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The National Mathematics Curriculum for BEP (Basic Education Programme) and the MDG (Millennium Development Goals) for Mathematics Teachers in Nigeria: Teachers' Perception and Readiness

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The study used a survey design. The instrument was teachers' questionnaire and interview on awareness and readiness. The interview was administered to the different categories of the respondents using a 4-point Likert scale. Two hundred mathematics teachers were randomly selected from 100 schools (public and private) using stratified random sampling technique. Simple percentage and frequency counts were used on research questions. The findings revealed inadequacy in both human and material resources for implementation of the UBE (universal basic education) project in CRS (Cross River State). On teachers' awareness, 71% believed that 6-3-3-4 is just changed to 9-3-4 as a new system, the quality of the new mathematics curriculum reduced as seen in their responses which points to the fact that most of them are unaware of the main objectives of the UBE and the rationale for restructuring the curriculum which mostly is to infuse emerging issues into relevant content and NEEDS (National Economic Empowerment Development Strategy) targets. Public primary school teachers also had higher attendance to re-training programmes than other teachers but attendances were still low (below 50%). On readiness, only 45% of teachers in public schools and 25% in private schools indicated readiness due to inadequacies in availability of resources for implementation and proper training required for taking off.

Keywords: mathematics curriculum, MDG (millennium development goals), teachers' perception and readiness

Introduction and Background of Study

Nigeria, one of the 189 countries of the world that sat to meet the needs of the world's poorest people, has widened access to primary and junior secondary education with the hope of achieving some of the MDG (millennium development goals). Curriculum reform perspectives in mathematics education articulated in many research papers and policy document of different countries aim at deepening and increasing each learner's mathematical learning and achievement (Luneta & Makonye, 2010). Obioma (2006) noted that the total development of the individual will depend to a large extent on the implementation of an appropriate curriculum.

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The MDG are the eight goals set to make a significant and measurable improvement in the lives of the people. The scheme was launched in 1999 and passed into law in 2004 as one of the strategies aimed at implementing the educational component of the MDG project conceived in terms of the revolutionary development needs of the country (Okey, 2008). CRS (Cross River State) started implementation first in 2006 with primary one and junior secondary one with the notion that they will have disarticulation. To achieve these, sound teachers are required in terms of skills and awareness of the national reconstruction process required.

Though, the MDG project through the UBE (universal basic education) programme provides teachers with the opportunity for in-service training, exposure to current trend in the most effective teaching and learning of mathematics through seminars and workshops, most teachers rarely have opportunity to update their skills after formal training, making it difficult to keep up with teaching trends especially in mathematics. Ivowi (2008) noted that right from basic education to tertiary education level, there are shortages of trained teachers and even the available ones are not properly provided with textbooks, conducive classrooms, laboratory equipments, and refreshing courses. Ekwueme and Meremikwu (2010), in their paper, pointed out such programmes as the MDG project designed to brush up teachers' knowledge of what they learnt in training and learn new approach and technique. They advocated that it should be a regular programme to equip the teachers with job. UBE (2000), in their verification exercise, noted that additional 275,462 teachers were needed to teach in primary school. Fields (1996) also stressed that the preparation of teachers must include deep knowledge of the subject matter they will teach and the skill necessary to communicate that knowledge.

Mathematics Curriculum and MDG

The restructured national mathematics curriculum for the primary and junior secondary schools is focused on giving the children the opportunity to acquire mathematical literacy to function in an information age, cultivate understanding of the skills necessary for the changing technical world. There is a need to include such changes in the area of information and communication technology since mathematics is associated with quantitative skills which is a driving skill for information technology. The curriculum is a teaching curriculum that provides maximum aids for both the teachers and the students. The curriculum tries to make mathematics more of real life than abstract concept and advocate training and re-training of mathematics teachers to update their technology and competence and acquire more teaching skills (Ekwueme & Meremukwu, 2010). The new national mathematics curriculum has come from basics one to nine, hierarchically arranged.

