

Relevance of the Mathematics Education Programmes of the Nigerian Colleges of Education to the Teaching of Junior Secondary Mathematics

Olusegun Ayodele ADELODUN

Institute of Education, Obafemi Awolowo University, Ile-Ife, Nigeria.

E-mail: adelodun@oauife.edu.ng; segunadelodun@yahoo.com

Abstract

The education system in Nigeria is faced with a mirage of defects which hinged on man power used in carrying out the teaching and learning process. This study considers the relevance of the mathematics education programmes of the Nigerian Colleges of Education (NCE) to the teaching of junior secondary mathematics. This was with a view to providing necessary information for later mathematics education curriculum revision in NCE. The subjects of the study included Heads of departments of mathematics in five Colleges of Education in Southwestern Nigeria as well as 179 teachers of 49 secondary schools with the region. The employed a survey design with two instruments namely: Content Analysis Discrepancy Model (CADM) and Mathematics Teachers' Questionnaire (MTQ) used to obtain the closeness of Colleges of Education mathematics curriculum with that of NCE and used to enquire which of the mathematics contents in JSS the teachers were equipped to teach, respectively. Findings from the descriptive analysis of data revealed that mathematics education programme run by the Colleges of Education was 96.36% relevant to the junior secondary mathematics curriculum. It is also revealed that all the NCE teachers can teach up to 70% of the JSS mathematics topics. The findings bring into focus the need that 82% of the experienced NCE and 18% less experienced NCE teachers wanted a review of the mathematics education programme of the Nigerian Colleges of Education.

Key Words: Students' Achievement, Mathematics Education Programme, Junior Secondary School

1. Introduction

Globally, education is viewed as an essential pathway to making a total child. As noted by Wolfenson (2000), Yara & Otieno (2010), it is a fundamental human right. The pivot to sustainable development, stability and tranquility within and among nations is the provision of education to the populace of such countries. Mathematics, as one important subject for sustainable development, has permeated all facets of human endeavour. It is required in learning other science subjects such as Biology, Chemistry and Physics (Kalejaiye, 1979). Students who are not grounded in Mathematics have difficulties in employing Mathematics concepts, principles and skills in the course of their science education.

According to Herbor-Peters (2001), Mathematics remains the pivot on which any true science can rest and no true science can succeed without going through Mathematical demonstration. The relevance of Mathematics to human living has been greatly acknowledged. Apart from its use in science and technology, mathematics skills are also utilized in such areas as management information systems, traffic control and a wide range of applications (Saddiq, 2001). Makarfi (2001) noted that mathematics is universal not only in the way it influences the basic sciences, the applied sciences, engineering, and technology, but also in the way it has been made relevant to the development of the social sciences and the liberal arts. It is in recognition of its usefulness that the Federal Government of Nigeria through the National Policy on Education (2004) made mathematics one of the core subjects to be offered at the pre-primary, primary and post-primary levels of education.

The significance of Mathematics in producing versatile and resourceful graduates that are needed for economic development cannot be over-emphasized. This is why Setidisho (1996) affirmed that Mathematics is a fundamental science that is necessary for understanding of most other fields in education. He stressed further that, it is glaring that no other subject forms such a strong force among the various branches of science. The Science Teachers Association of Nigeria (2002) referred to Mathematics as the central intellectual discipline of the technology societies. In his submission, Odusoro (2002) affirmed that the knowledge of science remains superficial without Mathematics. It therefore means that, the position of Mathematics in secondary school curriculum in Nigeria is important for scientific development. However, it is disheartening that research and data from National Examination Bodies like West African Examinations Council (WAEC) have shown a consistent poor performance in this subject.

Today, many organizations have sprung up in support and encouragement of the teaching and learning of Mathematics. Such organization include: Olympiad Mathematics Competition, Cowbell Mathematics Competition, Nigeria National Petroleum Corporation (NNPC) Mathematics Competition, National Academy of Science Mathematics Competition, etc. These competitions provide collaborative efforts in promoting the teaching and

learning of Mathematics nationwide.

In spite of these efforts on the parts of many stakeholders, majority of secondary school students often dread and show negative attitude towards Mathematics (Awofala, 2000) and the trends of their achievement in the senior secondary school certificate examination is also a source of worry to the stakeholders. For instance, the percentage credit pass of students in May/June WAEC Mathematics between 2004 and 2007 is a concern as indicated on Table 1.

