
RELEVANCE OF SCIENCE, TECHNOLOGY AND MATHEMATICS EDUCATION ACQUIRED IN SCHOOLS IN JOBS CREATION AMONG GRADUATES OF COLLEGES OF EDUCATION

By

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Abstract

This research work was aimed to ascertain the relevance of science, technology and mathematics education (STME) acquired in schools in jobs creation among graduates of colleges of education. Variables such as employment opportunities, number of graduates employed and self employed based on integration of STME acquired in school and perceived challenges in the integration of STME by graduates were used to ascertain the relevance of STME integration in jobs creation. Questionnaire was the main instrument used to obtain information from the graduates. The population for the study consisted of a hundred (100) formal students of department of mathematics of Federal college of Education, Okene who studied and graduated from 2002 to 2004 with mathematics combinations. From this population, sixty (60) students were sampled out for the study. Likert scale was used and statistical analysis was based on mean, standard deviation, percentages and chi-square at 0.5 level of significant. The results of the analyses revealed that the STME acquired in schools is not relevant for graduates in creating jobs for themselves. Based on the findings, the need for curriculum change was recommended.

It is obvious that Nigerian government cannot provide enough jobs for our graduates; judging from the level of unemployment and the number of years it takes to secure a job either with the government or private sector. Nwachukwu (2009) supported this observation when he said that there are so many graduates of the nation's educational system who are roaming about the streets as unemployed and job-seekers. This situation is worrisome to any well meaning Nigerian, as it contradicts the aims and objectives of Nigerian education stipulated in the National policy on Education (FRN 2004), which stresses the acquisition of appropriate skills for development of self-reliant graduates.

The term, self-reliance graduates is an expression where students under gone series of training in the schools in order to acquire enough skills so as to be able to

create jobs for themselves; and possibly be employers of labors. It implies being able to engage oneself in a meaningful job that generates income necessary to bridge the gap between the poor and the rich; being able to meet ones basic needs and thereby reducing hunger, disease, unemployment and general poverty. Unfortunately, this has become an ideal situation almost impossible to realize despite the number of years we spent in schools developing the skills to be self-reliant. Funny enough, it has become the slogan and the language of our political leaders during their campaigns to make this country a self-reliant nation. According to Jimo (2009), self reliance has become conceptually and practically attractive term, particularly in developing countries like ours, where the problem of meeting numerous economic needs with limited resources is the case. Surely, no nation can be completely self sufficient, but vision 2020 can only be realized when our numerous unemployed graduates on the streets can create jobs for themselves and become self reliant.

Although Nigeria is rich in inhuman and natural resources, it is still one of the poorest and underdeveloped countries of the world. This shows that the policies and the practices in the schools have some yawning gaps (Offorma, 2005). This was supported by Nwachukwu (2009) when he asserted that the present trend of mass unemployment in Nigeria shows that the STME being taught in schools do not prepare Nigerian graduates to function well in the nation undergoing transition from rural economy to modern economy. Therefore, the problem of high number of unemployed graduates in the country is an indication of lack of integration of the STME acquired in schools by the graduates in order to create jobs for themselves. However, this forms the basis of this research study in order to ascertain the relevance of STME integration and jobs creation among graduates of colleges of education. This is paramount in view of the relevance of STME in the world both in the past and at present. STME have been instrumental in shaping and improving the life of mankind; which has enabled mankind to be relevant in his environment. It has lead to improved world standard of living, not only to build houses, supply food, health, defense, travel and communications but in arts, sculpture, music and literature (Mutasa in Nwachuku, 2009).

With such an assertion about the importance of STME as a powerful tool for man's development and even for man's destruction, we should ask ourselves, what indeed is this almighty STME? We now, define Science, Technology, Mathematics and Education, so as to have a clear symbolic relationship between them.

Science: Ikoku (1989) defines science as an organized knowledge derives from the systematic study of the structure and properties of matter. Also, science according to the Oxford Advanced Learner's Dictionary is "knowledge arranged in an ordinary manner especially knowledge by observation and testing of facts in pursuit of such knowledge.

Technology: Daniyan (1998) said technology simply means the practical application of science or other knowledge and a major source of economic expansion.

Mathematics: Mathematics is the science of space and number. The study of space called geometry, the study of numbers is called arithmetic while the hybrid of geometry and arithmetic is called algebra. In essence, mathematics is a human invention, borne out of human resolve to solve human problems (Kolawole & Oluwatoyin, 2004).

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Education: Education is the imparting and acquiring of these Science, Technology and Mathematics (STM) knowledge through teaching and learning at schools or similar institutions.