The pupils at the nine years compulsory basic level would now be taught core basic subjects: English language, mathematics, and basic science (NERDC (Nigerian Educational Research and Development Council), 2009).

Then, at the three-year senior secondary level, which is not within the scope of this study, students will now be exposed to five compulsory cross cutting subjects and four distinct fields of study of which mathematics is prominent in all as a compulsory subject.

Now, considering the importance of mathematics and its position in the national curriculum, there is a great need for the emphasis on its preparation/organization and effective communication of the subject. Mathematics is generally made up of concepts which are hierarchical in nature. The understanding of the basic first-order concepts makes it easier to understand the subsequent higher-order concepts and the restructured national curriculum is structured as such.

Experience with the teaching of mathematics in most Nigerian secondary schools showed that many

mathematics teachers are under the pressure of external examination syllabus and school scheme of work and this makes them always in a hurry to complete the syllabus irrespective of the students' level of understanding of the concepts taught (Ekwueme, 2006). We cannot teach mathematics effectively without making sure that the lower-order concepts or the pre-requisite have been thoroughly understood so that its usefulness could be felt at a higher class and that is what the restructured curriculum is advocating. The distinction between primary and secondary concept must be clear because that is the basis of the learning hierarchy which is very important in the teaching and learning of mathematics in schools and the MDG project mission.

According to Ojerinde (1999), mathematics is a tool for use in science, technology, and industries; and if mathematics is really the tool for use in science, technology, and industries, then the mathematics curriculum should be such that will have leading contents to those areas and involvement of competent mathematics teachers that will be abreast with the content.

This study, therefore, intends to investigate the extent of readiness and the awareness of the mathematics teachers in CRS primary and junior secondary schools in implementing the new curriculum and in bearing in mind the UBE goals as re-training of teachers, provision of classroom blocks and libraries, and provision of laboratories and laboratory equipments.

Research Questions

The research questions are as follows:

(1) What is the participation level of mathematics teachers (primary and junior secondary) in the re-training programmes in CRS?

(2) To what extent are the mathematics teachers ready for implementation of the new curriculum in terms of the availability and adequacy of resource material?

(3) Which content is perceived as the most difficult by both primary and junior secondary mathematics teachers?

(4) What are the teachers' ratings of extent of adequacy of infrastructure in their different schools for effective implementation of new curriculum?

(5) What is the level of the teachers' awareness of the new mathematics curriculum for actualization of the UBE goals?

(6) Which of the themes do mathematics teachers in primary and junior secondary schools rank as the most important and what is the level of achievement of these themes in workshops as perceived by the teachers in the ranking?

Materials and Method

Research Design

The study used a survey research design, because the study involved the use of representative sample from a population and drawing of conclusion based on the analysis of data. The instruments used for this study were teachers' questionnaire and interview. The questionnaire tagged "MTAQAR (Mathematics Teachers' Assessment Questionnaire on Awareness and Readiness) for the UBE implementation" was made up of 50 items divided into six sections, namely, personal data which include participation level of mathematics teachers to organized training programmes, level of readiness, level of mathematics content competence, ratings on availability of resources, level of awareness, and ranking of themes. The instrument was validated by two

experts in Faculty of Education and corrections were affected.

The interview items which were mainly for the headmasters/principals, SUBEB (State Universal Basic Education Board (Nigeria)) officials and MoE (Ministry of Education) personnel were made of items concerning structural developments in schools (provision of equipment, computers, enlargement of buildings, increased funding, and laboratories).

A 4-point Likert scale was used for some of the items ranging from SA ("Strongly agree") to SD ("Strongly disagree") with their weighting ranging from "4" to "1" for favorable responses and vice verse for unfavorable response.

Also for the level of difficulty, a score of "4" is for the easiest down to a score of "1" for the most difficult. For the ratings on the extent of availability of resources, the ratings from 0%−50% are considered not favorable and are below average while ratings from 51%−100% are considered favorable and above average.