Table1: Students' Achievement in May/June Senior Secondary School Examination (WAEC) 2004-2007

Year	Total Number of Candidates	Credit A1-C6	Pass D7- E8	Fail F9	Absent
2004	1,019,524	33.97%	28.16%	34.47%	3.4%
2005	1,054,853	38.20%	25.36%	34.41%	2.03%
2006	1,149,277	41.12%	31.09%	24.95%	2.84%
2007	1,249,028	46.75%	26.75%	24.24%	2.26%

From Table 1, in 2004 when 1,019,524 enrolled for Mathematics, 33.97% had credit pass (i.e A1-C6), 28.16% had ordinary pass (i.e. D7-E8), 34.47% had F9 while 3.4% were absent. From this result, it shows that only 33.97% of the enrolled candidates have the opportunity of furthering their education provided they also have credit passes in four other relevant subjects, including English language. In 2005, from 1,054,853 candidates that enrolled, 38.20% had credit pass, 25.36% had ordinary pass i.e. between D7 and E8, and 34.41% had F9 while 2.03% candidates were absent. Further, in 2006, 41.12% had between A1 and C6, 31.09% had between D7 and E8, while 24.95% failed. Finally, in 2007, 1,249,028 candidates enrolled, 46.75% had credit pass, 26.75% had ordinary pass, 24.24% failed while 2.26% absent from the examination. Though there is a steady increase in the percentage of students with credit pass, the conclusion drawn from students' achievement in Mathematics between 2004 and 2007 is that, more than 50% of students enrolled had below credit pass i.e. A1-C6. This is a source of worry to stakeholders.

Ojerinde (2004) noted that mathematics has the highest cancellation percentage among the core subjects in the year 2001 to 2003 of National Examination Council (NECO). The detail is given in Table 2 where mathematics was the highest subject cancelled in the years 2000, 2002 and 2003, while the second highest cancelled in 2001. There were indications of different forms of examination malpractice or misconduct that led to the cancellation.

Table 2: Analysis of Some Core Subjects Cancelled

Year	English	Maths	Econs	Govt	Physics	Chem	Biology	Agric. Sc
2000	21.21	34.29	16.28	3.64	1.90	2.26	2.92	1.90
2001	19.67	18.34	11.66	16.62	3.40	2.78	2.57	9.65
2002	21.10	21.84	5.02	5.84	2.08	3.58	11.77	8.10
2003	17.22	18.89	9.84	5.78	3.49	3.30	10.65	9.32

There is also informal evidence that teacher education programme in mathematics may be partly responsible, that is, teachers may not have good grasp of the subject matter, in other words defects in the mathematics teacher education programme may present in not being relevant to what they teach consequently upon graduation. Nigerian Colleges of Education are chosen for this study due to the fact that they produce largest teachers in primary and secondary schools. Apart from this, foundational mathematics teaching in JSS which is saddled on NCE graduates requires a more strategic approach.

The present study examined the relevance of the mathematics education programmes of the Nigerian Colleges of Education to the new junior secondary mathematics curriculum. Specifically, the study will answer the following questions:

1. To what extent are the mathematics components of National Certificate of Education programmes relevant to the JSS mathematics curriculum?
2. What proportion of the JSS mathematics teachers have the perceived ability to teach at least 70% of the JSS mathematics topics?
3. To what extent do practicing JSS mathematics teachers agree that the training received while in schools was relevant to the teaching of the JSS mathematics by gender?
4. What proportion of the practicing junior secondary mathematics teachers wish that the mathematics curriculum of the NCE programme be reviewed in order to meet the requirements of the new JSS mathematics curriculum?

