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DEVELOPING ENTREPRENEURSHIP SKILLS AMONG PRE-SERVICE TEACHERS THROUGH LEARNING OF MATHEMATICS EDUCATION FOR SUSTAINABLE DEVELOPMENT

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Abstract
The study investigated developing of entrepreneurial skills among pre-service teachers through teaching of mathematics education for sustainable development. Based on the purpose of the study, one research question and two hypotheses guided the study. Analytical survey research design was adopted in carrying out the study. The population consisted of all pre-service teachers in the department of primary education studies of Alvan Ikoku Federal College of Education Owerri in Imo State. A sample of 90pre-service teachers was used for the study using simple random sampling technique in selecting the sample size. The instrument used for data collection was structured questionnaire titled developing entrepreneurship skills through mathematics education (DESME). The validity of the instrument was done by two experts in mathematics education and two experts in entrepreneurial education. The internal consistency of the items was established to be 0.87 using Cronbach Alpha Statistics Method. The data generated were analyzed with the aid of SPSS Version 20.0 .Descriptive statistics of mean and standard deviation were used to answer the research question while inferential statistics of Z-test, ANOVA were used to test the hypotheses at 0.05 level of significance .The result of the study showed that knowledge of mathematics is very important in the development of entrepreneurial skills while gender and levels of years of pre-service teachers do not differ in the acquisition of the entrepreneurial skills.

Keywords: Entrepreneurship skills, Pre-service Teachers, Mathematics Education and Sustainable development.

Introduction

Mathematics is a core subject in Nigerian education system. The subject was established in schools in order to provide competent persons who are skillful in applying mathematical knowledge in solving everyday life problem. Akinmola (2014) opined that mathematics is an excellent vehicle for the development of person's intellectual competence in logical reasoning, spatial visualization, analysis and abstract thinking. Also, the development of a high skilled scientifically and technological based manpower requires a strong grounding in mathematics (National Council of Teachers of mathematics 2000 & FGN, 2013). Mathematics is a tool used for solving problems (Leonard, Steve, & Art 2004). Mathematics knowledge and skills provide a key for entry into a rapidly changing technological world (Leonard, Steve, & Art 2004). Ukeje in Lawrence, I.A, & Kolawole, O.U. (2007) while acknowledging the importance and contribution of mathematics to the modern culture of science and technology stated that "without mathematics there is no science, without science there is no modern technology and without modern technology there is no modern society". Also, Butler and Wren in Obodo (1997) opined that mathematics can contribute to the realization of the general aims of education among others, by:

(i) Developing good habits for effective critical thinking
(ii) Providing competence in the basic skills and understanding for dealing with numbers and form.
(iii) Developing intellectual independence, aesthetic appreciation and expression
(iv) Developing the ability to differentiate between relevant and irrelevant data and to make relevant judgment through the discrimination of values. Akinmola (2014) outlined the aims of learning mathematics education in schools as follows.

- Acquire the necessary mathematical concepts and skills for everyday life and for continuous learning in mathematics and related disciplines.
- Develop the necessary process skills for the acquisition and application of mathematical concepts and skills.
- Develop the mathematical thinking and problem solving skills and apply these skills to formulate and solve problems.
- Recognize and use connections among mathematical ideas and between mathematics and other disciplines.
- Develop positive attitudes towards mathematics.
- Make effective use of a variety of mathematical tools (including information and communication technology tools) in learning and application of mathematics.
- Provide imaginative and creative work arising from mathematical ideas.
- Develop the abilities to reason logically, communicate mathematically and learn cooperatively and independently. According to Sidhu (2006), the aim of learning mathematics is not only for knowledge and understanding objectives; it includes skills application, positive attitude, appreciation and interest objectives of which, among other things, the learner should:

(i) Acquire and develop skills in the use and understanding of mathematics,
(ii) Acquire and develop speed, neatness, accuracy, brevity and precision in mathematical applications.
(iii) Learn and develop technique for problem solving
(iv) Develop the ability to estimate, check and verify results
(v) Develop ability to think correctly, to draw conclusions, generalizations and inferences
(vi) Develop appreciate skills in drawing, reading, interpreting graphs and statistical tables.
(vii) Develop skill in necessary, weighting and surveying
(viii) Develop the ability to apply mathematics in his future vocational life.

(ix) Develop the habit of systematic thinking and objectives reasoning.
(x) Develops self-confidence for solving mathematical and other problems.
(xi) Show originality and creativity.

Researchers like Obodo, 1997: Odill, 2006 & Akinmola, 2014 agreed that there are some traits which mathematical learners should possess. This indicates that if a learner or student acquired mathematics effectively, these traits must be imbedded in the students. The traits among others are persistence, self-confident and patient, inquisitive, competent, risk-taker, resourceful, rationalization of every act, optimistic, realistic, systematic process, determined, very hardworking and resilience (Bolaji, 2002; Enukoha, 2002; Eshiet, 2002; Uka,2006) Ugochukwu, Elisha, Afam, Partrick, Nwoke, Emmanuel & joseph (2014) opined that it is through such traits that the students acquired skills that can be transferred into science, technology and mathematics which will in turn contribute to economic growth and national development in Nigeria and such mathematics can therefore be said to be a key to entrepreneurship education.

