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**DEVELOPING ENTREPRENEURIAL SKILLS IN SECONDARY SCHOOL STUDENTS THROUGH EFFECTIVE MATHEMATICS EDUCATION IN ABA, NIGERIA.**

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**ABSTRACT:** *Unemployment is a global issue which increases every day. Developing entrepreneurial skills could be a way of reducing, if not eliminating it. There is the need to make students self-reliant. These skills cannot be developed without efficient and effective knowledge of mathematics. That is why this study considers how entrepreneurial skills can be developed through mathematics education. This study was conducted in Aba metropolis of Abia State, Nigeria. Aba being one of the major centers of commerce in Nigeria was selected as to identify some of the skills and discuss how the knowledge of mathematics can assist develop them. A survey research design was used for this study with 200 senior secondary school (sss 1) students and 80 teachers selected randomly from 40 secondary schools. The instrument of study was structured questionnaire. Data collected were analyzed and research questions answered using descriptive statistics of mean and standard deviation, and co-relational statistics of Pearson moment correlation. Among others, it was found that both students and teachers need knowledge of mathematics to be good entrepreneurs. There is strong positive relationship between mathematics and entrepreneurial skills. It was recommended that there is need to enhance the mathematical background of students, and teachers with strong mathematical background should be used in teaching entrepreneurship education.*

**KEYWORDS:** Entrepreneurial, Skills, Mathematics, Education.

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## **INTRODUCTION**

Unemployment remains one of the most critical problems facing every nation today, including Nigeria. Nigeria which is the most populous in Africa and the second largest economy in the continent with a population of over 150 million is endowed with diverse human and material resources. Yet, unemployment rate among the youth is over 38 percent with secondary school graduates mostly found among unemployed rural population, accounting for about half of this figure, while university and polytechnic graduates make up the rest (World Bank statistics, in Bakere 2013).

If the rate of unemployment is not checked, it will lead to more graduates being recruited into the rank of oil theft syndicates, armed robbers, kidnappers, militants and insurgents.

The Nigerian government actually had made efforts to create jobs. Programmes such as the Youth Empowerment Scheme (YES) and the Youth Enterprise with Innovation (YOU-WIN) have only given a scratch on the surface of unemployment. As government should design larger and more realistic program for job creation, we all must realize that to reduce unemployment in any country, all hands must be on deck; individuals, private sector and government at all

levels. To holistically address the issue of unemployment, acquiring entrepreneurial skills (entrepreneurship education) has been identified as a tool for molding employable individuals as unemployed individuals' need more skills than they already have to find new jobs. Above all, it prepares them for self-employment and financial independence because with paid employment one earns a living, but with self-employment one's earning is unlimited.

These entrepreneurial skills may not be efficiently acquired without effective knowledge of mathematics education. Mathematics is needed in all facets of life. Hence the need for this study, to find out how effective mathematics education can enhance developing entrepreneurial skills.

### **Mathematics Education, Entrepreneurship Education and Senior Secondary School Curriculum.**

The National policy on Education (FRN,2004) states the broad aims of secondary education as

- i preparation for useful living within the society, and
- ii preparation for higher education.

In specific terms, the secondary school among other things should

- i diversify its curriculum to cater for the differences in talents, opportunities and roles possessed by or open to students 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 its students with a desire for achievement and self-improvement both at school and in later life.(Obodo, 1997)

The primary objectives of senior secondary education is to ensure that every senior secondary school (sss) graduate is well prepared for higher education as well as acquired relevant functional trade/ entrepreneurship skill as to prepare for useful living, The curricula focus is on value re-orientation, job creation, wealth generation and poverty eradication.

In the new senior secondary school curriculum the compulsory core subjects are English studies, General mathematics, one trade/entrepreneurship subject and civic education. The first set of senior secondary student graduates where entrepreneurship subject is now compulsory was examined in June 2014. Mathematics *ab initio* has been a compulsory core subject due to its indispensability in all facets of life. The general objectives for mathematics education among others include;

- i to generate interest in mathematics and to provide a solid foundation for everyday living.
- ii to develop computational skills.
- iii to foster the desire and ability to be accurate to a degree relevant to the problem at hand.

- iv to develop precise, logical and abstract thinking.
- v to develop the ability to recognize problems and to solve them with related mathematical knowledge.
- vi to provide necessary mathematical background for further education.
- vii to stimulate and encourage creativity. (Obodo, 1997).

It is opined by Butler and Wren (1951) in Obodo (1997) that mathematics can contribute to the realization of the general aims of education among others, by

- i developing habits of effective critical thinking
- ii providing competence in the basic skills and understandings for dealing with number and form.
- iii developing intellectual independence and 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.

