

APPLICATION OF FUNCTIONAL SCIENTIFIC KNOWLEDGE TO IMPROVING STUDENTS' ENROLMENT IN SCIENCE SUBJECTS IN SECONDARY SCHOOLS IN EBONYI STATE: AN OPINION

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Abstract

In view of the importance of functional science education as the bedrock for the accomplishment of science and technological development of any nation, it becomes necessary to look at students' enrolment in science subjects in the secondary schools in Nigeria. To achieve this, this paper examined the enrolment of students in science subjects in seven secondary schools in the Abakaliki metropolis of Ebonyi State. From the data obtained from the schools, it was observed that the enrolment of students in science subjects was very low compared to the other Arts and Social Sciences. It was also observed that such factors as: lack of manpower, lack of infrastructural facilities, absence of laboratories and science equipment, lack of motivation to science teachers, apparent abstractness of science subjects, and lack of science textbooks, are probably responsible for the low enrolment of students in the science subjects. Finally, to improve and increase the enrolment of students in science in the secondary schools, the paper examined the application of functional scientific knowledge by the teachers and also recommended, among other things, that science laboratories and equipment should be provided, science teachers should be motivated, and the teacher should assume his role firmly in science teaching for effective learning.

Introduction

Worldwide, science education has been recognised as a prerequisite for science and technological development. Contemporary innovations globally hover around science and technology. In science education, students are encouraged to think and act as responsible scientists. It provides opportunities for them to acquire relevant functional knowledge and skills associated with scientific processes for the advancement of science and technology (Udu, 2017). Adikwu (2008) revealed that education through the study of science and technology produces economic benefits and contributes to the country's growth and wealth by increasing the productive capacity of its people.

Unfortunately, the enrolment of students in this science education in Nigeria, especially in Ebonyi State, is not encouraging at all. According to Udu (2020), students do not achieve as well as they

should in the sciences because of problems in the teaching and learning process. This affects the enrolment of students in the subjects. Experiences from schools show that students achieve little or no skills in science at the end of their programme due to some factors, such as a lack of interest and other factors. This lack of interest shown by the students who study science subjects makes it difficult for those who would have wanted to study science to stay away because they are not being encouraged by those who are studying it. Rather, there is a rapid withdrawal by those students who were already studying or had the intention of studying science.

As revealed by Udu (2020), secondary school is supposed to be the starting point for future scientists. But in these secondary schools, science subjects are made so uninteresting that in a class of forty students, you could only find ten or fifteen students who are science inclined. There are so many factors that inhibit students' interests and, of course, lower their performance and achievement, which brings about low enrolment in science. These include, among other things, lack of science teachers, lack of qualified science teachers (where they exist), absence of laboratories and modern science equipment, lack of motivation in science teachers, apparent abstractness of science, non-application of science to life situations in the class, etc. (Onyishi 2007, Udu, et al. 2020)

To increase the enrolment of students in science, increase students' interest level, and of course, increase performance and achievement, science should be presented to the students in such a

way as to capture their interest. One way of achieving this is by the application of functional scientific knowledge. Every concept taught in science should be followed with examples of how such a concept should be applied in everyday life (Udu, 2017).

Meaning of Science

The term science, which has to do with nature, is derived from a Latin word "scientia" meaning what a fact is, what is known, truth in nature. According to Adamu (2000), science involves various complex activities of man, which will lead to the explanation of observable behaviour of things that exhibit characteristics in themselves, which can also be predicted. Also, according to Ali

(2002), science involves "doing" and is concerned more with various activities of the investigative process about developing, acquiring, and controlling knowledge, skill, capacity, and attitude about the natural factors of the environment. Through these activities and processes, veritable and reliable information is gathered for the use of science and other science-related disciplines. Onyishi (2004) sees science as that which has to do with all the processes involved in the identification of problems in the human environment and applying all human senses to find a solution to the problem. In his own view, Aniodoh (2001) defines science as a body of knowledge arrived at through systematic, procedural processes based on tentative observations and experiments. Accordingly, Udu et al. (2020) note that science essentially consists of an attempt to understand the relations among selected aspects of things and events in the real world, an attempt that should have both intuitive and logical components and must be based on observation and tested by further observation. Continuing, Udu et al. added that science is not a technique or a body of knowledge, though it uses both. It is rather an attitude of inquiry, observation, and reasoning with respect to the world. It can be developed, not by memorizing facts or juggling

formulas to get an answer, but only by actual practice, of scientific observation and reasoning. From the foregoing, it is interesting to know that Science is the study of nature. It is an exploration of natural phenomena. It seeks to provide a consistent model of the universe. It therefore explains why and how things happen. Its task is to explain natural events, processes, or phenomena. It seeks to disclose universally valid, objective, and verifiable relationships in order to make predictions and understand causal relationships and systems in nature. One can understand very clearly that science can be viewed as a process as well as a product (Aniodoh, 2001).

