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Assessment of Staff Perceived Effectiveness of Mathematics as a Tool for Entrepreneurial Skills Acquisition among Students in Public Tertiary Institutions in Cross River State

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Abstract
The study was carried out to assess staff perceived effectiveness of Mathematics as a tool for entrepreneurial skills acquisition among students in tertiary institutions in Cross River state. It was guided by two research questions and two hypotheses. Ex post facto design was adopted for this study. A sample size of 987 academic staff which was 10% of the population was drawn using stratified random and purposive sampling techniques from a population of 9,872 academic staff. A researcher developed instrument called "Assessment of Mathematics Effectiveness in Entrepreneurship Scale" (AMEES) was used for collecting data for analyses. The validation was carried out by experts in Measurement and Evaluation, while the reliability was established using Cronbach alpha reliability estimate. The coefficient of the sub scale was 0.88. Data collected were subjected to statistical treatment using population t-test and independent t-test statistical technique and the result showed, among others, that the extent of academic staff perceived effectiveness of mathematics as a veritable tool for enhancing entrepreneurial skills among students is significantly high. Based on the findings it was recommended, among others, that teachers with strong mathematical background should be used in teaching entrepreneurship education.
Keywords: staff, effectiveness, mathematics, entrepreneurial, skills

Introduction
Nigeria is currently besieged by high level of unemployment and this has provided opportunity for perpetration of social vices in the country. The number of graduates produced in the country per annum is more than the available space to cater for the white collar job demands of graduates (Bassey, 2019). This led to the introduction of entrepreneurship education as a compulsory course for all students of tertiary institutions in order to help them to acquire the entrepreneurial skills that will help them fit appropriately in the world of work.

Today the term entrepreneurship has acquired incredible prominence and popularity in the scheme of things throughout the whole world, Nigeria inclusive. Entrepreneurship is a process of exploiting the opportunities that exist in the environment or that are created through innovation in an attempt to create value. Entrepreneurship is the process of exploring the opportunities in the market place and arranging resources required to exploit these opportunities for long-term gains. Entrepreneurship is the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic and social risks and receiving the resulting rewards of monetary and personal satisfaction and independence (Hisrich et al., 2008). In fact,

entrepreneurship is a risk-infested economic venture by a person or group of people in speculative market environments with diverse latent intentions for personal or group satisfactions, with tendencies that may be opportunistic and/or exploitative in an attempt to move the society forward. According to Abubakar (2010), entrepreneurship has been identified as a means of providing employment and income generation in the country and a panacea to poverty reduction and pathetic unemployment situation. Omolayo (2006) defines entrepreneurship as the act of starting a company, arranging business deals and taking risk in order to make profit through the education skills acquired.

The operational definition of entrepreneurship is the willingness and ability of a person or persons to acquire educational skills to explore and exploit investment opportunities, establish and manage a successful business enterprise. The concept of entrepreneurship education, according to Anho (2011), is associated with various activities herein stated but not limited to the following: innovation, creativity, risk taking, initiative, visionary, focus, determination, team spirit, resourcefulness, financial control, self-confidence, versatility, knowledgeable, dynamic thinking, optimum disposition, originality, people oriented, flexible indecision, responses to suggestions and criticism, need achievement driven, profit oriented, persistent and preserving, energy for hard work, adjustment to challenges and future looking. Entrepreneurship education becomes necessary in view of the preset realities and the need to develop and empower particularly the youth in the society. There is seeming consensus on the importance of entrepreneurship in ameliorating some socio economic problems especially unemployment, poverty and all sort of social vices in the society (Oviawe, 2010).

However, despite the importance of entrepreneurial education to youths in tertiary institutions, it appears the level of unemployment grows geometrically on a daily basis. Students are still found with little or no skills needed in the labour market. This calls for concern as much has been invested in order to help students acquire the skills that will make them creator of jobs rather than job seekers. Many questions have arisen as to causes of this problems. According to Oviawe (2010), factors that hinder entrepreneurship skills acquisition among students includes poor knowledge based economy and low spirit of competition, poor enterprising culture, lack of entrepreneurship teachers, materials and equipment, unavailability of funds, non-inclusion of entrepreneurship in the school curricula, poor societal attitude to technical and vocational education development, and inadequate facilities and equipment for teaching and learning. The effect of this non acquisition of skills is manifested in heightened social vices and unemployment. While several efforts have been made to cushion the effect of students' inability to acquire the requisite skills needed for productive living, the researcher is presuming that mathematics as a subject can be a veritable tool in the acquisition of entrepreneurial skills.

