



## **Empowering Entrepreneurs with Quality Management Skills Through Acquisition of Mathematical Knowledge**

<sup>1</sup>Musa Sheriff Urama, <sup>2</sup>Ogara Edna Ekene & <sup>3</sup>Anyimba Grace Ngozi

Corresponding Author: [musasherry@yahoo.com](mailto:musasherry@yahoo.com)

<sup>1</sup>*Department of Entrepreneurship Education University of Nigeria Nsukka*

<sup>2</sup>*Department of Childhood Education Federal College of Education, Eha-Amufu*

<sup>3</sup>*Department of Business Education Federal College of Education Eha-Amufu*

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### **Abstract**

*Entrepreneurship is key to reduction of unemployment in the world today. Developing entrepreneur skills is a way of increasing entrepreneurship among the populace. Entrepreneur skills cannot be developed without effective knowledge of mathematics. This is one of the reasons that lead the curriculum planners of vocational education to include general mathematics, statistics and probability, business mathematic and commercial mathematics in entrepreneurship education as an effective tool for entrepreneurs to offer during their training. Mathematics if well taught can enable individual to learn to solve personal problems which can translate to solving problems on entrepreneurship activities thereby enhancing entrepreneurship skills. It also discussed how entrepreneurial skills can be developed through mathematics education. It also discussed entrepreneurship, entrepreneur, mathematics, and the relationship between them. It is recommended that the teaching and learning techniques used by teachers in imparting mathematical knowledge to entrepreneurs should be able to stimulate and expand student minds, and attract students interest towards entrepreneurship*

**Keywords:** Entrepreneurs skills, Entrepreneurship, Mathematics

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## Introduction

The rate of unemployment in Nigeria is rising day-in day-out. It has greatly affected the nation's economy and development as the graduates did not acquire enough skills that could make them self-reliant after graduation from tertiary institutions. This is caused by the type of education they received during their studies. As population continues to increase, the number of people seeking for jobs keeps rising. The unemployed people are roaming about the streets in cities and towns looking for white-collar jobs that are not available (Mafikuyomi & Ojetunde, 2019). Unemployment is a condition when a paid job is not available for those who are willing to work (Mafikuyomi & Ojetunde, 2019). It is a situation where graduates or people who seek for jobs cannot find any resulting to economic, social, political and psychological crises causing a lot of vices like hooliganism, banditry, armed robbery, political thug activities, kidnapping, insecurity, joblessness, skills shortage and so on (Mafikuyomi & Ojetunde, 2019).

These problems can be tackled by restructuring tertiary education to become functional which could encourage practical skills acquisition to facilitate the employability of graduates who will increasingly become self-employed, job creators rather than seeking for white collar jobs (Okebukola cited in Mafikuyomi & Ojetunde, 2019). In their contributions, Okachi and Amadi (2019) are of the view that education is the vehicle for self-reliance as such suggested that the Nigerian education system be structured such that it will be oriented towards the development of skills, productivity and creativity leading to entrepreneurship education. In realization of this, Onoshakpokaiye (2021), stated that one of the main aim of education is to assist the children earn their living and make them to be self-dependent as such, the national policy on education, it stresses the development of appropriate skills, mental, physical and social abilities and competences to empower the individual to live in and contribute positively to the society. To address the skills shortage, promote sustainable job creation, the education provided to citizen must be functional. That is why entrepreneurship education was introduced into the tertiary education curriculum. Entrepreneurship education is meant to liberate individual from over-reliance on others (FRN, 2013). Enhancing entrepreneurial knowledge and skills among youth in Nigeria has become a must if there is a need for national growth in terms of the economy.

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## **Entrepreneurship**

Entrepreneurship is one of the life and career skills students need to master that requires more than thinking skills and knowledge. Students develop life and career skills to face the complex life and career environment in an increasingly challenging world (Mahmud, et al; 2022). It has been identified as a means of providing employment and income generation in the country, as well as a panacea to poverty reduction and the country's appalling unemployment rate. Umar and Adamu (2023) view entrepreneurship as the act of establishing a business, arranging business transactions, and taking risks to profit from the skills gained through mathematics education in Nigeria. In addition, entrepreneurship is the willingness and ability of a person or persons to acquire educational skills to explore and exploit investment opportunities, as well as establish and manage a successful business enterprise.

Entrepreneurship is the act of being an entrepreneur. Amarjeet and Malik (2016) and Mahmud et al, (2022) defined entrepreneurship as a dynamic process of vision, change and wealth creation that requires application of energy and passion towards the creation and implementation of new ideas and creative solution. Success in entrepreneurship occur through creative ideas, extensive research work, plenty trials, identifying problems accurately, having good managerial ideas and consistent persistence of efforts. According to Inah and Agbudu (2022) asserted that the mathematics which students learn in school if applied will help learners in any entrepreneurial skill development. (Inah & Agbudu; 2022).