Enrolment of Students in Science Subjects in Ebonyi State

The importance of science education to any nation, especially a developing nation like Nigeria, cannot be overemphasized. To realise this importance and achieve scientific literacy necessary for reasonable socio-economic development and increase enrolment in science, the interest of the learner is paramount. Despite the clarion call and policy of government and other related agencies in favour of science, the enrolment of students in science in Nigeria and Ebonyi State in particular is still very poor compared to the other disciplines in Arts and Social Sciences (Onyishi 2007, Udu 2020).

The enrolment and achievement of students in science subjects in the secondary schools have been observed to be very poor in recent times. This was proved by the enrolment of students in the science subjects obtained from secondary schools in Abakaliki metropolis in Ebonyi state. It is shown in Tables 1 and 2 below.

The tables of total enrolment of students in the schools and in science subjects from seven (7) secondary schools in Abakaliki metropolis are shown below. The secondary schools used for this study were government-owned secondary schools only.

Table 1. Total Enrolment of Students in the Secondary Schools 2022/2023 Academic Session

Name of School	Total No. of Students		
	M	F	Total
Girls High School Abakaliki	-	1,609	1,609
Army Day Sec. Sch. Abakaliki	805	833	1,638
Comm. Sec. Sch. Ekumenyi	388	225	613
Comm. Sec. Sch. Ndiuruku	121	151	272
Comm. Sec. Sch. Akpeamachi	446	335	781

Comm. Sec. Sch. Ndiebo-Amachi	532	467	999
Comm. Sec. Sch. Azuoffia Edda	119	50	169
Total	2,411	3,670	6,081

Table 2. Enrolment of Students in Senior Secondary Classes and in Science Subjects 2022/2023 Academic Session

Name of school	Total no. of stds in S.S classes			Total no. of science students			% of science students
	M	F	Total	M	F	Total	
Girls High School Abakaliki	—	780	780	—	110	110	14.1
Army Day Sec. Sch. Abakaliki	390	425	815	118	81	199	24.4
Comm. Sec. Sch. Ekumenyi	183	107	290	40	20	60	20.7
Comm. Sec. Sch. Ndiuruku	50	70	120	17	10	27	22.5
Comm. Sec. Sch. Akpeamachi	200	100	300	30	10	40	13.3
Comm. Sec. Sch. Ndiebo-Amachi	256	144	400	30	12	42	10.5
Comm. Sec. Sch. Azuoffia Edda	50	20	70	12	3	15	21.4
Total	1,129	1,646	2,775	247	246	493	17.77

Source: Statistics unit, Ebonyi State Secondary Education Board, Abakaliki, 2024

From the tables above, it was observed that the enrolment of students in science is very poor, based on the total percentage enrolment of 17.77. Specifically, the percentages of enrolment of students in the schools are: Girls High School, Abakaliki, 14.1%, Army Day Secondary School, Abakaliki, 24.4%, Community Secondary School, Ekumenyi, 20.7%, Community Secondary School, Ndiuruku, 22.5%, Community Secondary School, Akpeamachi, 13.3%, Community Secondary School, Ndiebo-Amachi, 10.5%, Community Secondary School, Azuoffia Edda, 21.4%. From Table 2 above, it was deduced that none of the schools had up to 25% enrolment in the science subjects. Also, Army Day Secondary School, Abakaliki, had the highest enrolment of 24.4%, while Community Secondary School, Ndiebo-Amachi, with a percentage enrolment of 10.5%, had the lowest enrolment of students in the sciences.

In comparing the two schools, the one with the highest percentage enrolment and the one with the lowest percentage enrolment of students in science subjects, one can infer that such factors as the location of the school, availability of laboratory and science equipment, and socio-economic status of parents, would have been responsible for the differences in the enrolment. These would be investigated further in our follow-up research.

