Identifying the Causes of Low Student Enrolment in STEM Courses in Nigerian Higher Educational Institutions

[1]Akugbe Iguisi and [2]Sabrena Edomsowan
[1]Department of Chemical Engineering
[2]Department of General Studies
Edo State Polytechnic
Usen

Abstract
Because of students' poor engagement in science, the government's Higher Educational Institution (HEI) admission policy of a 60:40 science/arts ratio at Nigeria's Higher Educational Institutions (HEIs) has been unable to fully implement the programme. According to this interpretation, an economy cannot grow its human and material resources if it does not have a sufficient pool of suitably skilled workers in research and scientific-related sectors at all levels of government. For the foreseeable future, the STEM workforce will continue to be critical to our economic vitality, with contributions to innovation, technological growth, and economic development expected. As part of the effort to determine the root cause of this lack of interest, this research was conducted. After asking themselves why STEM-related courses were not offered at higher education institutions, students responded with six broad distinct groupings that might be classified as follows: According to the findings of the survey, the notion that STEM courses are difficult is the most significant factor preventing students from enrolling in STEM-related courses in college. When it comes to dealing with the issues that have been recognised. The government would have to play a key role in driving the process by putting in place policies that are viable and implementable.

Keywords: HEIs, STEM, Education, Policy

Introduction

The government and its agencies, such as the Nigeria Education Research and Development Council (NERDC), as well as some professional associations, such as the Science Teachers Association of Nigeria (STAN), have worked hard over the years to increase student interest in science at all levels of education. However, despite these efforts, student enrolment in the sciences has continued to decline

over time (Nworgu, 1990; Maduabum, 1994, Salau, 2002, Israel, 2005). For those who choose science, a significant number of students simply register for a science subject because it is required by their school (FRN, 2004). It's no surprise that science is a difficult topic to teach in schools, according to Yager and Penick (1987).

Due to students' limited engagement in science, the government's admittance policy for higher educational institutions (HEIs) of a 60:40 science/arts ratio has been hampered in its efforts to implement the policy. This circumstance poses a threat to the nation's objectives in the fields of science and technology. Studies conducted so far in Nigeria (Maduabum, 1996; Akinseinde and Ariehrie, 2000; Salau, 2002; Israel, 2005; Longbap and Nok, 2007) have primarily focused on students' enrolment and performance in science at the secondary school level (Maduabum, 1996; Akinseinde and Ariehrie, 2000; Salau, 2002; Israel, 2005; Longbap and Nok, 2007). Secondary school is an educational institution.

Primary and secondary education are intended to prepare students for useful living in the community and for higher education, according to the National Policy on Education of the Federal Republic of Nigeria (FRN, 2004). The broad aims of secondary education within the overall national objectives are as follows: 1. preparation for useful living in the community; and 2. preparation for higher education.

To be more explicit about it, the policy paper stated that secondary schools should prepare pupils to live efficiently in our current age of science and technology, among other things. Given this, the government and professional organisations such as the Scientific Teachers' Association of Nigeria (STAN) have maintained their regular contributions to science education in order to ensure that science is successfully taught in Nigerian primary and secondary schools. Note that the trend in most secondary schools in Nigeria suggests that the number of students who opt to pursue science topics at the Senior Secondary School level has been decreasing in recent years (Nworgu, 1990; Maduabum, 1994, Salau, 2002). Despite the efforts and interest of the government in science, This has resulted in a decrease in the number of students enrolling in science courses at higher education institutions. There are few students enrolled in science courses in higher institutions, according to the data available (Madabum

and Madubuike, 1995, Nkpa and Olatunji, 1996; Maduabum, 2000; Maduabum, 2005).

In today's world, science has evolved into a precondition for the development and advancement of most nations in all fields of human endeavour. Nations such as the United States of America (USA) and the United Kingdom (UK) have risen to positions of prominence by applying a scientific approach to their lives and work. It must be stressed that advances in science and technology have made it possible for people all around the world to enjoy higher standards of living. Science and technology have made significant contributions in the fields of medical, solar and nuclear energy development, enhanced land and water resources, the creation of immediate communication networks around the world, and the rise of the electronic age in general. Even more concerning is the fact that this tendency has resulted in a shortfall in the number of competent candidates required to fill the quotas allotted to science and science-related courses in the Higher Education Institutions (Abdulraman, 1992, Maduabum, 2000). According to this interpretation, an economy cannot grow its human and material resources if it does not have a sufficient pool of suitably skilled workers in research and scientific-related sectors at all levels of government.