According to Sidhu (2006), the aim of learning mathematics is not only for knowledge and understanding objectives, it includes **Skill Application, Attitude, Appreciation and Interest Objectives** of which among other things, the learner

- i acquires and develops skill in the use and understanding of mathematics,
- ii acquires and develops speed, neatness, accuracy, brevity and precision in mathematical applications,
- iii learns and develops technique of problem-solving,
- iv develops the ability to estimate, check and verify results,
- v develop ability to think correctly, to draw conclusions, generalizations and inferences,
- vi develops, appreciate skill in drawing, reading, interpreting graphs and statistical tables,
- vii develops skill in measuring, weighing and surveying,
- viii develops the ability to apply mathematics in his future vocational life,
- ix develops the habit of systematic thinking and objective reasoning,
- x develops self-confidence for solving mathematical / other problems,
- xi shows originality and creativity.

There are some traits/ attitudes which mathematically minded people / learners possess. This means if a student acquires mathematics efficiently, these traits will be imbedded in him. The traits among others are;

persistence, self-confident and patient, inquisitive, thorough, competent, risk-taker, resourceful, rationalization of every act, optimistic, realistic, systematic process, determined, very hardworking, resilience (Bolaji, 2002; Erukoha, 2002; Eshiet, 2002; Uka, 2006).

Some experts think of entrepreneurs as people who are willing to take risks that others could not. Other defined them as people who start and build successful businesses. Entrepreneurship does not necessarily involve one starting his own business. There are many people who do not work for themselves who are recognized as entrepreneurs within their organization because they can take advantage of an opportunity which others who are equally knowledgeable cannot take.

The 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 opportunities.

Entrepreneurship education focuses on developing understanding and capacity for pursuit, of entrepreneurial behaviours, skills and attributes in widely contexts. These behaviours or skills can be practiced, developed and learned.

There are some traits/skills/ behaviors which are expected of one to acquire if one has to be a successful entrepreneur. These skills among others include willingness to take risks, 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, that is financial skills such as book-keeping and calculating tax, able to plan, coordinate and organize effectively, management skills(ability to manage time and people successfully), communication skills (e.g ability to sell ideas and persuade others), optimism, resilience, courage, determination.

A critical look at the objectives of studying mathematics and attitudinal traits of mathematics minded people, makes it almost obvious that the entrepreneurial skills listed above are embedded in them.

The researcher, therefore, believes that acquiring mathematical attitude/abilities will enhance/develop the entrepreneurial skills thereby actualization the personal qualities relevant to entrepreneurship.

### **Statement of Problem**

The issue of unemployment is not peculiar to Nigeria, as it is a global issue. Countries have taken many measures, yet the problem is increasing every day. 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.

This study therefore, is targeted to ascertain if the knowledge of mathematics will enhance the development of the skills. It will determine to what extent the skills required mathematics knowledge. It also investigates if gender of mathematics teacher has anything to do with the development of the entrepreneurial skills.

## Research Questions

The following research questions were raised to guide this study

1. Is mathematics really needed in developing entrepreneurial skills?
2. To what extent do entrepreneurial skills need mathematics?
3. Does the gender of mathematics teacher influence the developing of entrepreneurial skills?

## METHODOLOGY

### Research Design

A survey research design was adopted for the study since the opinions of respondents were sought.

### Area of Study

The study was carried out in Aba metropolis in Abia South Senatorial zone of Abia State, Nigeria.

### Population of the Study

The population is made up of mathematics teachers and students in all the public and private secondary schools in Aba metropolis in Abia State.

### Sample and Sampling Technique

The sample of this study consists of 200 Senior Secondary School (SS1) students selected from 15 public secondary schools out of 30, and 25 private secondary schools out of 69.

There were 62 respondents from the public secondary schools and 121 from private secondary schools.

The distribution is shown in table 1.

Likewise 80 mathematics teachers were randomly selected from both public and private secondary schools. From the public secondary schools, there were 21 respondents while in the private secondary schools, there were 50 respondents (see table 2).