When we talk about the location of a school, we are talking about the environment of the school. Basically, the environment has a direct or indirect influence on human abilities; it enhances or inhibits the ability of human beings. It is only when a teacher considers an environment favourable to him that he begins to be productive in that environment, adapting his teaching to the very environment, and this is what science teaching demands (Udu et al. 2020). Continuing, Udu et al. maintain that the location of the school has a role to play in the enrolment of students in science subjects. If the school is located in an urban area, the enrolment of students in science subjects would be greater than when the school is located in a rural area. From table 2 above, Army Day Secondary School, Abakaliki, which had the highest enrolment of 24.4%, is located in the urban area of Abakaliki, while Community Secondary School, Ndiebo-Amachi, with a percentage enrolment of 10.5%, is located in the rural area of Abakaliki metropolis.

According to Iwu, Ike, and Okoye (2002), laboratory work is a unique source of teaching and learning in science because science students can observe and manipulate materials to demonstrate certain aspects of the subject matter that has been learnt in class through lectures, discussions, and textbooks. Hence, practical work provides students with opportunities to engage in processes of investigation and inquiry. Udu (2017) maintains that laboratory and science equipment are also factors that can affect the enrolment of students in science. Udu stressed that schools that have laboratory and science equipment will have more students in the science subjects than schools that do not have laboratories and science equipment. Based on that, Army Day Secondary School, Abakaliki, has a laboratory that is better equipped than that of Community Secondary School, Ndiebo-Amachi. This might have accounted for the higher enrolment of students in the school.

The question is: what are the probable factors responsible for the general low enrolment of students in the science subjects?

Probable Factors Responsible for the Low Enrolment of Students in the Science Subjects

One of the major probable factors militating against students' enrolment in science subjects is a lack of interest by the students as a result of other factors such as lack of manpower, lack of infrastructural facilities, absence of laboratories and science equipment, lack of motivation to

science teachers, apparent abstractness of science subjects, and lack of science textbooks (Onyishi 2007, Udu 2027, Udu 2020). These factors hinder the presentation of science and science-related subjects in such a manner as to entice the students in order to increase their interest and hence increase their performance, which will in turn increase the enrolment.

Lack of Qualified Manpower

Oyedepi (2002) warned that good and real science teachers were increasingly becoming an endangered species and might be extinct in the nearest future. Science teaching calls for dedication and commitment and requires a well-qualified and educated science teacher. To get good and real science teachers who can face the challenges of the 21st century, the standards and morale of the science teachers must be uplifted. Their conditions of service need to be improved (Adamu 2000).

The number of qualified science teachers is very small. Personal observation in the schools visited proved this. Some schools do not have teachers in science subjects. There is no way the students can read science on their own, without being guided. These of course lower or entirely take away the students' interests from the subject. This brings about poor performance in the subjects by the students and as a result they shy away from the subjects. This results in the low enrolment being experienced in the subjects. **Absence of Science Laboratories and Equipment**

Science is a practical subject. It cannot be learned in a vacuum. To capture the interests of the students and increase their performance and enrolment, science laboratories and equipment must be available and conducive for teaching and learning of science (Onyishi 2004).

Lack of Motivation of Science Teachers

The level of motivation of science teachers is very low. The teacher is faced with a lot of stressful factors in the school environment. The teacher does the administrative function, oversees class and laboratory facilities, and ensures that students' attitudes are friendly and conducive to the delivery of good quality lessons in science (Oyedepi 2002). This affects the teacher's output, which will also affect the interests and enrolment of the students.

The Teachers' Personality and Teaching Methods

The teacher's personality and his teaching methods go a long way in influencing students' interest and attitude in science. The way and manner in which students perceive a teacher affects their performance in science. If the students perceive the teacher as a role model, they will want to learn and have an interest in the subject (Onyishi 2007).

Apparent Abstractness of Science

The mere mention of any science subject, especially the physical or natural science subjects, scares the students away. This is due to the apparent abstractness of the science subjects, where letters and symbols are used (Udu et al. 2020).