From the above definitions of STME, one can deduce that technology is “know how”, science is regarded as “know why” while knowledge of mathematics helps in scientific and technological developments. Thus, science is essentially a method which is employed to produce and accumulate knowledge while technology produces service and goods (Azuka, 2000).

STME have been described as a meta-discipline, the creation of a discipline based on the integration of other disciplinary knowledge into a new whole. This interdisciplinary knowledge bridging among discrete disciplines is now treated as an entity known as STME (Morrison, 2006). Thus, STME offers students one of the best opportunities to make sense of the world holistically, rather than in bits and pieces. It should be noted, however, that STME is an interdisciplinary approach to learning; where rigorous academic concepts are coupled with real world lessons. As students apply STME in the context that make connections between schools, community, work and the global enterprises, it enable the development of STME literacy and self reliance skills, and with it, the ability to compete in the new economy (Tsupros & Hallinen, 2009). In reality, graduates from good STME ought to have acquired sufficient skills that would make them self reliant, prepare them to create jobs and make progress in them.

Therefore, the delivery of STME should be practical oriented where students graduate with hands-on skill, and minds-on experience (Offorma, 2005). This trend will help to harness the relevance of STME in the development of skills necessary for self reliance. Other criteria such as curiosity, open mindedness, creativity, aptitude etc, which are often used in connection with STME, are also relevant and applicable for the development of skills for self reliance. However, Oriafo (2002) observed that STME in Nigeria are grossly characterized by inadequacy of content and ineffective methodology by teachers, paucity of facilities, equipment and materials in our laboratories, as well as dominated socio-cultural lapses. These lapses call for inward looking for self-help, so as to find out what needed to be done that we have not done well and what need not to be done that we are doing. It is against this background that this paper also examines the likely challenges involved in STME integration by the graduates of our educational system which may be the militating factors against jobs creation for self reliance in Nigeria.

Statement of the problem

Available literature has shown that STME acquired in schools most especially in colleges of education is inadequate for the graduates to be self reliant. This was supported by Oriafo (2002) when he stated that STME in Nigeria are grossly characterized by inadequacy of content and ineffective methodology by teachers, paucity of facilities, equipment and materials in our laboratories, as well as dominated socio-cultural lapses. As a result, few or no graduates are capable of integrating the STME acquired in schools in order to create jobs for themselves. However, the exact

figure of the graduates who created jobs for themselves by integrating STME and its' relevance, have not been ascertained. Therefore, to what extent is STME acquired in schools relevant in jobs creation among graduates from colleges of education, how many were able to create jobs for themselves by integrating STME and how many could not and why? These are the main problems under study.

Purpose of the study

Nowadays, it is difficult to find individuals with self reliant skills in the community due to the non-commitment of the system to the development of local human potentials and resources in the environment (Nwachukwu, 2009). The number of individuals who are likely to be self reliant is a function of STME acquired in schools. Therefore, the purpose of this study is to ascertain the:

- relevance of STME acquired in schools in graduates employments and
- possible challenges militating against STME integration by graduates in creating jobs.

Research questions

The following research questions were raised to guide the study:

1. What are the graduates' employment opportunities since their graduations?
2. Are number of graduates employed dependent on STME integration on their daily jobs?
3. Are number of graduates self employed dependent on STME integration?
4. Are number of graduates self employed dependent on STME acquired in school?
5. Are there perceived challenges in the integration of STME by graduates?

Research methods

The study employed descriptive survey method. This is because the variables which were tested clearly describe and interpret the relationship that exists between the parameters.

Population and sample

The population used for this study consisted of one hundred (100) students from the department of mathematics, Federal College of Education, Okene who studied and graduated from 2002 to 2004 with mathematics combinations. This consists of forty seven (47) students in Mathematics/Physics, thirteen (13) students in Mathematics/Chemistry, twenty two (22) students in Mathematics/Biology and eighteen (18) students in Mathematics/Integrated Science. The population was limited to these mathematics combinations because they are core science courses run in the college.

The sample for this study was sixty (60) graduates. In order to ensure a representative sample of the entire population, the researcher selected 60% of the entire population using stratified random sampling technique. Thus the sample consists of 28 (twenty eight) Mathematics/Physics graduates, 8 (eight) mathematics/Chemistry

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graduates, 13 (thirteen) mathematics/Biology graduates and 11 (eleven) mathematics/Integrated Science graduates.

Instrument

A questionnaire was developed by the researcher, validated by experts in mathematics and then used to collect data for this study. The first part of the questionnaire was used to collect demographic data. Following this were sections about employment opportunities, STME integration and perceived challenges to STME integration by graduates. Respondents were asked to indicate their level of agreement on perceived challenges to STME integration using a four-point scale (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree). Graduates were also asked to respond yes or no to ascertain their agreement on employment opportunities and STME integration.