For teachers' ranking of themes in order of importance to them and also level of achievement, the most important has a rank of the 1st to less important with a rank of the 4th while the highest achievement has a rank of the 1st to the lowest achievement with a rank of the 4th. The instrument was administered to the respondents in their various schools by the researchers. All copies were correctly filled and returned. Interview items were also handled personally by the researchers and reviewed accordingly.

Population and Sample

The population is made up of all the mathematics teachers in the public and private primary and junior secondary schools in Calabar metropolis. One hundred schools were randomly selected as shown in Table 1.

Table 1

Distribution of the Sampled Teachers in the Different Schools

Type of school	No. of mathematics teachers sample
Public primary school	40
Private primary school	40
Public secondary school	60
Private secondary school	60
Total	200

Stratified random sampling technique was used to select a representative sample from all the forms of schools for the study.

Out of 390 mathematics teachers in both primary and junior secondary schools, a sample of 200 mathematics teachers was randomly selected from the schools. Forty mathematics teachers were from both public and private primary schools and 60 mathematics teachers were from both public and private secondary schools. Questionnaires were given to only two mathematics teachers in each school.

Data Analyses

The simple percentages and frequency counts were used to answer the research questions and the results presented in the Tables 2−7.

Research Question 1

What is the participation level of mathematics teachers (primary and junior secondary) in the re-training programmes?

From Table 2, it was observed that less than half of all the respondents had attended workshops (40%), so also with seminars and short-term training with 41% and 12.5% attendance respectively. Also, about 13 respondents indicated that they had not attended any of the programmes. It was also observed that the public primary school mathematics teachers had more opportunity to attend those organized programmes with 65% and 75% for workshop and seminar respectively. Though for the primary school teachers and the secondary schools teachers, less than 50% attendance was recorded for the programmes. This, therefore, means that the participation level of the mathematics teachers to those organized programmes is still low with less than 50% attendance in any of the above-listed programmes for most of the teachers.

Table 2

Percentages of Teachers' Attendance to Re-training Programmes

Programme	Frequency				Grand total
	Primary (n = 40 each)		Secondary (n = 80 each)		
	Public	Private	Public	Private	
Workshop	26 (65%)	16 (40%)	18 (30%)	20 (33.3%)	80 (40%)
Seminar	30 (75%)	18 (45%)	22 (36.7%)	12 (20%)	82 (41%)
Short-term training	10 (25%)	5 (12.5%)	4 (6.7%)	6 (10%)	25 (12.5%)

Research Question 2

To what extent are the mathematics teachers ready for the implementation of the curriculum in terms of the availability and adequacy of resource materials?

Mathematics teachers' response and comment on readiness for full implementation and adequacy of resource materials were shown in Table 3.

Question/comment: Are you adequately ready for the implementation? Yes ( ) No ( )

Table 3

Frequency and Percentage of Mathematics Teachers' Responses on Their Readiness

Form of school	Adequately ready	Not adequately ready
Public primary school	21 (52.5%)	19 (47.5%)
Public secondary school	24 (40.0%)	36 (60.0%)
Private primary school	11 (27.5%)	29 (72.5%)
Private secondary school	19 (31.7%)	41 (68.3%)

From percentages in Table 3, it was observed that the level of readiness in public primary and secondary schools (52.5% and 40.0%) are more than that of the private primary and secondary schools (27.5% and 31.7%) though all recorded low percentage in adequacy. This means that most teachers are not adequately ready for the full implementation of the new curriculum in terms of the adequacy in re-training teachers, provision of classroom blocks, instructional materials and improvisation, mathematics laboratories, and textbooks for both teachers and students. In the public schools, 45% of the teachers indicated readiness while 30% of the teachers in private schools indicated the same.

Research Question 3

Which content/theme is perceived as the most difficult by the primary and junior secondary school mathematics teachers?

The data in Table 4 revealed that most primary and secondary school teachers agreed that item 1 (number

and numeration) was their easiest theme with 71.3% and 95.0% respectively, while item 4 (geometry and menstruation) was rated by both primary and secondary teachers as their most difficult themes with 76.3% and 69.2% respectively.