As a result, the purpose of this study is to determine the factors that have contributed to the decrease and lack of interest in STEM-related courses among students enrolled in higher educational institutions in Nigeria. Students will be asked to reply to some elements that have been identified in the literature, and this is the goal. The findings will be analysed, and the conclusions will be given.

The Study's Goals and Objectives

Among the objectives of this research are:

1. to determine why science disciplines are so rarely chosen by pupils.
2. Identify the causes that are to blame for it.
3. To provide any recommendations that are necessary to arrest the tide.

The Importance of the Research

There is a significant disparity between students' preferences for scientific and non-science subjects. This has always been reflected in the amount of students who are actively involved in science disciplines in their respective schools. Every

year, according to the research evidence, the number of students enrolled in science courses at Nigerian higher education institutions decreases. There is no doubt that science education is confronted with significant obstacles throughout the world (Obiadezie, 2016 & Aina and Adedo, 2013).

This study comes at an opportune time since it will help to reverse the loss of interest among students in STEM courses in school by addressing the causes mentioned. Governments, school administrators, parents, and education planners are expected to benefit from this, since they will be better able to identify strategies and policies to halt this deteriorating scenario in its tracks.

Science, Technology, Engineering, And Mathematics (STEM)

Education is now required to offer learners with hard skills as well as soft skills in order to develop competent human resources that can compete on a global scale. Educating the population is the most crucial factor in a country's development. Education that is able to provide students with learning experiences so that they can solve issues, think deeply, manage projects, and use a variety of technological and informational tools is what is required today. There are several subjects in education that are essential to learn because they provide numerous benefits both in real life and in integration with other disciplines. These subjects include: (Milaturrahmah, Mardiyana and Pramudya, 2017).

In the field of science, technology, engineering, and mathematics, the term "STEM education" refers to the teaching and learning that takes place in these fields. Educational activities spanning all grade levels — from pre-school to post-doctoral — are often included, and they can take place in both official (e.g., classrooms) and informal (e.g., afterschool programmes) contexts (Gonzalez and Kuenzi, 2012).

As a result of the current debate over the existence of STEM shortages, there is an important question regarding the development of a national strategy for sustaining economic innovation in countries around the world, particularly at a time when scientific research, technological innovation, and related work in STEM occupations have become more integrated globally (NAS, 2007).

The Committee on Prospering in the Global Economy of the Twenty-First Century of the National Academy of Sciences (NAS) is responsible for this report. 2007. Raising America Above the Gathering Storm: Energizing and Recruiting America for a More Prosperous Economic Future, The National Academies Press is located in Washington, DC.

For the foreseeable future, the STEM workforce will continue to be critical to our economic vitality, with contributions to innovation, technological growth, and economic development expected. Capable STEM students, ranging from primary school kids all the way up to the most highly educated students at the postgraduate level, will continue to be required in the pipeline for vocations that will fuel our nation's innovative capability and capacity in the future. Many people have legitimate concerns about our children' capacity to "fill the positions that will keep our country at the forefront of innovation" because of the importance of STEM employment to our nation's economic strength and capability of successfully adapting to technological change (NAS, 2007).

Courses Related to STEM

In the sense that you will have to complete these subjects before you may pursue a Higher Educational degree in STEM, the following courses and their subsidiaries are closely related to STEM.

The knowledge of raw materials, manufacturing processes, quality control, costs, and other approaches for maximising the efficiency with which commodities are manufactured and distributed is referred to as production and processing.

The following topics are covered in detail:
computers and electronics; circuit boards; processors; chips; electronic equipment; computer hardware; computer software; and computer applications and programming.
Understanding of the practical application of engineering science and technology is required for anyone working in the field of engineering and technology. This comprises the application of principles, processes, procedures, and equipment to the design and manufacture of a wide range of goods and services, among other things.