**Table 1: Distribution of Sampled Senior Secondary School (SSS1) students.**

Nature of School	Male	Female	Total
Public	22	40	62
Private	57	64	121
<b>Total</b>	<b>79</b>	<b>104</b>	<b>183</b>

**Table 2: Distribution of Sampled Mathematics Teachers.**

Nature of School	Male	Female	Total
Public	5	16	21
Private	18	32	50
Total	23	48	71

### Instrument for Data Collection

Two instruments, one for students and the second for mathematics teachers which were questionnaires tagged “Students Questionnaire (SQ)” and “Mathematics Teachers’ Questionnaire (MTQ)” respectively. Each of the questionnaire is made up of two sections, section A of each dealt with the demographic variable of the respondents while section B of SQ and MTQ consists of 16 items and 9 items respectively. The instruments were validated by two experts after which the items in SQ increase from 12 to 16 while that of MTQ increased from 7 to 9 in which question 9 have 10 sub questions (i to x)

A four-point likert scale rating was used from the strongly Agree (SA) to strongly Disagree (SD) with weighting ranging from 4 to 1 for positively cued items and vice versa for negatively cued items.

### Administration of Instrument

A total of 200 and 80 copies of SQ and MTQ were administered to the respondents respectively by the researcher and her assistants. 183 and 71 were respectively collected back after respondents have filled them.

### METHOD OF DATA ANALYSIS

The research questions were analyzed using mean and standard deviation. To arrive at a decision, any item that is positively worded which has a mean score of 2.5 and above is taken as accepted while an item with a mean less than 2.5 is rejected. For the negatively worded items the reverse is the case.

Exceptionally in SQ, to determine the extent the entrepreneurial skills needed mathematics, Pearson moment correlation was used to correlate the students’ score Entrepreneurship Education and Mathematics.

**RESULTS****Research Question 1****Table 3: Mean and Standard Deviation scores of Respondents' (students) Opinion on the need of Mathematics in Developing Entrepreneurial skills.**

S/N	ITEMS	Mean	Standard Deviation	Remarks
1	I like mathematics.	3.47	.678	Accept
2	I like acquiring entrepreneurial skills	3.46	.600	Accept
3	I need Mathematics to do well in entrepreneurial skills.	3.11	.904	Accept
4	Good mathematics students do better in entrepreneurial skills than those who are not so good in mathematics.	3.05	.953	Accept
5	Developing entrepreneurial skills needs sufficient knowledge of mathematics.	2.90	.876	Accept
6	Mathematics is highly needed in every entrepreneurial skill.	2.89	.916	Accept
7	One cannot do well in entrepreneurial skills without mathematics.	2.54	.948	Accept
8	Knowledge of mathematics is not really needed in entrepreneurial skill development.	2.32	.983	Reject
9	Every entrepreneurial skill requires knowledge of mathematics.	2.88	.894	Accept
10	My doing well in entrepreneurial skills is hinged on my knowledge of mathematics.	2.85	.909	Accept
11	Without knowledge of mathematics I cannot do well in entrepreneurial skills.	2.91	.855	Accept
12	My entrepreneurial skills cannot be developed without mathematics.	2.69	.924	Accept

From table 3, it could be observed that items 1,2,3,4,5,6,7,9,10,11,12, positively worded with mean 3.47, 3.46, 3.11, 3.05, 2.90, 2.89, 2.54, 2.88, 2.85, 2.91, and 2.69 respectively were above the cut-off point(2.5) and were accepted likewise item 8 had a mean of 2.32 and was rejected. All these indicate that mathematics is really needed in developing entrepreneurial skills.

**Table 4: Mean and standard deviation scores of respondents' (mathematics teachers) opinions on the need of mathematics in developing entrepreneurial skills.**

S/N	ITEMS	Mean	Standard Deviation	Remarks
1	Mathematics is needed in developing entrepreneurial skills.	3.68	.580	Accept
2	Teaching of entrepreneurial skills need adequate knowledge of mathematics.	3.44	.649	Accept
3	There is no entrepreneurial skill that does not need mathematics knowledge.	3.13	.792	Accept
4	A good mathematics student will do well in entrepreneurial skills.	3.39	.597	Accept
5	A good entrepreneur cannot do without a good knowledge of mathematics.	2.94	.715	Accept
6	Required traits of a good entrepreneur are impeded in the traits/ attitudes of a good mathematics learner.	3.08	.627	Accept
7	Teachers of entrepreneurship need adequate knowledge of mathematics.	3.25	.625	Accept
8	A good mathematics student will be a good entrepreneur.lkiu7	3.27	.675	Accept
9	The under listed entrepreneurial skills, traits/ behaviours are major attributes of mathematical mind, so one can be a good entrepreneur i. Optimistic ii. Initiative iii. Risk- taker iv. Drive and persistence v. Resilience vi. Critical and creative thinking vii. Problem-solving ability viii. Goal-setting ix. Decision-making x. Planning and organizing	3.54 3.61 3.59 3.61 3.62 3.63 3.58 3.59 3.56 3.58	.556 .520 .550 .547 .544 .541 .552 .523 .527 .525	Accept

From table 4, items 1 to 8 have means above the cut-off point (2.5) indicating that mathematics is highly needed in developing entrepreneurial skills. Both the students and teachers of entrepreneurship education need adequate knowledge of mathematics.

