THE ROLE OF MATHEMATICS EDUCATION IN THE DEVELOPMENT OF ENTREPRENEURIAL SKILLS AMONG SECONDARY SCHOOL STUDENTS IN IKA SOUTH L.G.A OF DELTA STATE.

By

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Abstract

This paper examines the role of mathematics education in the development of entrepreneurial skills among secondary school students. The population of the study was 650 JSS3 students from fifteen (15) public secondary schools in Ika South Local Government Area of Delta State. The technique used to select three (3) Secondary Schools was simple Random Sampling. All the students in the three (3) selected schools, making a total of One Hundred and Ninety-Five (195) JSS3 students were used as sample for the study. Three (3) research questions and two hypothesis guided the study. The collection of data were done using a self-constructed 21-item student questionnaires (SQ) with a reliability coefficient of 0.74 and analysed using Mean and Standard deviation for the research questions and t-test statistics for the hypothesis, tested at 0.05 level of significance. The findings of the study among others indicated that; Mathematic education plays a significant role in the development of entrepreneurial skills among JSS3 students, mathematical knowledge provides entrepreneurial skills acquisition, male and female student responses on the need of mathematical knowledge for entrepreneurial skills acquisition do not significantly differ. Against this background, it was recommended that; strategies should be put in place by government to intimate mathematics teachers at all level of educational systems of the role of mathematics education in the development of entrepreneurial skills among JSS3 students; qualified teachers should be employed to teach school mathematics that will boost students' mathematics knowledge and thereby bring about improvement in Nigeria economy among others.

Keywords*: Mathematics Education, Entrepreneurship Skills, Development*.

Introduction

Nigeria like most developing nations of the world faced with myriad of problems and hearse realities which include poverty, unemployment, conflicts and diseases (Oviawe, 2010). These situations prose great challenges to the very existence of individuals in most developing nations thereby calling for the training of educated men and women who can function effectively in the society in which they live. The massive unemployment of Nigeria graduates from various institutions of higher learning is traceable to the disequilibrium between labour market requirement and lack of essential employable skills by the graduates (Diejomal & Okimolade, 1991, Dabelen, Oni & Adekola, 2000). The existing gaps in skills hamper youth development and in turn national development. Developing student entrepreneurial skills could help curb this ugly trend. Hence, there is a need to make student self-reliant over the years and Nigeria has been clamouring to be self-reliant and self-sufficient. In realizing this desired dream, the country came up with vision 2020, which is to make Nigeria one of the20 top economy nations in the world. To achieve this goal there is a need for entrepreneurship education.

What is entrepreneurship education?

Entrepreneurship education is that aspect of education which equips an individual with the mind-set to undertake the risk of venturing into something new by applying knowledge and skill acquired in school. Entrepreneurship education builds in a student the necessary skills for

self-reliance. These skills include resiliency, focus, creativity, problem solving, concentration, management of resources, goal-setting, decision-making among others.Venkataraman (2010), views entrepreneurship as any activity that involves discovering, evaluation and exploitation of opportunities to introduce a new goods and services, way of organising, markets, processes and raw materials, through the organising efforts that previously had not emitted. Hence, entrepreneurship has been traditionally defined as the process of designing, launching and running a new business such as Start-up Companyoffering a product process or service (Gigane, 2017). Also, entrepreneurship is defined as the process of creating something different with value by devoting the necessary time and effort, assuming the accompanying financial, psychological and social risk; and receiving the resulting rewards of monetary and personal satisfaction (Ibe, 2013). Factors that set entrepreneurs apart include; innovation, opportunities recognition, process, and growth in business and employment strategy management practises in the business (Watson, 2006). Innovation involves finding a new and better ways of doing things that are commercialized (Rwigema & Venter, 2005). One major ingredient of such education is mathematics.

Mathematics is the gate and key to developing entrepreneurship skills as everybody needs it. Therefore, the realization of the above needs for mathematics would serve as a spring board for the students who are prepared for self-sustenance in life. Mathematics is a science that deals with the logic of shape, quantity and arrangement. Mathematics is everywhere and everything we do is has mathematics implication. According to Onyeachu (2006), mathematics is a model for thinking, developing scientific situation, drawing conclusions as well as solving problems in a real life context. Few studies as Uka (2015) have shown that a positive relationship exists between problem solving and entrepreneurship education. Therefore, problem solving is an aspect of mathematics itself just as creativity is an aspect of entrepreneurship. Hence, there exist connections between the variables.