Procedure for data collection

The data were collected by the researcher using online medium of administering copies of the questionnaire to the graduates in their various locations. Sixty (60) copies of the questionnaire were posted out, of which exactly sixty (60) of the copies (that is 100%) were retrieved from the respondents upon several calls. All retrieved questionnaire were adequately completed and were found usable for the study and then used for the analysis.

Data analysis

The data collected were organized and analyzed using statistical tools such as mean, standard deviation (SD), percentage and chi-square (χ) at 5% level of significance for the research questions.

Research question 1

What are the graduates' employment opportunities since their graduations?

Table 1: Graduates employment opportunities since their graduation

	No. of graduates	% of graduates
Employed by govt. /private	10	16.67
Self employed	18	30.0
Unemployed	32	53.33

Table 1 shows that ten (10), eighteen (18) and thirty two (32) out of the sixty (60) graduates are employed by government/private sector, self employed and unemployed respectively. That is, 16.67%, 30.0% and 53.33% of the graduates are employed by government/private sector, self employed and unemployed respectively. This means that only twenty eight (28) of the graduates (i.e 46.67% of the graduates) have the opportunities of being employed while the rest thirty two (32) of the graduates (i.e 53.33% of the graduates) have no employment opportunities.

Research question 2

Is number of graduates employed dependent on STME integration on their daily jobs?

Table 2: Number of graduates employed base on STME integration on their daily jobs

Number of graduates employed	integrating STME	not integrating STME
Observed frequency	4	24
Expected frequency	14	14

Result: $\chi_c = 14.29$, $\chi_t = 3.841$, $\alpha = 0.5$, $N = 28$, $df = 1$, $R =$ significant.

The result of table 2, showed that the $\chi_c = 14.29 > \chi_t = 3.841$. Thus, it can be concluded that the number of graduates currently employed is evidently at 5% level of significance independent of their STME integration; i.e, the number of graduates currently employed does not depend on the STME integration.

Research question 3

Is number of graduates self employed dependent on STME integration?

Table 3: Number of graduates self employed Base on STME integration

Number of graduates self employed	integrating STME	not integrating STME
Observed frequency	4	14
Expected frequency	9	9

Result: $\chi_c = 5.556$, $\chi_t = 3.841$, $\alpha = 0.5$, $N = 18$, $df = 1$, $R =$ significant.

Table 3 result also revealed that the $\chi_c = 5.556 > \chi_t = 3.841$ at 5% level of significance. This implies that there is significant evidence that the number of graduates self employed is independent of their STME integration; i.e, the number of graduates self employed does not depend on the STME integration.

Research question 4

Is number of graduates self employed dependent on STME acquired in school?

Table 4: Number of graduates self employed base on STME acquired in school

No. of graduates self employed	integrating STME acquired in school	integrating STME acquired outside school
Observed frequency	0	4
Expected frequency	2	2

Result: $\chi_c = 4.0$, $\chi_t = 3.841$, $\alpha = 0.5$, $N = 4$, $df = 1$, $R =$ significant.

The result of table 4 showed that the $\chi_c = 4.0 > \chi_t = 3.841$ at 5% level of significance. Thus, it can be concluded that the number of graduates self employed that are currently integrating STME in their jobs does not depend on the STME acquired in the school but depend on STME acquired outside the school.

Research question 5

Is there perceived challenges in the integration of STME by graduates?

Table 5: Perceived challenges in the integration of STME by graduates

Perceived challenge	Mean	SD	χ_c	R
Lack of funds to purchase equipment/materials	3.54	1.24	6.72	ns
Overcrowded classrooms/laboratories	4.42	0.74	7.80	ns

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Emphasis on passing examinations and graduations	1.52	1.02	9.02	s
Lack of proper monitoring and feedback mechanisms	2.66	1.11	5.79	ns
Lack of interest among students	1.24	0.92	9.56	s
Use of archaic/traditional teaching methods	4.07	1.03	7.50	ns
Absence of self-reliance training programs outside school	3.65	1.32	6.65	ns
Poor policy implementation procedures	3.61	1.32	5.53	ns
Shortage of qualified STME teachers/educators	2.51	1.27	4.27	ns
Congested school curricula	4.36	0.89	7.12	ns

(Note: $\chi_t = 7.82$, $\alpha = 0.5$, $N = 60$, $df = 3$, R =remark and s = significant)