Table 4

Frequency and Percentage of Responses on the Level of Difficulty of the Content/Theme

S/N	Contents/theme	Frequency of responses			
		Easy		Difficult	
		Primary	Secondary	Primary	Secondary
1	Number and numeration	57 (71.3%)	114 (95.0%)	23 (62.5%)	6 (7.5%)
2	Basic operations	30 (37.5%)	75 (62.5%)	50 (62.5%)	45 (37.5%)
3	Algebraic processes	19 (23.8%)	87 (72.5%)	61 (76.3%)	33 (27.5%)
4	Geometry and menstruation	27 (33.8) %	37 (30.8%)	53 (66.3%)	80 (69.2%)
5	Everyday statistics	41 (51.2%)	82 (68.3%)	39 (48.8%)	38 (31.7%)

Research Question 4

What is the mathematics teachers' rating of the adequacy of infrastructures in their different schools for effective implementation of the new curriculum?

Table 5

Frequency of Teachers' Rating on Availability/Inadequacy of Infrastructures

S/N	Goals	Frequency of ratings			
		0%–50% (inadequate)		51%–100% (adequate)	
		Primary	Secondary	Primary	Secondary
1	Re-training of primary school teachers	25 (31.5%)	51 (63.8%)	55 (68.5%)	69 (57.5%)
2	Re-training of secondary school teachers	50 (62.5%)	104 (86.7%)	30 (37.6%)	16 (13.3%)
3	Provision of additional classroom	74 (92.9%)	38 (31.7%)	6 (7.5%)	82 (68.3%)
4	Provision of mathematics laboratory	78 (97.5%)	116 (96.7%)	2 (2.5%)	4 (3.3%)
5	Provision of textbooks for schools	58 (72.5%)	50 (41.7%)	22 (27.5%)	70 (58.3%)
6	Provision of libraries	78 (97.5%)	88 (73.3%)	2 (2.5%)	32 (26.7%)
7	Provision of instructional materials	28 (35%)	58 (48.3%)	52 (65%)	62 (51.7%)
8	Provision of sciences laboratories	63 (78.8%)	48 (40%)	17 (21.3%)	72 (60%)
9	Provision of computers	77 (96.3%)	19 (15%)	3 (3.85%)	101 (84.2%)
10	Employment of qualified mathematics teachers	70 (87.5%)	72 (60%)	10 (12.5%)	48 (40%)

Notes. 0%–50% is low availability (inadequate); and 51%–100% is high availability (adequate).

The data in Table 5 showed that there is inadequacy in almost all of the items responded to except for the re-training of the primary school teachers and provision of instructional materials where 68.5% and 65% rated the availability above average using the stated criteria of 0%–50% as below average (inadequate) and 51%–100% as above average (adequate). For secondary school, 57.5%, 68.3%, 58.3%, 51.7%, 60%, and 84.2% rated re-training, provision of additional classroom and textbook, instructional materials, science laboratory, and provision of computers above average while in other items the greater percentage of respondents rated them below average.

Research Question 5

What is the level of mathematics teachers' awareness of the new mathematics curriculum for actualization of the UBE goals?