Mathematics is integral to everything about life (Eze, 2009). Every occupation which students may choose to pursue and much of every day's lives are full of opportunities and the need to apply mathematics. Mathematics gives extra power to our thinking and creative minds. No wonder, Adewumi and Adu (2012) posited thus, mathematics is made up of two dimensions; Viz:

    (a) Mathematics Knowledge: This is the knowledge about what works and how things could be made.
    (b) Mathematics Techniques/Skills: These are the application of this knowledge to processes and tools for daily living.

This is why Hassan (2005) opined that Mathematics as a subject is now universally recognised and accepted as indispensable to self-reliance and sustainable development of any nations' economy, because of its functional utility. The National Policy on Education (FRN, 2013) states that the broad areas of secondary education are: (i) preparation for useful living within the society, and (ii) preparation for higher education. In specific terms, the secondary schools among other things should:

    i.   Diversify its curriculum to cater for the differences in talents, opportunities and roles posed by or open to student after their secondary school course.
    ii.   Equip students' to live effectively in our modern age of science and technology.
    iii.   Raise a generation of people who can think for themselves, respect the views and feelings of others, respect the dignity of labour and appreciate these values specified under our broad national aims and live as good citizens.
    iv.   Inspire into the students with a desire for achievement and self-improvement both at school and in later life.

Mathematics has been a compulsory core subject due to its indispensability in all facets of life. The emphasis of the mathematics curricula is on the value re-orientation, job creation, wealth generation and poverty eradication through the achievement of mathematics education. These objectives are quite laudable and can facilitate national growth when achieved through careful planning and execution of research work such as presented in this paper. Therefore, the general objectives for mathematics education among others include:

- To generate interest in mathematics and to provide a solid foundation for everyday living.
- To develop computational skills
- To foster the desire and ability to be accurate to a degree relevant to the problem at hand
- To develop precise, logical and abstract thinking
- To develop the ability to recognise problems and solve them with related mathematical knowledge
- To provide necessary mathematical background for further education
- To stimulate and encourage creativity.

It is therefore clear that the general objectives of education coincide with the objectives of mathematics education. Hence, these stated objectives cannot be achieved, if students are not made to be self-reliant through entrepreneurship. Since entrepreneurship is about creativity and innovation, mathematics plays a significant role in its development (Udosa, 2015).

There is no doubt that Nigeria is blessed with abundant natural resources. Despite availability of abundant natural resources and huge revenue generated from the sale of oil and gas, Nigeria's economy has not significantly responded to the pressures of demand from over one hundred and eighty (180) million people. This is an indication that wealth without an active manufacturing sector has its limits. As more countries plan to ban the use of petrol cars, industry watchers says this could spell doom for Nigeria whose economy is heavily dependent on sale of crude oil in the international market. Therefore, there is need to look forward to a new Nigeria beyond oil and gas, where her citizens can be self-reliant and self-employed. It is based on this background that this paper seeks to determine if the knowledge of mathematics is capable of enhancing the acquisition of entrepreneurial skills such as creativity and problem solving skills among students'.

Statement of the Problem

The issue of economic instability and unemployment are not peculiar to Nigeria alone, as it is a global issue. Countries have taken diverse measures to curb the menace, yet the problem still persists. Entrepreneurship which requires developing skills has been identified as a means of making students self-reliant and capable of making her citizens to discover opportunities and a subsequent creator of new economic activities, after through the creation of new organization. These skills need to be developed and their development needs adequate knowledge of mathematics. Therefore, the problem of the study put in question form is stated thus: "Is the role of mathematics education capable of enhancing the acquisition of entrepreneurial skills among JSS 3 students? In other words, to what extent do students acquisition of entrepreneurial skills require the knowledge of mathematics education?

Purpose of the Study

The main purpose of this study is to find out the roles of mathematics education in the development of entrepreneurial skills among secondary school students. Specifically, the study seeks to determine the following:

1. The extent to which mathematics education play a significant role in the development of entrepreneurial skills among secondary school students.
2. The extent to which mathematics knowledge provides entrepreneurial skills acquisition.
3. The mean responses of male and female students on the need of mathematical knowledge in entrepreneurial skills acquisition.

Research Questions
The following research questions were raised to guide the study.
1. To what extent do mathematics education play significant role in the development of entrepreneurial skills among secondary school students?
2. To what extent do mathematics knowledge provides entrepreneurial skills acquisition?
3. What is the mean response of male and female students on the need of mathematical knowledge in entrepreneurial skills acquisition?