The importance of Mathematics to human existence cannot be overemphasized in view of its application to humans' everyday life activities (Sunday et al., 2014). Mathematics is an essential discipline that is recognized as a tool for solving everyday problem faced by individuals. Mathematics is an important subject as knowledge of it enhances a person's reasoning, problem-solving skills, and in general, critical thinking. According to Ezeh and Ugwuanyi (2013), mathematics is a subject that develops critical, creative and problem solving mind and skill in the learner which is also essential for the development of entrepreneurship skills needed to tackle unemployment. The basis for all critical activities

is a deep conceptual and principled understanding of mathematics (Batista, 2011), then youths who are adapt at reasoning, problem solving and learning will find it much easier in their entrepreneurship pursuit.

Ejeviome (2011) stated further that a sound mathematics education which teaches explicitly the deep affective qualities will harness the values in mathematics education which if utilized will help in attaining self-reliance among youths, a sole benefit of entrepreneurship skills. It is high time federal and state governments started universally developing students' mathematical capabilities. Such capability functions in creating literate and informed citizens, helps each individual reach his or her full potentials both in work and personal life, and also helps in the attainment of mathematical ideas needed to develop in the youths the entrepreneurial skills to be self-reliant. Venturing into a new business requires a careful appraisal to measure the viability of such venture. Such appraisal requires mathematical techniques to make it a reality. While undergoing feasibility and viability appraisal, mathematical skills are required to put in place the projected statement of income and expenditure and so on.

The planning process which involves the decision on what to be put in place in the future, requires a good deal of mathematics because for instance, if it is production venture, knowledge of the required quantity of goods to be produced, selling price that will bring about profit, involve mathematical knowledge. To buttress this, Ogundimu (2014a) opines that for an entrepreneur who specializes in making profitable investments, his success heavily depends on commercial mathematics that contain topics such as simple and compound interest, amortization, annuity, inflation, mark of chains, graph theory and a host of others.

According to Udonsa (2018), since entrepreneurship is about creativity and innovation, mathematics plays a significant role in its development. Venturing into a new business may require a careful appraisal to measure the viability of such venture. Such appraisal requires mathematical techniques to make it a reality. While undergoing feasibility and viability appraisal, mathematics skills are required to put in place the project cash flow, budget, projected statement of income and expenditure and so on. Hence, the place of mathematical education in shaping entrepreneurship for societal development should not be handled with levity.

In a study carried out by Babatunde (2016) to assess mathematics as a tool for the development of entrepreneurial skills: a panacea for unemployment among Nigerian youths, it was noted that Mathematics is the foundation of science technology and the functional role of mathematics to science and technology is multifaceted and multifarious such that no area of science, technology and business enterprise escapes its application. Entrepreneurship education can be used for wealth creation, poverty reduction, ensuring socio-economic empowerment, sustained self and national development. Though the present situation in the country has posed a lot of challenges to the government and to the youths who are mostly affected, yet the study has revealed that mathematics plays a significant role by providing the required numerical aid to an entrepreneur who may not be able to handle matters of mathematical relevance in business. It is therefore believed that the paradigm shift in the system of education including the review of policies on education to entrepreneurial base will tackle youth and graduate unemployment, high rate of poverty,

overdependence on foreign goods and technology, low economic development, among others. Consequently, mathematics which is an intrinsic quality of entrepreneurship should be encouraged and strengthened at all levels of the Nigerian educational system.

Yeovil (2016) carried out a study on gender differences and entrepreneurial skills acquisition in secondary school vocational studies. The study adopted a survey research design with stratified and purposive sampling techniques to select a total of 546 respondents. The study instrument for data collection was a questionnaire and the data collected were analyzed using independent t-test and the result showed that there is no significant difference between male and female students' acquisition of entrepreneurial skills.