Understanding of design approaches, tools, and principles that are involved in the development of accuracy is required.
Houses, buildings, and other structures, such as highways, roads, and bridges, require a thorough understanding of the materials, methods, and tools used in their construction or repair. • Building & Construction:
Knowledge of machines and tools, including their designs and functions as well as repair and maintenance, is required in the mechanical field.
Calculus, statistics, and its applications are all covered under the umbrella term "math."
Understanding and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, as well as mechanical, electrical, atomic and subatomic structures and processes. • Mathematics: Knowledge of mathematical concepts and operations.
The study of chemical composition, structure, and properties of substances, as well as the chemical processes and transformations that they go through, is referred to as chemistry. This encompasses the applications of chemicals and the interactions between them, as well as hazard signs, manufacturing techniques, and disposal strategies.
Plant and animal species, as well as their tissues and cells, as well as their various roles, interdependencies, and interactions with one another and with the environment, are covered in biology.

Numerous high-profile studies have raised the alarm about the fact that we are underproducing STEM talent, according to Carnevale, Smith, and Melton (2018). It is vital to note that there are chronic shortages in courses relating to STEM areas at this time. having established the tone for the discussion Numerous analysts, on the other hand, have attributed the STEM worker shortages to inadequate preparation and low academic performance at the elementary and secondary school levels.

A total of five primary subgroups are included in STEM occupations: • Computer occupations • Mathematical Science occupations • Architects, surveyors, and technicians • Engineers and engineering technicians • Life and physical science occupations

STEM implemented early in school will have a significant impact on a country's ability to confront global challenges. As previously stated, schools must produce human resources who are knowledgeable and competent, with the ability and creativity to lead the developed countries. STEM implemented early in school will have a significant impact on a country's ability to confront global challenges (Hidayah, 2014). Technological innovations can be improved to meet global concerns by incorporating Science, Technology, Engineering, and Mathematics (STEM) education into the curriculum.

Education Policy

The low number of students enrolled in STEM-related courses in Nigeria's educational sector has become a major source of concern in recent years. Educational policies set the tone for educational activity and provide guidance. Policy actions in the field of education are usually taken by governments to set the direction of a particular educational system (Okoroma 2000:190). A characteristic technique in which the society inducts its young members into full membership, according to Osokoya (1987), is through the process of "ducation." As a result, every contemporary civilization need a set of educational rules to guide it through the process of initiation. However, while a policy describes the region in which decisions are to be made, it does not determine the decisions themselves. Most of the time, it serves as a general guidance that makes decision-making easier.

This strategy was controversial because it was unable to meet the national goals of the country, despite its best efforts. It was in 1969 that a National Curriculum Conference was convened, during which the inherited curriculum was examined and new national goals for Nigerian education were set. A foundation for the National Policy on Education is provided by Nigeria's philosophy of education, as articulated through the nation's objectives. In accordance with the Second National Development Plan, which has been approved as the required foundation for the National Policy on Education, Nigeria has five major national objectives that must be achieved (Okoroma, 2006).

They are the foundation for the construction of: • a free and democratic society; • a just and egalitarian society; • a united, strong, and self-sufficient nation; • a

great and dynamic economy; and • a land of bright and ample opportunities for all residents (FRN, 1998).

An examination of the efforts made to implement the primary and secondary parts of Nigeria's education policy will provide insight into the relationship between policies and the achievement of goals through implementation, as well as the effectiveness of these efforts.

González-Kuenzi (2012) asserts that STEM education serves as a robust foundation for individual and societal economic success. The United States and other countries, regrettably, have fallen behind in terms of fully appreciating the benefits of STEM education and training.

The reasons for this lag in the production of STEM graduates have been extensively researched and documented. They are as follows (according to Gonzalez and Kuenzi, 2012; Thomasain, 2011):

• The absence of rigorous math and science standards in primary schools. Standards in math and science have differed widely from state to state, and in many cases, do not assess students' ability to apply concepts and solve problems in real-world situations.
• There is a scarcity of qualified instructors and teachers. In the primary school system, a chronic shortage of qualified math and science teachers in the classroom has resulted in many classrooms being filled by teachers who hold neither a certificate nor a bachelor's degree in their given subject area.
• An insufficient amount of preparation for college STEM studies. The capacity of a student to enter and complete a STEM postsecondary degree or certification is sometimes threatened because the child did not take sufficiently demanding courses in high school or spend enough time practising STEM abilities in hands-on activities throughout their high school years.
• Inability to pique students' interest in math and science subjects. The math and science topics are generally taught in isolation from other subjects and the real world in most primary school systems, and kids are often unable to recognise the links between what they are learning and potential STEM career paths.
• The inability of the postsecondary system to satisfy the demands of STEM-related jobs. Higher education institutions, as well as research institutions, have

made little or no attempt to expand the number of STEM degrees or certificates that are awarded to students.