Hypothesis
The following null and alternative hypotheses were used to determine level of significance at 0.05.
H_0: There is no significant difference between the mean responses of male and female students on the need of mathematical knowledge in entrepreneurial skills acquisition.
H_1: There is significant difference between the mean responses of male and female students on the need of mathematical knowledge in entrepreneurial skills acquisition.

METHODOLOGY
Research Design
A survey research design was adopted for the study, since the opinions of respondents were collected from the field.

Scope of the Study
The study was focus on the role of mathematics education in the development of entrepreneurial skills among Junior Secondary Schools 3 and was carried out in Ika South Local Government Area of Delta State.

Population of the Study
The population of the study comprises all JSS 3 mathematics students in public secondary schools in Ika South Local Government Area of Delta State.
Sample and Sampling Technique
The sample for this study comprises 195 Junior Secondary School Three (JSS3) Students. Simple random sampling technique was adopted to select the sample size, which consists of three (3) intact classes from the fifteen (15) public secondary schools in the L. G. A.

Instrument for Data Collection
The instrument used for data collection was questionnaire. The respondents were requested to express their opinion from a four point modified Likert response scale with Strongly Agreed (SA), Agreed (A), Disagree (D) and Strongly Disagree (SD) with their weight ranging from 4 – 1 for positively cued items and vice versa for negatively cued items. The instruments were validated by two experts who certified them fit for the study.

Method of Data Analysis

Data collected were analysed using mean and standard deviation and t-test statistics to test the hypothesis.

Analysis and Result

The results of the study were obtained from research questions answered through data collected and analysed. Any item with mean score above 2.50 was adjudged accepted, while items with mean score below 2.50 is adjudged rejected. The tables below shows the summary of the results of the data collected.

Research Question 1: To what extent do mathematics education play significant role in the development of entrepreneurial skills among secondary school students?

Table 1: Mean Responses of the Significant Roles Mathematics Education Play in the Development of Entrepreneurial Skills among JSS 3 Students.

S/N	ITEMS	N	MEAN	SD	DECISION
1	Most successful entrepreneurs are god at Mathematics	195	3.20	1.79	Accepted
2	Mathematics teachers who teach well can be good entrepreneurs	195	3.00	1.73	Accepted
3	An entrepreneur should be able to compute discount with the knowledge of Mathematics	195	2.89	1.64	Accepted
4	Acquisition of entrepreneurial skills need adequate knowledge of Mathematics	195	3.90	1.70	Accepted
5	The knowledge of Mathematics will help an entrepreneur to calculate unit and total cost of articles sold	195	3.10	1.76	Accepted
6	An entrepreneur needs to have the knowledge of Mathematics to be able to plan and coordinate business activities effectively and efficiently	195	3.00	1.73	Accepted
7	Students who do well in Mathematics can be good entrepreneur	195	3.80	1.95	Accepted

The results in table 1 above shows that the mean scores of all items fall above the benchmark of 2.50 and so, all items were accepted. Hence, the result shows that mathematics education play significant role in the development of entrepreneurial skills among JSS 3 students.

Research Question 2: To what extent do mathematics knowledge provides entrepreneurial skills acquisition?

Table 2: Mean Responses on how Mathematics Education provides Entrepreneurial Skills Acquisition.

S/N	ITEMS	N	MEAN	SD	DECISION
8	Knowledge of basic Mathematics operation (+, -, x, ÷) cannot provide growth in business	195	1.60	1.26	Rejected
9	Mathematics knowledge helps students to think of how to start their business after JSS 3 especially those who could not further their education	195	3.10	1.97	Accepted
10	With the help of Mathematics knowledge entrepreneurs are able to develop market	195	3.04	1.92	Accepted

	survey to sell their product				
11	Students have understood that Mathematical knowledge can help an entrepreneur to analyse gains and loss in the business	195	3.25	1.98	Accepted
12	The knowledge of Mathematics helps students to reconcile check and balance account for business owners	195	3.42	2.06	Accepted
13	The knowledge of Mathematics will help students to see the link between Mathematics and business	195	3.10	1.76	Accepted
14	The knowledge of Mathematics education helps students to understand that Mathematics does not entail calculations only, but can be applied to other areas of life pursuit especially in entrepreneurship education	195	3.16	1.72	Accepted

Table 2 above shows the extent Mathematics knowledge provides entrepreneurial skills acquisition. From the table, the mean scores of items 9 – 14 are above the benchmark of 2.50 and were accepted, except for item 8 whose mean score was below the benchmark of 2.50 and was rejected. This means that the knowledge of basic Mathematics operations such as addition, subtraction, multiplication and division are needed in entrepreneurial skills acquisition.