Table 5 shows the mean values, standard deviation and chi-square of the perceived challenges in the integration of STME by graduates. The perceived challenges such as lack of interest among students and emphasis on passing examinations and graduations have the lowest mean values of 1.24 and 1.52 with corresponding standard deviations 0.92 and 1.02 and chi-square values of 9.56 and 9.02 respectively. Whereas perceived challenges overcrowded classrooms/laboratories, congested school curricula and use of archaic/traditional teaching methods have the highest mean values of 4.42, 4.36 and 4.07 with corresponding standard deviations 0.74, 0.89 and 1.03 and chi-square values of 7.80, 7.12 and 7.50 respectively. This means that most of the graduates disagreed that, lack of interest among students and emphasis on passing examinations and graduations are not problems to STME integration by the graduates but overcrowded classrooms/laboratories, congested school curricula and use of archaic/traditional teaching methods are the main challenges. However, the chi-square values are insignificant for most of the variables considered for the perceived challenges in the integration of STME by graduates except for lack of interest among students and emphasis on passing examinations and graduations where the chi-square values are significant. This implies that the number of graduates that may integrate STME in order to create jobs will depend on the variables such as class-size, school curricula, teaching methods, training programs outside school, policy implementation, funds, monitoring and qualified teachers.

Findings

1. The STME acquired in schools is not relevant for the graduates in creating jobs for themselves.
2. About 46.67% of the graduates are employed and their employment opportunities do not depend on STME integration.
3. About 64.29% of the graduates that are employed are on self employment and their employment does not depend on STME integration.
4. 100% of the graduates who are self employed based on STME integration do not depend on the STME acquired in school.
5. Graduates are aware and interested in STME integration right from school but perceived their challenges in the following areas:
 - i. Overcrowded classrooms/laboratories
 - ii. Congested school curricula

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- iii. Use of archaic/traditional teaching methods
- iv. Lack of training programs outside school
- v. Poor policy implementation
- vi. Lack of funds to acquire equipment/materials
- vii. Lack of monitoring and
- viii. Shortage of qualified STME teachers/educators.

Discussion

Obviously, there is high rate of unemployment in Nigeria; judging from the findings of this research where 53.33% of not less than ten (10) years graduates from colleges of education are still unemployed. This result is in agreement with Nwachukwu (2009) when he stated that there are so many graduates of the nation's educational system who are roaming about the streets as unemployed and job-seekers. This is because, the graduates are unable to create jobs by themselves using the STME acquired in schools. The effects of this trend on any nation are enormous and if not checked in good time may result to worse situations as we are already experiencing in the country.

It's also clear that the government and as well as private sectors have exhausted their jobs vacancies. Even though about 46.67% of the graduates are employed, about 64.29% of the graduates that are employed are on self employment. This however, may not be a bad development as it keyed in to the aims and objectives of Nigerian education stipulated in the National policy on Education (FRN 2004), which stresses the development of a self-reliant nation. But sad still, is the fact that the 77.78% of the graduates who are self employed are not based on STME integration and 100% of the graduates who happened to integrate STME are not based on STME acquired in schools but out of school. This calls for re-examination of the contents and practices in our educational system. It is the same reason that Offorma (2005) stated that the policies and the practices in the schools have some yawning gaps.

However, this does not mean that STME is not relevant to job creation but it's the type of STME taught to the students that may be faulty. Good enough, graduates are aware and interested in STME integration in their daily activities right from school but are unable to utilize STME to create jobs for themselves due to some fundamental problems such as overcrowded classrooms/laboratories, congested school curricula, use of archaic/traditional teaching methods, lack of training programs outside school, poor policy implementation, lack of funds to acquire equipment/materials, lack of monitoring and shortage of qualified STME teachers/educators. According to Offorma (2005), the delivery of STME should be practical oriented, but it is theorized because of lack of competent teachers or lack of equipment to enable that; and hence, students graduate without any hands-on skills and minds-on experience. Similarly, Ojonubah (2011) stated that students in overcrowded class-size perform significantly lower and have negative perception of learning mathematics than students in normal class-size. This trend tends to obscure the relevance of STME in the development of skills necessary for graduates to create jobs to guarantee self reliance.

Conclusion

STME can become relevant to graduates for creating jobs for themselves if the delivery is practically oriented with suitable learning conditions. This will surely help the graduates to secure jobs by themselves in order to become self-reliance rather than roam about the streets seeking for jobs that are not there.

Recommendation

The findings of this research have many implications and as such the following recommendation were raised:

The ratio of students to a teacher should be very low to enable effective teaching learning to take place in class.

There is need for curricula change such that in-relevant courses should be remove from school curricula in order to des-congest the curricula so as to have enough time for the relevant courses.

Adequate qualified teachers capable of using modern teaching methods should be made available in schools for effective teaching and learning.

Training programs outside the school should be established so as to equip graduates who have not acquired enough skills in the school.

There should be adequate policy implementation and monitoring of programs at all levels.

Funds should be made available to graduates who have proved to have acquired skills to integrate STME in job creation in order to purchase necessary equipment/materials.

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