Table 6

Frequency and Percentage of Responses on the Level of Awareness

S/N	Goal	Frequency and percentage of responses			
		SA	A	D	SD
1	The organization of workshops opened up new ideas in participating mathematics teachers	74 (37%)	50 (25%)	40 (20%)	36 (18%)
2	There was no new content added in mathematics curriculum	60 (30%)	30 (15%)	65 (32.5%)	45 (22.5%)
3	9-year basic education will run at a stretch in a particular school	90 (45%)	32 (16%)	60 (30%)	18 (9.0%)
4	6-3-3-4 system has been changed to 9-3-4 system	112 (56%)	30 (15%)	37 (18.5%)	21 (10.5%)
5	There is great emphasis on creative thinking in the new mathematics curriculum than the former one	128 (64%)	40 (20%)	14 (7%)	16 (8%)
6	Quality of the mathematics curriculum content reduced	30 (15%)	85 (42.5%)	45 (22.5%)	40 (20%)
7	Mathematics content are now overloaded	30 (15%)	92 (46%)	33 (16.5%)	45 (22.2%)
8	Topics in the new mathematics curriculum facilitate problem-solving skills more	121 (60.5%)	30 (15%)	20 (10%)	29 (14.5%)
9	UBE workshops exposed me to variety of teaching strategies	115 (57.5%)	27 (13.5%)	30 (15%)	28 (14.5%)
10	The infusion of basics one to nine curriculum has reduced relevant mathematics content	20 (10%)	22 (11%)	143 (71.5%)	15 (7.5%)

Notes. SA ("Strongly agree") and A ("Agree")—high awareness; and SD ("Strongly disagree") and D ("Disagree")—low awareness.

From responses in Table 6, high percentage of SA ("Strongly agree") and A ("Agree") on items 2, 3, 4, 6, 7, and 10 shows negative response and indicates low level of awareness while that of SD ("Strongly disagree") and D ("Disagree") shows high level of awareness using those items. On the other hand, high percentage of SA and A on items 1, 5, 8, and 9 shows positive response and indicates high level of awareness. Most of the respondents are not aware of the main gist of the restructured mathematics curriculum and what is required of them as seen in their responses to the items in Tables 5−6, especially items 3, 4, 6, and 7 with 122, 142, 115, and 122 respondents agreeing to the items with 61%, 71%, 57.5%, and 61% respectively when it should not be so if they have high level of awareness of the scheme.

Research Question 6

Which of the themes do mathematics teachers in primary and junior secondary schools rank as the most important? And what is the level of achievement of these themes in workshops and seminars as perceived by the teachers in their ranking?

Looking at the ranking by the respondents, activities in the workshops and seminars were divided into themes to find out the participating teachers' ranking of their importance to them and the level of achievement of those themes from the organized workshops and seminars. It was discovered from their responses that the most important theme for the participating teachers is the methodology with 182 (91%) teachers ranking them 1st and 2nd and the less important as instructional material with 116 (58%) respondents ranking them 3rd and 4th. It was also observed that the level of achievement of the theme—methodology was ranked the 1st by 102 (51%) respondents which means that the teachers achieved more of methodology than any other themes they have participated in during the workshops, seminars, and short-term training of ICT (information and communication technology) (see Table 7).

Table 7

Frequency of Teachers' Ranking of Themes in Order of Importance and Level of Achievement in Workshops

S/N	Theme	Order of importance				Level of achievement			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th
1	Content	90 (45%)	13 (6.5%)	37 (18.5%)	60 (30%)	89 (44.5%)	11 (5.5%)	80 (40%)	20 (10%)
2	Methodology	112 (56%)	70 (35%)	10 (5%)	8 (4%)	102 (51%)	30 (15%)	41 (20.5%)	27 (13.5%)
3	Instructional material	19 (9.5%)	65 (32.5%)	30 (15%)	86 (43%)	50 (25%)	63 (31.5%)	70 (35%)	17 (8.5%)
4	ICT	30 (15%)	73 (36.5%)	90 (45%)	7 (3.5%)	12 (6%)	36 (18%)	112 (56%)	40 (20%)

Notes. Order of importance: 1st and 2nd—very important; 3rd and 4th—less important; and 1st and 2nd—high achievement; 3rd and 4th—low achievement.

Discussion of the Findings

One of the findings of this study revealed inadequacy in most of the items for smooth implementation of the new mathematics curriculum. The study also revealed inadequate provision of both human and material resources for the implementation of the UBE project in CRS. This finding lends credence to the work of Ekwueme and Meremikwu (2007) whose study revealed shortage of both human and material resources in terms of qualified teachers and infrastructure that reflect technological advancement, etc., which hampers maximum productivity in terms of performance. Though teachers have been trained but the number of those trained teachers is not enough for the number of schools in the state, but surprisingly, high number of teachers used for this study in the public primary schools had indicated having participated in the workshops. This also agreed with the report of the UBE's (2000) verification exercise about the additional teachers needed.

