals. *54th Annual Conference of STAN,* 297-302.

Njoku, Z.C. (2001). Improving science and technology education on of girls and women in Nigeria: The way forward. In Nnaka C.V. and Anaekwe, M.C. *Journal of Nigeria Academy of Education.* 1(2), 24-32

Okoli, J.N. & Ifeakor, A.C. (2010). Reforms and transformation in girl-child education for acquisition of entrepreneurial skills in universities for poverty alleviation. *International Journal of Forum for African Women Educationalists Nigeria* (IJOFAWEN), 43-57.