The Current Scenario in Nigeria

The number of students enrolled in science courses in Nigerian institutions, particularly secondary schools, has been steadily declining (Aina and Akanbi, 2013). In 2003 and 2004, Akanbi (2003) and Bamidele (2004) reported a low enrollment of students in science topics and recommended for more inquiry. Given the critical role that research plays in a nation's technological growth, the study is particularly timely at this point in time. According to Omoesewo (2009), science education has the potential to provide solutions to many of the technological difficulties that the country is currently confronting.

Every year, according to the research evidence, the number of students enrolled in science courses at Nigerian higher education institutions decreases. There is no doubt that science education is confronted with significant obstacles throughout the world (Obiadezie, 2016 & Aina and Adedo, 2013). For example, due of a leadership crisis and widespread corruption in Nigeria, the situation is different. Teaching and learning scientific knowledge are important components of science education, with the goal of disseminating scientific knowledge to the general public in order to promote sustainable development. According to Aragon (2016), in Nigeria, the teaching and learning of scientific information (Science education) begins as early as pre-school age.

Education in science in Nigerian schools has faced a number of difficulties since the country gained its independence in 1960. It is not only Nigeria that is experiencing difficulties in science education; it is a worldwide concern. According to research reports, there is a scarcity of trained teachers to teach many of the science courses in schools all over the world, particularly in developing countries (Forni, 2007; Subair and Talabi, 2015; Aragon, 2016). In their classrooms, science instructors report feeling overwhelmed by the demands and complexity of their jobs, as well as alone and unsupported by their colleagues (Mangrubang, 2005). In underdeveloped countries such as Nigeria, scientific instructors have high status, but their pay is extremely low, and science teaching is no longer the first professional choice for many young people in the country (Adesoji, 2018). For the teachers, there is a lack of drive and enthusiasm. Employees' ability to perform

depends on the level of motivation they have acquired as individuals to do the activities necessary to achieve the organization's objectives (Panjwani, 2018). Motivation can be defined as a driving force within a human organism that moves or causes a person to wish to channel his or her behaviour toward the achievement of an organisational goal or objective (Abdullahi and Jimoh, 2018).

The residents of any country that wishes to see their nation's ambition of scientific and technological growth come true must demonstrate remarkable proficiency in physics and other scientific areas. No country can thrive economically if the next generation does not perform well in the scientific field.

More concerning is the fact that this tendency has resulted in a decrease in the number of eligible candidates available to fill the quota set aside for science and scientific-related courses in universities (Abdulraman, 1992, Maduabum, 2000).

Methodology, as well as results and conclusions
The following is the research technique that was followed in practise: Consultation of relevant literature, which included books, reports, and journal publications.
Some students from higher education institutions were simply asked why they did not pursue courses in STEM fields.

Their responses were included in the results, which were then analysed. A total of 150 students enrolled in arts and social science courses were consulted or utilised in this study.

The responses were categorized into six major factors as seen in Table 1.

Table 1: showing the categories of responses and the frequency

S/No	Responses	Frequency
1	Teacher's factor	32
2	Textbook factor	27
3	Equipment factor	15
4	Too abstract	19
5	Perceived to be difficult	41
6	Too much calculation	16