Research Question 3: What is the mean response of male and female students on the needs of mathematical knowledge in entrepreneurial skills acquisition?

Table 3: Mean Responses on the extent to which Mathematical Skills enhances Entrepreneurial Skills

S/N	ITEMS	N	MEAN	SD	DECISION
15	N entrepreneur with average Mathematical skills can manage his business efficiently	195	3.18	1.92	Accepted
16	Those who are Mathematically inclined are innovative when it comes to entrepreneur activities	195	4.32	2.08	Accepted
17	Entrepreneur with good knowledge of mathematics perform better than their counterparts who are not good in Mathematics	195	4.20	2.05	Accepted
18	Mathematical skills acquisition brings about creativity in entrepreneurial activities	195	3.60	1.90	Accepted
19	The knowledge of Mathematics helps an entrepreneur to solve problems faster than his contemporaries	195	3.80	1.94	Accepted
20	The use of Mathematical skills can lead to acquisition of creative entrepreneurial skills	195	3.35	1.82	Accepted
21	A good knowledge of Mathematics brings about innovations in entrepreneurial activities	195	3.60	1.90	Accepted

The results in table three above shows the extent to which mathematical skills enhances innovation and creativity in entrepreneurial skills. The mean scores of items 15 – 21 are all above the benchmark of 2.50. Hence, all the items were accepted. This indicates that mathematical skills are a booster to entrepreneurial skills.

Table 4. Independent Sample T-test Analysis on the Mean Responses of Male and Female students on the needs of Mathematics Knowledge towards the acquisition of Entrepreneurial Skills.

GENDER	N	$\bar{X}$	SD	df	t_{cal}	t_{crit}	Significance
MALE	90	3.45	0.43	194	0.484	1.96	Reject H_0
FEMALE	105	3.48	0.44				

Table 4 above reveals the mean responses of male and female students on the needs of mathematical knowledge in the acquisition of entrepreneurial skills. The result above shows that t_{cal} score of 0.484 which is less than t_{crit} score of 1.96 means that the null hypothesis (H_0) should be rejected. Hence, the alternative hypothesis should be accepted. Therefore, it is clear from the result that there is significant difference in the mean responses of male and female students on the needs of Mathematical skills towards the acquisition of entrepreneurial skills.

Discussion of Findings

From the data analysis presented in table 1, the result shows that mathematics education plays significant role in the development of entrepreneurial skills among JSS 3 students. This is in line with the findings of Giganti (2007) and Uka (2015) who asserted that an effective mathematics teaching and learning leads to a good acquisition of entrepreneurial skills.

From the data analysis presented in table 2, it reveals that mathematical knowledge provides entrepreneurial skills acquisition. This is in line with the view of Enukoha (2002) who observed that there is hardly any area of science and entrepreneurship education that does not use mathematical concepts to explain its own concepts, theories or models.

From the data analysis presented in table 3, the results reveal that mathematical skills enhances entrepreneur's innovation and creative skills. This agrees with Effiom (2010) who observed that improved scientific knowledge and the availability of modern technology in mathematics teaching and learning will certainly increase economic productivity and viability.

Recommendation

Based on the above results and discussion of findings, the following recommendations are made:

1. Government should put some strategies in place to intimate mathematics teachers at all level of education on the role of mathematics education in the development of entrepreneurial skills among secondary school students.
2. Qualified mathematics teachers should be employed to teach school mathematics, so that there will be a boost in students mathematical knowledge and thereby develop entrepreneurial skills for the improvement of Nigeria economy.
3. Mathematics education which is an intrinsic quality of entrepreneurship education should be encouraged and strengthened at all levels of the Nigeria educational system.
4. The government should show adequate attention and support to entrepreneurial skills development.
5. Mathematics teachers should endeavour to build confidence in students and encourage them towards having positive perception about the relationship between mathematics education and entrepreneurship education.

Conclusion

A good background in mathematics is a very necessary tool for developing entrepreneurial skills among secondary school students. Mathematics is one of the ingredient,

essential in the building of entrepreneurial education which is required for self-reliant, self-sufficient and self-actualization which the country is clamouring for. This is because (Nigeria as the largest economy in Africa and the 22nd largest globally) has continue to rely heavily on crude oil for her survival. Oviawe (2010) submits that through well planned and executed entrepreneurship education, Nigeria youth will be productive and committed employees or employers of labour. Basically, if more graduate become entrepreneurs, then the nation's economy is bound to improve drastically and this will go a long way in securing a brighter tomorrow for Nigeria beyond oil and gas.

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