Lack and Inadequacy of Science Textbooks

There is not enough literature in science subjects. The few ones available are written in foreign cultures with illustrations that are not common with the students' background. The students will understand a concept more if the illustration used in the explanation is from the students' immediate environment. With this, the interest of the students will be high in such a subject (Udu 2017).

Applying Functional Scientific knowledge as a means of Improving Students' Enrolment in Science Subjects

Science subjects should be presented in such a way as to give the recipients the power to apply such scientific knowledge in reality to achieve success in life. We know that knowledge is power; hence, functional scientific knowledge is power. Scientific knowledge is functional when such knowledge can be organised, classified, and put into action. Science should be presented in such a way as to show students the practical application of some concepts in everyday life activities that are within their environment (Onyishi 2007, Udu 2017).

The main objective of science education should be to give the recipient power, that is, the ability to cope better with men and things, to become more efficient in the great struggle for existence (Onyishi 2007).

True science education increases students' strength to grasp, to hold, and more especially to utilise the knowledge to solve daily problems, practical ability to meet issues, and to solve difficult problems. It may not matter how much theory you have stored up in your mind if you cannot marshal your scientific knowledge at will and concentrate it upon a given problem to proffer a solution to such a problem. Every bit of scientific knowledge should be practiced to achieve success in life (Adikwu 2008, Udu 2020).

A student who is scientifically educated is supposed to be, he who is so trained in his perceptive ability, in his analytical powers, so trained in all his abilities, put him down in the midst of difficult surroundings, he will be able to master his conditions, instead of being overwhelmed by them (Udu 2020). The student who can master himself and master the surroundings, wherever he may be, only gives him a little time; he is a scientifically educated individual. Therefore, practical life and comprehensive command of one's native resources constitute true education and make it interesting. So, what should be uppermost in the minds of science educators to increase the interest of students and increase enrolment in science should be, what practical skills do I impact on my students, what practical skills do they know, and not where they were educated.

Recommendations

To realise the objectives and make science interesting to students to improve their enrolment, the following steps should be taken;

Re-orientation of Teaching and Learning of Science

Teaching and learning of science should be more practically oriented with illustrations from the students' immediate environment, and not the lecture method employed in most of our secondary schools in Abakaliki, Ebonyi State. Any concept taught in science, no matter the level, should be followed with its practical application to everyday life. This may help to improve the students' interest and, by so doing, increase the enrolment.

Revision of Science Curriculum

The science curriculum should be redesigned to include more practical life applications of science with examples from the immediate surroundings of the students. This as well will make science more meaningful to the students and, of course, increase their interest and enrolment. Attention should not be paid to theories more than to the practical.

Provision of Laboratories and Science Equipment

For science to be meaningful and interesting to students, in order to be able to apply what they have learnt to realities, so as to have the required power to succeed in life, standard laboratories and modern equipment are inevitable. The interest of the students and better performance cannot be guaranteed without adequate and functional laboratories, science equipment, and materials.

Textbooks

A close look at the science textbooks in Nigeria shows that most of the science textbooks being used in our schools are written in a culture quite different from the culture of the students. The illustrations are not drawn from the students' immediate environment. This makes science difficult to understand and, hence, appear uninteresting to the students. Our science teachers should strive to write more textbooks with illustrations that are within the students' environment, so that the students should be able to understand and apply such knowledge to everyday life activities. By so doing, there will be more students interested in science, and this will bring about an increase in the enrollment of students in the science subjects.

The Teacher factor

The role of the science teacher can hardly be overemphasized in the teaching and learning environment. The teacher is very important in science. The teacher should be humane; He should not make himself artificial and should not make science artificial. He / She should be businesslike

and not carefree. He should pay attention to details in doing things and not do things carelessly. In being business-like, the teacher should be able to help, challenge, and oversee students' activities in a science lesson and in a science laboratory.

Conclusion

The importance of science to national growth and development cannot be overemphasized. But the enrolment of students in these science subjects needs much to be desired. This paper examined science teaching in relation to the enrolment of students. It enumerated some of the factors that militate against the enrolment of students in the subjects. It went further to proffer how the application of functional scientific knowledge can help students have more interest in the subject, thereby increasing their enrolment. It recommends that to realise this objective of increasing students' enrolment in science subjects, teaching and learning of science should be in a conducive environment, the science curriculum should be re-designed, laboratory facilities must be in place and in good condition, science teachers should be motivated, etc. **References**

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