## **Entrepreneurs**

People need to find other ways to earn a living as such leading people to become entrepreneurs. Entrepreneurs are people who start companies with the hope of making a profit. Entrepreneurs set themselves apart from business owners by being visionary, by spotting a gap in the market and coming up with a product that fills that gap (Oxford Scholastica Academy, n.d).

Ogbo in Amarjeet and Malik (2016) viewed an entrepreneur as any individual who creates valuable ideas, which are put into practice to support economic development and job creation. In the same vein, Inah and Agbudu, (2022) defined an entrepreneur as a person who identifies and solves problems; he is creative, innovative, opportunist, risk taker, self-starter and open minded. Other traits/skills/behavior which are expected of one to acquire if one has to be a successful entrepreneur includes problem solving skills, decision making skills, innovative skills, computational and

analytical skills, managerial skills (ability to manage time, financial resources and people successfully), communicative skills (ability to sell ideas and persuade others). 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 mathematics (Amarjeet & Malik, 2016; Mahmud et al. 2022 ).

### **Mathematics and Entrepreneurs**

Venturing into a new business requires a careful appraisal to measure the viability of such venture of which the appraisal requires mathematical technique (Abubakar in Umar & Adamu, 2023). While undergoing feasibility and viability appraisal, mathematics skills are required to put in place the projected cash flow budget, projected statement of income expenditure and so on. The gradual planning process and decision making on what will be done in the future requires a good deal of mathematics. The application of mathematics in entrepreneurship has many purposes and functions.

According to Amarjeet and Malik (2016), various functions of an entrepreneur and the role of mathematics in developing these entrepreneurial skills include:

- i. The selection of a conducive environment bearing in mind the proper cost of transportation, supply of raw materials for which the entrepreneur needs to have thoroughly learnt arithmetic/calculations.
- ii. Calculations involving cost of transportation of finished products to the area where products are likely to be sold need proper knowledge of arithmetic.
- iii. The entrepreneur needs to work out the cost of production which requires the sound knowledge of calculations.
- iv. An entrepreneur needs to have mathematical knowledge to be able to plan and work out business activities effectively.
- v. Knowledge of mathematics will help an entrepreneur to preserve his financial resources effectively and utilize available financial resources to meet all his needs.
- vi. This mathematical knowledge, if properly learnt in school, will help an entrepreneur to calculate the gains and losses to know if the business is growing or not.

vii. Some areas of mathematics like percentages, decimal, fraction will enable an entrepreneur to manage business operations effectively.

### **Entrepreneurship in relations with Mathematics**

Mathematics is intrinsically linked to the development of entrepreneurship playing a vital role in various aspects of business management, creativity and innovation in decision-making and financial planning. A strong foundation in mathematics enables entrepreneurs to effectively manage costs, analyze financial data, make informed decisions with careful evaluation to determine its viability and ultimately improve their chances of success (People Development Magazine, 2023, Inah and Agbudu, 2022; Amarjeet and Malik; 2016). That is why the following type of mathematics are included in the entrepreneurship programmes for entrepreneurs to study. They are general mathematics, business mathematics, commercial mathematics, modeling, Statistics and optimization.

Mathematics skills are required to put in place the projected cash flow, budget, projected statement of income and expenditure, and other related issues while undergoing feasibility and viability appraisals. The planning process, which involves deciding current and what will be done in the future, necessitates a good deal of mathematics (Umar & Adamu;2023). The need to teach entrepreneurs mathematics is important as this will equip the entrepreneurs to meet their objective requirement of their ventures (Umar & Adamu;2023). In addition, Mathematics in entrepreneurship incorporates successful exploration of numerical, geometrical, and logical relationships. Its formulae help entrepreneurs compare income, costs, expenses, and profits. The various formulas are derived using various percentages, ratios, and equations. The various ratios are derived, such as inventory turnover ratios, profitability ratios, debtor turnover ratios, debt-equity ratios, and so on (Pal Kaur in Umar & Adamu;2023).

For any entrepreneur to analyze starting costs, operating expenses, revenue projections, and profit merging, proper financial management, entrepreneurs needed Mathematics to be useful in developing the type of skills needed to own and run their own business. According to [Dankravic](#) (2023), applications of mathematics in the entrepreneur strongly rely on these concepts which form the bedrock upon which financial decisions, strategic planning, and operational efficiency are built:

*Arithmetic Operations:* At the core of business math are [basic arithmetic operations](#) such as addition, subtraction, multiplication, and division. These operations are used daily in business transactions, from calculating sales revenues to determining profit margins.

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*Percentages and Ratios:* Percentages and ratios are essential for interpreting financial data and trends. Whether it's calculating the growth rate of a company's earnings or assessing the liquidity of assets, percentages and ratios are invaluable tools.

*Algebraic Equations in Business:* Algebraic equations come into play when solving complex business problems. These equations help in forecasting future trends, optimizing production processes, and making informed decisions.

Further element of mathematics needed by entrepreneurs as follows:

*Budgeting:* Creating a budget is the foundation of sound financial management. Math helps you allocate resources, estimate expenses, and plan for future growth. By using mathematical formulas and projections, you can [set realistic financial goals](#) and allocate funds where they are most needed (Dankravic, 2023)..