The mean of each sub-item of item 9 is more than 2.5, which is the cut-off point. This implies that these attributes /traits of mathematics, initiate, risk-taker, drive and persistence, resilience, critical and creative thinking, problem solving ability, goal setting, decision making, planning and organizing have been confirmed as the characteristics of a good entrepreneur.



**Research Question 2****Table 5: Pearson Moment Correlation of Students' Score in Entrepreneurial Skills and that of Mathematics.**

	Mean	Standard Deviation	Correlation Coefficient	P- Value
Entrepreneurship Score	70.97	17.07	0.691	< 0.001
Mathematics Score	69.78	16.11		

The table above shows the correlation analysis between entrepreneurship scores and mathematics scores of students. From the result obtained, one can infer that there is a strong positive relationship (0.691) between entrepreneurial skills and mathematics. This shows that the strength of their relationship is about 69.1%. This relationship is very significant with a p-value of less than 0.001.

**Research Question 3****Table 6: Mean and Standard Deviation scores of Respondents' (students) Opinion on the Influence of Gender of Mathematics Teachers in Developing Entrepreneurial skills.**

S/N	ITEMS	Mean	Standard Deviation	Remarks
13	The gender of my mathematics teacher affects my acquisition of entrepreneurial skills	2.10	1.11	Reject
14	I prefer being taught mathematics by a female to enable me understand entrepreneurial skills better	2.23	1.09	Reject
15	Female mathematics teachers apply mathematics in entrepreneurial skills more than their male counterparts	2.25	1.05	Reject
16	Both male and female teachers apply mathematics in entrepreneurial skills	3.23	0.86	Accept

From table 6, items 13, 14, 15 have means 2.10, 2.23, 2.25 respectively which are less than 2.5 cut-off point and were rejected. This implies that the gender of the mathematics teachers does not affect the entrepreneurial skills development. Item 16 has a mean of 3.23 which is above 2.5 cut-off point and so is accepted indicating that both male and female teachers apply mathematics in entrepreneurial skills.

**Major Findings**

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

1. Mathematics is really needed in developing entrepreneurial skills.
2. Both students and teachers need knowledge of mathematics to be good entrepreneurs.

3. There is strong positive relationship between mathematics and entrepreneurial skills.
4. The gender of mathematics teachers does not influence the entrepreneurial skills acquisitions.
5. A good mathematician would be a good entrepreneur.
6. The attributes of the mathematical minded persons were confirmed to be that of entrepreneurs.

### **Discussion of Findings**

The data on tables 3 and 4 show that the knowledge of mathematics will enhance entrepreneurial skills development. This is in agreement to 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 which among other things, will help the learners and develop skills. It will also help him (learner) develop the ability to apply mathematics in his future vocational life.

This finding also agrees to the general saying that mathematics is needed in every facet of life.

The study from tables 3 and 4 reveals that both the students and teachers agreed that knowledge of mathematics is really needed for the development of entrepreneurial skills. Item 7 of table 4 reveals that though knowledge of mathematics is needed, one need not be a mathematician before entrepreneurial skills are developed.

The positive relationship between the students' mathematics score and that of their entrepreneurial education as stated in table 5 is a clear indicator and agrees with people's opinion that a good mathematics students can equally do well in other areas including development of entrepreneurial skills. Furthermore, it reveals that a good mathematician should be a good entrepreneur.

This study from table 6 also reveals that the gender of the mathematics teacher does not influence the development of entrepreneurial skills. This agrees with the opinion of Uka (2006) which says that there is no significant main effect of gender on pupils' academic achievement in mathematics.

From item 9, of table 4, it reveals that the attributes of mathematical minds were that of entrepreneur. This agrees with the thinking of some experts who said that entrepreneurs are willing to take risks, make decisions, and possess ability to initiate among others.

### **RECOMMENDATIONS**

Based on the findings of this study, the following recommendations are made.

1. There is need to enhance the mathematical background of students.
2. Teachers with strong mathematical background 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.

## CONCLUSION

This study revealed that knowledge of mathematics is a crucial element in the teaching/learning and development of entrepreneurial skills. The sex of the mathematics teaching has nothing to do with acquisition of the entrepreneurial skills. Both the students and teachers need knowledge of mathematics to really scale through in the acquisition of entrepreneurial skills.

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