2. Methods

Study participants were heads of mathematics departments of Nigerian Colleges of Education and mathematics teachers at junior secondary schools random selected from two Federal and three State Colleges of Education in Southwestern Nigeria. The population of the study consisted five heads of departments of mathematics of Nigerian Colleges of Education and 179 mathematics teachers from 49 secondary schools from the region. The Content Analysis Discrepancy Model (CADM) was used to obtain the closeness of Colleges of Education mathematics curriculum with that of NCE (find the availability or otherwise of the thirty-three major content areas of the junior secondary mathematics curriculum in the mathematics components of the mathematics education programme of the Nigerian Colleges of Education) and Mathematics Teachers' Questionnaire (MTQ) used to enquire which of the mathematics contents in JSS the teachers were equipped to teach. Any College of Education which scored twenty-five points out of a total of thirty-three (about 70%) was considered having a mathematics education programme that is relevant to the JSS mathematics curriculum. The second instrument was a researcher-designed questionnaire for mathematics teachers elucidating their qualifications, teaching experience, training received, among others. The research instrument had been pilot-tested on some educators in the Faculty of Education and few experienced mathematics teachers in two schools to ensure validity, readability and ease of understanding. Through that the contents listed initially were fifty-five, reduced to thirty-three. Data analysis was done using descriptive and chi-square statistics.

3. Empirical Analysis and Results

The results of data analysis were analyzed and presented in question by question form. The interpretation of the findings was analyzed and discussed as presented.

Research Question 1: To what extent are the mathematics components of National Certificate of Education programmes relevant to the JSS mathematics curriculum?

To validate this question, the scores for each of the Colleges of Education in a test for relevance were computed and the mean scores were obtained. The mean score for the Colleges of Education (State and Federal) was computed to be 96.36%. This implies that the Colleges of Education ran relevant mathematics education programme. The mathematics education programme run by the Colleges of Education was 96.36% relevant to the junior secondary mathematics curriculum. Tables 3 and 4 indicate the above results in details.

Table 3: Comparison of Relevance of Federal and State NCE Mathematics Education Programme to the Junior Secondary Mathematics Curriculum

Colleges of Education	Number	Mean Scores	Extent of Relevance
Federal	2	90.91	Very Relevant
State	3	100.00	Very Relevant

Table 4: Relevance of NCE Mathematics Education Programme to the Junior Secondary Mathematics Curriculum

Colleges of Education	Total No of Mathematics Education Programme Available	Relevant JS Mathematics Topics Available in the Mathematics Education Programme of the NCE. Total Score = 33	Percentage of the JS Mathematics Topics Available in the NCE Mathematics Education Programme
Osun State College of Education, Ila-Orangun	08	33	100.00
Osun State College of Education, Ilesa	08	33	100.00
College of Education, Ikere-Ekiti	07	33	100.00
Adeyemi College of Education, Ondo	06	27	81.82
Federal College of Education, Osiele, Abeokuta	05	33	100.00

Research Question 2: What proportion of the JSS mathematics teachers have the perceived ability to teach at least 70% of the JSS mathematics topics?

The question was tested by counting the number of NCE mathematics teachers who indicated that they could teach at least 70% of the JSS mathematics topics. It was found out that all the NCE mathematics claimed they could teach at least 70% of the JSS mathematics topics while none claimed they could not teach up to 70% of the JSS mathematics topics. This result can be concluded that all the NCE teachers can teach up to 70% of the JSS mathematics topics.

Research Question 3: To what extent do practicing JSS mathematics teachers agree that the training received while in schools was relevant to the teaching of the JSS mathematics by gender?

To ascertain this, the question was subjected to 2 x 2 contingency table (Yate's chi-square statistics). Its calculated value 0.15895 was obtained and this value is not significant at 0.05 level. Therefore, the research question is accepted and judging the results in Table 5, one can conclude that relevance of training received while in schools is not dependent on the gender of the mathematics teachers.

Table 5: Results of Yate's Chi-square to Compare Relevance of Training Received by Male and Female Mathematics Teachers

Categories of Teachers	Appropriate	Not Appropriate	Total	Chi-square	df	Level of significant
Male	96(96.82)	13 (12.18)	109	0.15895	1	0.05
Female	63(62.18)	7 (7.82)	70			
Total	159	20	179			

Research Question 4: What proportion of the practicing junior secondary mathematics teachers wish that the mathematics curriculum of the NCE programme be reviewed in order to meet the requirements of the new JSS mathematics curriculum?