Entrepreneurship education is the development of skills for economic growth of a nation (Udofia, 2000). According to Siamatocre (2000), entrepreneurship education is made of all kinds of experience that give students the ability and vision of how to access and transform opportunities of different kinds. It goes beyond business creation. It is about developing students' ability to anticipate and respond to societal changes. Also Wikipedia (2009) define entrepreneurship education as seeking to develop students with the knowledge, skills and motivation to encourage entrepreneurial success in a variety of settings. Uka (2015) opined that entrepreneurship education has done a lot in the national development in that it can revive the economy of the nation, improve the standard of living of people everywhere, develop indigenous technological base, reduce rural-urban drifts and create employment opportunity. Entrepreneurship education focuses on developing understanding and capacity for pursuit, of entrepreneurial behaviours, skills and attributes among the leaners. These behaviours or skills can be practical, developed and learned. There are some skills which are expected of one to acquire if one has to be a successful entrepreneur. These skills among others include risk- taking, perseverance, ability to work under pressure, ability to initiate, take responsibility and make- decisions, an innovative and creative thinker, self-motivated and disciplined, able to research effectively, financial literacy i.e. that is financial skills such as book-keeping and calculating tax, able to plan, coordinate and organize effectively, management skills, communication skills, optimisms, resilience, courage and determination. Okwuanaso and Nwazor (200) opined that entrepreneurship education is the key for economic growth of the nation. Anyamene (2009) asserts that entrepreneurship education encourages students to be creative, self-reliant and subsequently gain the ability to generate, recognize and seize the intervening opportunities.

Sustainable Development Commission (SDC 2004) defined it as "a frame work for redefining progress and redirecting our economy to enable people meet their basic needs and improve their quality of life, while ensuring that the natural systems, resources and diversity upon which they depend are maintained and enhanced both for their benefits and for that of future generations. The core objectives of sustainable development according to (UNESCO (2003) are;

- It must train the individual for a better appreciation of his own cultural traditions while at the same time equipping him/her with the ability to absorb new ideas, new information and new data for resolving the constantly changing problems of his environments.

- It must train the individual to relate to and interact meaningfully with other individuals in the society and to appreciate the importance of human organizations.
- It must develop the creative ability of individuals especially in cultural and technological realms.
- It must foster in the individuals those values, which make good citizenship such as honesty, selflessness, tolerance, dedication, hard work, and personal integrity.
- It must provide the culture of productivity by enabling every individual to discover the creative genius in human and apply it to the improvement of the existing skills and techniques of performing specific tasks, thereby increasing the efficiency of his personal and societal efforts.

The united Nations identified science, technology and mathematics as the key to sustainable development (United Nations, 2015). In addition, job opportunities and recruitment exercises into security agencies are accessible with good performance or success in mathematics. Aptitude tests for employment, promotion and placement are made up of questions that are based on mathematics. These are significant justification of the relevance of mathematics for development and economic growth of the society. At national and global levels, there is a general consensus that economic development, viability and stability are solely, in the 21stcentury, scientific and technology based. This means that economic prosperity of a nation depends largely on the scientific and technological development which cannot be possibly altered without sound, effective and strong mathematics education (Fajamidagba, 1986; Sule, 1990 and Collins, 2000 in Aminu, 2005). The study therefore is to ascertain whether entrepreneurship skills among pre-service teachers will be developing through learning of mathematics education. In recent years, the government, the parents as well as general public have expressed considerable unemployment situations in Nigeria though some blame it on the low performance of graduates of higher education. Institutions in the labour market stressed that many Nigerian graduates are not employable in the outside world. They have little or no entrepreneurship education development and skills to establish small scale businesses that enable them earn livelihoods. Therefore, the quest for self-reliance in industrialization, technological growth and development of entrepreneurship education. Entrepreneurship which required developing skills has been identified as a means of making students self-reliant. These skills need to be developed and their development needs adequate knowledge of mathematics education. Therefore, the study intends to ascertain whether the development of entrepreneurship skills among pre-service teachers through learning of mathematics education for sustainable development. Specifically, it seeks;

i. To find out whether mathematics education is important in developing entrepreneurship skills among pre-service teachers for sustainable development.
ii. Whether difference exists between male and female pre-service teachers in developing entrepreneurial skills through learning of mathematics education for sustainable development.
iii. Whether difference will exist between levels of pre-service students in developing entrepreneurial skills through learning of mathematics education for sustainable development.

The question that guided the study is:

1. To what extent is mathematics education important in developing entrepreneurship skills among pre-service teachers for sustainable development?

The hypotheses that guided the study are:

1. There is no significant difference in the mean scores of male and female pre-service teachers in developing entrepreneurial skills for sustainable development.
2. There is no significant difference in the mean scores of level one, two, and three pre-service teachers on developing entrepreneurial skills for sustainable development.