	involved	
		150

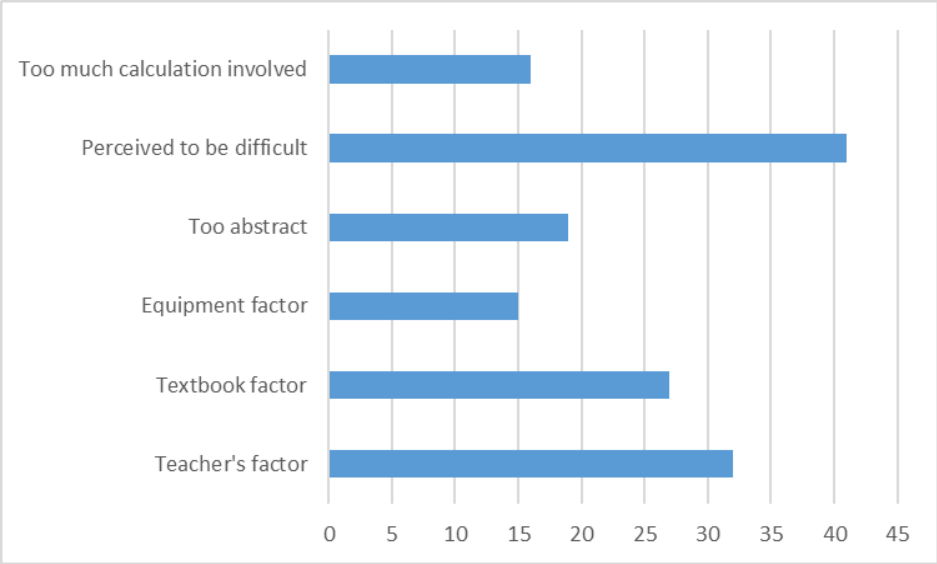

Figure 1: bar chart presentation of table 1.

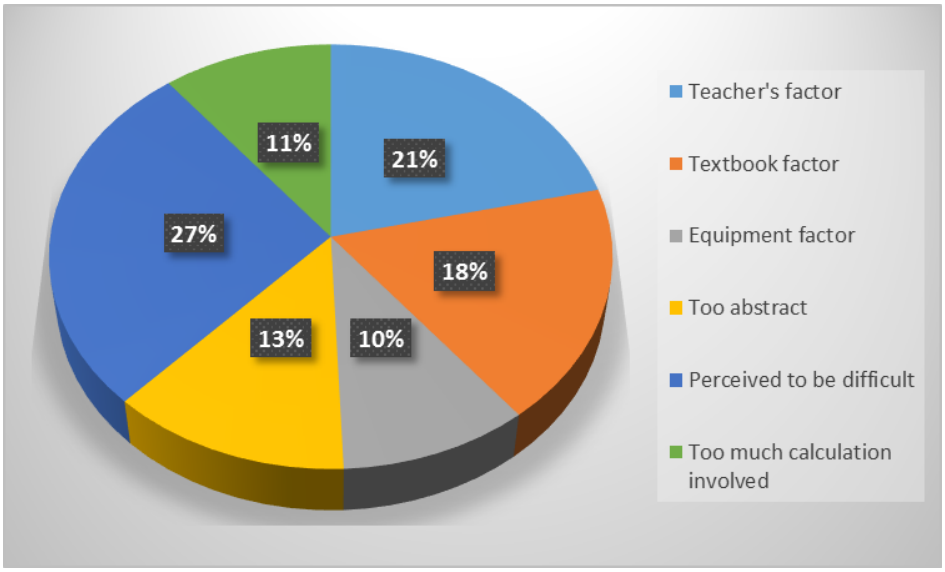

Figure 2: showing a pie chart and percentage presentation

The study shows that perception of the fact that STEM is difficult is the most important factor militating against students offering STEM related courses. This factor has a frequency of 41 and makes up 27%. This is followed by teachers'

factor and textbook factor. The next is being the fact that it is too abstract, there is too much calculations and finally equipment factor for practical.

Conclusion and Recommendations

Six major distinguished groups were identified from students' response to the question "why didn't they offer STEM related courses in HEIs". The six groups identified were Teacher's factor, Textbook factor, Equipment factor, too abstract, perceived to be difficult and Too much calculation involved. From this from the most important to the least important factor in the research are: (1) Perception that it is too difficult, (2) teachers' factor which may have to do with teaching and motivational skills, textbook factor which may have to do with the fact that textbooks used are majorly foreign and students' find them difficult to comprehend because they cannot relate probably to illustrations used, (3) that it is too abstract which may have to do with instructional materials and no practical equipment available, (4) it involves too much calculation (5) that there is too much calculations in STEM and finally not materials, apparatus, equipment for practical. Haven identified the keys factors, the recommendations will be to seek ways to address each of the factors. Here government will have to play a prime role by putting workable and implementable policies to drive the process.

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