*Cost Management:* Entrepreneurs need to understand and manage costs effectively, including production costs, to transportation costs, and operational expenses. Mathematical calculations. Such as those mostly fractions, percentages, and ratios, are essential for accurately determining and controlling these costs

*Financial Analysis:* Analyzing Financial Statements, including balance sheets and income statements, requires a solid grasp of mathematical concepts and financial ratios. By performing calculations like liquidity ratios, profitability margins, and return on investment, will allows entrepreneurs to assess the financial health of their business, track performance, and make informed decisions about investments portfolio and expenses ([Dankravic](#), 2023).

*Decision Making:* Mathematical models and Statistical analysis can be used to predict future sales, expenses and revenue, enabling entrepreneurs to make data-driven decisions and optimize their business strategies (People Development Magazine, 2023) the importance of mathematics knowledge in business success).

*Resource Allocation:* Entrepreneurs often need to allocate limited resources effectively. Mathematics skills, such as optimization techniques can help them make optimal decisions about resources allocation to maximize efficiency and profitability (Inah & Agbudu; 2022); Oxford Scholastica Academy; 2025)

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*Inventory Management:* Mathematical concepts like inventory turnover and stock control are crucial for managing inventory levels efficiently; minimizing storage costs, and prevents stock outs.

*Business Planning:* Mathematical calculations are fundamental to creating realistic business plans, forecasting financial performance and securing funding using Statistics (Amarjeet & Malik; 2016).

*Risk Management.* Mathematics, particularly Probability and Statistics, helps entrepreneurs assess and manage risks associated with their ventures, such as market fluctuations, competition, and potential losses.

In addition according to Kaminski (2025) some other examples of how entrepreneurs uses mathematics to analysis data are:

*Market Research:* Entrepreneurs and bloggers use data analysis to conduct market research, which helps them understand their target audience, identify trends, and identify potential opportunities and challenges in the market.

*Customer Analysis:* By analyzing customer data, entrepreneurs and bloggers can gain insights into customer behavior, preferences, and needs. This allows them to tailor their products, services, and content to better meet the needs of their customers.

*Performance Metrics:* Entrepreneurs and bloggers track and analyze performance metrics such as website traffic, conversion rates, and sales data. This helps them identify areas for improvement, optimize their marketing and sales strategies, and measure the success of their campaigns.

*Content Optimization:* Bloggers use data analysis to determine which types of content perform well and resonate with their audience. They analyze metrics such as page views, bounce rates, and social shares to identify what content drives engagement and conversions. This enables them to create more targeted and impactful content.

*Financial Forecasting:* Entrepreneurs use mathematical models and statistical analysis and other forecasting techniques to project or predicting future financial performance, including revenue, sales, expenses, and profitability. This helps them make educated guesses based n historical data and market trends or informed decisions about budgeting, pricing, and investment opportunities (Dankravic, 2023).

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## Teachers' role in Entrepreneurs Mathematics

The issues relating to the teacher's level of knowledge about entrepreneurial mathematical skills revealed that not all teachers have knowledge related to entrepreneurial skills and competencies; this lack of knowledge makes it difficult to apply entrepreneurial mathematical knowledge in mathematics teaching. Depending on the content and pedagogical knowledge framework, knowing the content of mathematics teaching is a necessary but not sufficient condition for teaching (Mahmud et al, 2022).

Amarjeet and Malik (2016); Inah and Agdudu (2022); Dankravic (2023); Umar and Adamu (2023), shows that Mathematics plays important role in the in entrepreneurs success and is the integral part of subject for entrepreneurship, a course which no entrepreneur can neglect. Studies have shown that despite lofty relationship and vast utility of mathematics in entrepreneurship by entrepreneurs, there are still less acknowledgement of mathematics by entrepreneurs.

### Conclusion

Mathematics plays a crucial role in their business strategies and allows them to stay ahead of the competition. The application of entrepreneurial mathematics in teaching prepares students for entrepreneurial skills and thinking. It also helps the students to practice managing simple basic to complex sales projects and produced products based on knowledge mathematical skills. In order to make a profit, one needs to be on top of their finances, income and expenses. Having a good background in mathematics and arithmetic is vital to maximise the efficiency of one business and thus maximise profits. Presently, the application of mathematical knowledge and skills in acquisition of entrepreneurship is low and not encouraging,

### Recommendations

It is recommended that:

- The teaching and learning techniques used by teachers in imparting mathematical knowledge to entrepreneurs should be able to stimulate and expand student minds, and attract students interest towards entrepreneurship.
- Mathematics teachers should also know their students' needs and be well versed with the curriculum, teaching strategies, and assessment strategies in order to teach effectively

- There is need to enhance the mathematical background of entrepreneurs; and teachers with strong mathematical skills should be used in teaching entrepreneurs
- Mathematics education, as an inherent quality of entrepreneurship, should be encouraged and strengthened at all levels through direct school funding to maintain its status quo in all Nigerian educational systems.

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