Method

The study adopted descriptive survey research design. A descriptive survey research seeks to collect detailed factual information that describes the nature of existing conditions. It assesses the characteristics of the whole population and usually study sample drawn from the population of the study. The population of the study consisted of all Nigerian Certificate in Education (NCE) primary education pre- service teachers at Alvan Ikoku Federal College of Education, Owerri with a population size of 403 students. The sample was made up of 135 pre-service teachers selected from the three levels (one, two, and three) using simple random sampling technique. The instrument used for data collection was researchers made questionnaire "entrepreneurship skills among pre- service teachers through learning of mathematics education (ESPSTLME)". The questionnaire comprises two sections A and B. Section A contains the demographic data of the respondents while section B the objectives of the study. The ESPSTLME was measured on a 5 point likert type format of Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree which was assigned numerical value of 4,3,0,1 and2, the acceptable level of mean score was 3.0 and above will be accepted while less than will be rejected. The face and content validity of the instrument were established by two experts in mathematics education and one expert in entrepreneurship education. A trial test was carried out on primary education students outside the sample of the study using Cronbach Alpha Method to establish reliability coefficient of 0:87. In analyzing the data, descriptive statistics of mean and standard deviation were used in answering the research question while inferential statistics of Analysis of Variance (ANOVA) was used to test the hypotheses at 0.05 level of significance.

Results

Table 1: Mean and Standard deviation scores of respondents' opinion on the importance of mathematics education in developing entrepreneurial skills.

S/N	Items	Mean	Standard Deviation	Decision
1.	I like mathematics	3.47	0.69	**Accepted**
2.	I like acquiring entrepreneurial skills	3.46	0.60	**Accepted**
3.	I need mathematics to do well in entrepreneurial skills.	3.11	0.90	**Accepted**
4.	Good mathematics students do better in entrepreneurial skills than those who are not so good in mathematics.	3.05	0.95	**Accepted**
5.	Developing entrepreneurial skills needs sufficient knowledge of mathematics.	3.90	0.87	**Accepted**
6.	Mathematics is highly needed in every entrepreneurial skill.	3.89	0.91	**Accepted**
7.	One cannot do well in entrepreneurial skills without mathematics.	3.54	0.94	**Accepted**
8.	Knowledge of mathematics is needed in entrepreneurial skills development.	3.32	0.98	**Accepted**
9.	Every entrepreneurial skill requires knowledge of mathematics.	3.88	0.89	**Accepted**
10.	My doing well in entrepreneurial skills is binged on my knowledge of mathematics.	3.85	0.90	**Accepted**
11.	Without knowledge of mathematics one cannot do well in entrepreneurial skills.	3.91	0.85	**Accepted**
12.	My entrepreneurial skills cannot be developed without mathematics.	**3.96**	**0.92**	**Accepted**

Results in table 1 indicated that all the items scored above the mean score cut-off of 3.00. This implies that mathematics education is important in developing entrepreneurship skills among pre- service teacher's sustainable development.

Table 2: Z-test analysis on gender

Results in table 2 showed that z-cal = 6.18 is greater than Z-crit = 1.96. We reject Ho and accept the alternative hypothesis that there is a significant difference in favour of female in the opinion of male and female pre-service teachers on developing entrepreneurship skills through learning mathematics for sustainable development.

Gender	N	Mean	SD	Z-cal	α	Z-Cal	Decision
Male	68	2.42	0.98	6.18	0.05	1.96	Reject
Female	72	3.47	0.68				

Table 3: ANOVA on pre-service teacher's level

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	138.708	1	138.708	0.017	3.213
Within Groups	2111.652	98	21.547		
Total	**2250.360**	**99**			

Results in table 3 indicated that the critical value 3.213 is greater than the calculated F-value of 0.017, we accept the null hypothesis that there is no significant difference in the mean scores of pre-service teachers' levels on developing entrepreneurial skills through learning of mathematics education for sustainable development.

Discussion

Results in the study revealed that the knowledge of mathematics is important in developing entrepreneurial skills for sustainable development. This is in agreement with the opinion of Sidhu (2006) which says that the aim of learning mathematics is not only for knowledge and understanding objectives, it includes skills objectives and interest which among other things, will help the learners and *I* develop skills. Also, the study revealed that gender and levels of years of pre-service teachers do not differ. This implies that there is no significant difference between gender and levels of years on development of entrepreneurial skills.

Conclusion

The study revealed that knowledge of mathematics is very important in the development of entrepreneurial skills. Gender and levels of years of pre-service teachers have nothing to do with acquisition of the entrepreneurial skills.

Recommendations

Based on the findings of the study, the researchers recommend as follows:

1. Mathematics education is important for sustainable development. This implies that mathematics teachers should enhance the mathematical knowledge of students.
2. Teachers with strong mathematical background knowledge should be used in teaching entrepreneurship education.
3. Entrepreneurship education teachers whose background is not in mathematics should embark on training and re-training to improve their mathematical traits.

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