Maxwell et al. (2014) carried out a study on an assessment of the taught entrepreneurship programme in Nigerian secondary schools. The primary objective of this study was to investigate the current entrepreneurship programme offered in Nigerian secondary schools as regards its consistence with inculcating the necessary enterprise skills required by secondary school students to start their own business or venture. This was targeted at curbing youth unemployment in Nigeria. A qualitative approach was used based on a survey method. Data was collated on the current trend of entrepreneurship programmes in secondary schools in Nigeria from three selected schools in the metropolitan area of Kaduna state. The study found out that the present entrepreneurship programme in the sampled schools covers the required content but the method of teaching was not practical oriented and was void of real life situations. Thus the programme was not effective at motivating secondary school students to start their own businesses.

Odumosu (2016) carried out a study on relevance of mathematics education to entrepreneurship skills acquisition towards the realization of vision 20:2020. It was noted that over the years, Nigeria has been clamouring to be self-reliant, self-sufficient and to achieve self-actualization. In realizing this desired dream, the country came up with vision 2020, which is to make Nigeria one of the 20 top economy nations in the world by the year 2020. To achieve this goal, there is need for entrepreneurship education. One major ingredient of such education is mathematics. The study sought to find out the relevance of mathematics to entrepreneurship skills acquisition. The data consisted of 200 pre-service teachers selected from three Colleges of Education in Lagos, Nigeria. The instrument used was twenty-four item questionnaire on entrepreneurship skills acquisition. The results showed that the knowledge of mathematics could positively influence the computational skill, problem solving skill, innovative skill, analytical skill, decision making skill and creative skill of the participants for successful entrepreneurship activities but the participants could not see the relevance of mathematics to managerial skill, though, mathematics is an effective way of communicating managerial ideas. Furthermore, there was significant difference in the opinion of pre-service teachers towards the relevance of mathematics to entrepreneurship development based on gender. However, the school type did not have significant effect on the opinion of pre-service teachers.

Purpose of the study

The purpose of the study is to assess staff perceived effectiveness of mathematics as a tool for entrepreneurial skills acquisition among undergraduate students in tertiary institutions in Cross River State. Specifically, the researcher intends to find out:

i. The extent to which mathematics can enhance entrepreneurial skills acquisition as perceived by staff of tertiary institutions.

ii. The extent to which male staff differ from female staff in their perception of the effectiveness of mathematics in enhancing entrepreneurial skills acquisition.

Research questions

The following research questions were raised to guide the study:

i. To what extent does mathematics enhance entrepreneurial skills acquisition as perceived by staff of tertiary institutions?

ii. What is the differences between male and female staff in their perception of the effectiveness of mathematics in enhancing entrepreneurial skills acquisition?

Hypotheses

The hypotheses were stated as follows for the study:

Ho1: The extent to which mathematics enhances entrepreneurial skills acquisition as perceived by staff of tertiary institutions is not significantly high.

Ho2: There is no significant difference between male and female staff on their perception of the effectiveness of mathematics in enhancing entrepreneurial skills acquisition.

Methodology

This research was carried out in Cross River State, Nigeria. There are seven public tertiary institutions including University of Calabar, Calabar; Cross River University of Technology (CRUTECH with four campuses); College of Education, Akampka; Federal College of Education, Obudu; Institute of Technology and Management (ITM), Ugep; Cross River School of Health Technology, Calabar; School of Nursing, Ogoja, and School of Nursing, Itigidi. Ex post facto design was adopted for this study. The population of academic staff in these tertiary institutions was 9,872. This information was obtained from the Establishment Divisions of the Registries of the tertiary institutions (Registry Units, 2020).

A sample size of 987 academic staff, which was 10% of the population, was drawn using stratified random and purposive sampling techniques. The basis for stratification was the institutions in which male and female academic staff was drawn. In each school, the researcher drew a sample frame for the 8 tertiary institutions and the nth term was used to determine the sample according to 10% already mentioned. A further breakdown of the sample showed that there were 635 male academic staff members, while their female counterparts were 352.

A researcher-developed instrument called "Assessment of Mathematics Effectiveness in Entrepreneurship Scale" (AMEES) was used for collecting data for analyses. Section A contained demographic variables, while section B was a 10-item 4-point modified Likert scale. The validation was carried out by two experts in Measurement and Evaluation, while the reliability was established using Cronbach alpha reliability estimate. The coefficient of

the sub scale was 0.88, which indicated that the instrument was good enough to consistently measure what is purports to measure. Thereafter, the instrument was administered to the sampled respondents.