The mathematics teachers in the JSS classes were divided into two groups: less experienced and experienced. So, a 2 x 2 contingency table (Yate's chi-square statistics) for experienced and less experienced NCE mathematics teachers was performed. The chi-square value of 0.03957 which was significant at 0.05 level (for 1 degree of freedom) was obtained. So there is a basis for accepting the question that the practicing JSS mathematics teachers wish that the mathematics curriculum of the NCE programme be reviewed in order to meet the requirements of the new JSS mathematics curriculum. The results are present in table 6.

Table 6: Results of Yate's Chi-square to Compare Opinions of NCE Mathematics Teachers as to Whether or not a Review of the Mathematics Education Programme was Necessary

Categories of Teachers	Review	No Review	Total	Chi-square	df	Level of significant
Experienced NCE Teachers	81(80.51)	54 (54.49)	135	0.03957	1	0.05
Less Experienced NCE Teachers	18(18.49)	13 (12.51)	31			
Total	99	67	166			

4. Concluding Remarks and Recommendations

A lot of deductions have been made in this study. The fact that the mathematics education programme run by the Colleges of Education was 96.36% relevant to the junior secondary mathematics curriculum shows a welcome development on the state of education in Nigeria. This implies that the mathematics components of National Certificate of Education programmes are relevant to the JSS mathematics curriculum. It is also revealed that all the NCE teachers (under the consideration of the study) can teach up to 70% of the JSS mathematics topics. Furthermore, it is shown that relevance of training received by mathematics teachers while in their NCE schools is not dependent on their gender. Moreso, 82% of the experienced NCE and 18% less experienced NCE teachers wanted a review of the mathematics education programme of the Nigerian Colleges of Education. The result of this study is in support of Saddiq (2001) and Yara & Otieno (2010).

The training programme of a prospective mathematics teacher should be expanded to allow for more sufficient exposure to subject matter content so that the product (the teacher) would have more sense of belonging to mathematics as well as relate their knowledge to the junior secondary school mathematics curriculum. The departments of mathematics in the Colleges of Education should cooperate to produce common curriculum guidelines for the mathematics component of the teacher education programme in order to ensure a uniform preparation of teachers for the same school mathematics curriculum. Once a skill has been developed, there ought to

be for a constant use of the skill and a regular contact with colleagues to ensure acquaintance with modern technique and practice of the skill.

References

- Herbor-Peters U.F. (2001): Mathematics: Language for the New Millennium, Implication to the Society, Proceedings of September, 2000 Annual Conference of Mathematical Association of Nigeria (MAN). Obodo G.C. (Ed) 1-14
- Kalejaiye A.O. (1979): Mathematical Knowledge and Skills required by Nigerian Secondary School in Learning School Science. Journal of the Science Teachers Association of Nigeria.
- Makarfi U.M. (2001): Mathematics: A Keynote Address Delivered at the Opening Ceremony of the 38th Annual National Conference of the Mathematical Association of Nigeria (MAN) held at the Hassan Usman Katsina Polytechnic, Katsina, from 27th August to 1st September, 2001.
- National Policy on Education (UPE) (2004) Lagos NERDC Press.
- Ojerinde O.O. (2004): Examination Malpractice in our Educational System-the NECO Experience. A Faculty of Education Lecture delivered at the Obafemi Awolowo University, Ile-Ife on 23rd February, 2004.
- Saddiq J.O. (2001): Mathematics: An Essential Tool for Universal Basic Education. A Lead Paper presented at the 38th National Conference of the Mathematical Association of Nigeria (MAN), Katsina, from 27th August to 1st September, 2001
- Science Teachers' Association of Nigeria (STAN) (2002): African Branch of the Commonwealth Association of Science, Technology and Mathematics Education (CASTME) 43rd Annual Conference and Inaugural Conference of CASTME in Port Harcourt August 2002.
- Yara P.O. & Otieno K.O. (2010): Teaching/Learning Resources and Academic Performance in Mathematics in Secondary Schools in Bondo District of Kenyan. Asian Social Science Vol. 6, No. 12.

About the Author

Olusegun Ayodele Adelodun is a Senior Lecturer in the Institute of Education, Obafemi Awolowo University, Ile-Ife. He bagged his Ph.D. in Statistics and M.Ed. Curriculum Studies in Obafemi Awolowo University. His areas of research interest are Statistics Education and Econometrics. He has many published articles in Local and International Journals to his credit.