The administration of the instrument was personally carried out in the sampled institutions by the researcher in an interval of three months. Data collected were subjected to statistical treatment using population t-test and independent t-test statistical techniques and the result is presented in the following section.

Presentation of results

Ho1: The extent to which mathematics enhances entrepreneurial skills acquisition as perceived by staff of tertiary institutions is not significantly high.

The variable involved in this hypothesis is mathematics as a tool to enhance entrepreneurial skills acquisition. To test this hypothesis, population t-test was used and the result is presented in table 1.

Table 1: Population t-test on the extent of mathematics as a tool for enhancing entrepreneurial skills acquisition as perceived by staff

Variables	N	Mean	Std Dev.	df	t-cal	p-val
Mathematics as a tool for enhancing entrepreneurial skills	10	34.53	7.98	986	17.43	.000

The result showed that t-cal=17.43, and p<.05. Since p(.000) is less than .05, this implies that mathematics as a tool to enhance entrepreneurial skills acquisition as perceived by staff of tertiary institutions is significantly high. Hence, the null hypothesis is rejected.

Ho2: There is no significant difference between male and female staff in their perception of the effectiveness of mathematics in enhancing entrepreneurial skills acquisition.

The independent variable in this hypothesis is gender categorized as male and female while the dependent variable is perceived effectiveness of mathematics in enhancing entrepreneurial skills acquisition. To test this hypothesis, independent t-test was used and the result is presented in table 2.

Table 2: Independent t-test analysis of the influence of gender on perceived effectiveness of mathematics in enhancing entrepreneurial skills acquisition

Variables	N	Mean	Std Dev.	df	t-cal	p-val
Male staff	10	21.12	6.98			
				985	1.21	.054
Female staff	10	20.78	7.0`			

The result showed that mean value (mean = 21.12) for male staff response is almost similar with the mean value (mean = 20.78) of female staff response. This shows that male staff do

not differ with female staff in their perceived effectiveness of mathematics in enhancing entrepreneurial skills acquisition. When the mean difference was tested using independent t-test, the result showed that t= 1.21, p>.05. Since p(.054) is ≥.05, this implies that there is no significant difference between male and female staff in their perception of the effectiveness of mathematics in enhancing entrepreneurial skills acquisition. Hence, the null hypothesis is retained.

Discussion of findings

Hypothesis one which attempts to examine the extent to which mathematics enhance entrepreneurial skills acquisition as perceived by staff of tertiary institutions was found to be significantly high. This implied that staff perception of mathematics as a veritable tool for enhancing entrepreneurial skills acquisition is high. This could be due to the fact that mathematics is considered as a subject that probes the mind and intellect. It helps the learner to think thereby developing skills like creativity, innovativeness and alertness. These skills are essential for any entrepreneur to begin his activities. This is in line with that of Ogundimu (2014a) who noted that for an entrepreneur who is interested in making profitable investments, his success heavily depends on commercial mathematics that contain topics such as simple and compound interest, amortization, annuity, inflation, mark of chains, graph theory and a host of others. Ogundimu (2014b) still noted that venturing into a new business requires a careful appraisal to measure the viability of such venture. Such appraisal requires mathematical techniques to make it a reality. While undergoing feasibility and viability appraisal, mathematics skills are required to put in place the projected statement of income and expenditure and so on.

On the hypothesis of finding out whether male staff differ from female staff in their perception of mathematics as a veritable tool for enhancing entrepreneurial skills acquisition, the result showed that there are no significant differences. This could be due to the fact that both male and female staff recognizes the importance of mathematics in shaping the thinking of the learner as well as helping them to be discipline in the approach of issues which is a key characteristics of mathematics scholars. The finding aligns with that of Yeovil & Colin (2016) who noted that male staff and female staff do not differ in their assessment of mathematics as a tool for effective entrepreneurial activities.

Conclusion

Based on the findings, it was concluded that mathematics enhances entrepreneurship skills acquisition.

Recommendations

It is recommended that mathematics should be made compulsory for all students in tertiary institutions, and that teachers with strong mathematics background should be employed to handle entrepreneurial education.

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