On the teachers' awareness of the true nature of this new system, most of the teachers believed that 6-3-3-4 has been changed to 9-3-4 as a new system or policy, and that the quality of the new mathematics curriculum has been reduced and is overloaded as seen in their responses which point to the fact that most of these practicing teachers are not aware of the main objective of the UBE and the rationale for restructuring the curriculum which among other things is to infuse emerging issues into relevant content and also take into account the targets of NEEDS (National Economic Empowerment Development Strategy) of value re-orientation, poverty eradication, etc.. Though about 168 (84%) of the respondents agreed that great emphasis in the new curriculum is on creativity and manipulative skills as stated in the revised National Policy on Education (Federal Republic of Nigeria, 2004), many of the views are yet to be embraced by them. It is obvious that most teachers were not properly educated on the goals of UBE and the need for the re-structuring of the curriculum and that adequate awareness of the teachers on its implementation has not been achieved.

On the re-training of the teachers, it was discovered that the public primary school teachers had higher attendance to re-training programmes than others. This was also supported by the data given by the state government on Giant Strides (2009) that about 2,400 primary school teachers, head teachers, and inspectors had been trained through the workshops. This still fails below the expected number of trained personnel needed for a smooth implementation since we have over 1,000 schools in CRS.

It was revealed that most of the primary and secondary school teachers believed that geometry and menstruation as a theme is the most difficult content for them to teach and further inquiries in the schools used for study confirmed that no special workshop is usually organized for specific theme/content, making it difficult to thoroughly handle some of these difficult topics in mathematics.

The interview responses of inspectors, school principals, and UBE directorate revealed very low

achievement of the UBE goals for the smooth implementation of the new curriculum. For instance, the principals/head teachers in most schools used, indicated that they have shortage of classroom blocks, textbooks to distribute to teachers and students, libraries, laboratories, and equipments for sciences. No provision for mathematics laboratory, making it difficult for them to safeguard some delicate projects produced during workshops and some that were supplied by book publishers, mathematics centre Abuja, and NERDC during workshops and seminars. It was also discovered that the high responses on the availability of infrastructure were from the private primary and secondary school teachers. This is an indication that most of the private schools used for the study had facilities more than the public schools.

Most private proprietors and principals lamented on their non-involvement in most of the workshops and seminars by the state even by way of information, that most of the workshops attended were organized mostly by book publishers and other bodies.

Funding was the major complaint from the UBE board. On the funding, UBE (1999) extract showed that the federal government share of responsibility for the provision of infrastructure is 75% for primary section and 25% for the junior secondary section, also federal government will carter for 50% of instructional material for junior secondary only and 100% of provision of classroom blocks. It has been noted that the funding has been very irregular in that funds are not released sufficiently and as when due. The response from the CRS MoE showed that the state has embarked on the renovation and expansion of classroom blocks in some schools. In Giant Strides (2009), the commissioner mentioned equipment of physics, chemistry, and biology laboratories and also computer laboratories and libraries without any plans for mathematics laboratory which most principals said has never been in the agenda of any school administrator. This goes to show why constant low performance in the subject is recorded because most of the models that could make some of the concepts more real are not handy.

Mathematics is based on the principle of learning by observation and proceeding from concrete to abstract.

Conclusion and Recommendations

Globally, education is the instrument per excellence for social and economic reconstruction. This quality of education by implication dictates the level of development and quality of life of any given society. For us in Nigeria, education is the vehicle for attaining both natural growth and development. The greatest challenge faced by any education administrator and school personnel lies on the training and re-training of teachers to enhance the needed qualitative education, also providing infrastructure needed for the smooth administration of instruction and availability of textbooks to enhance understanding of what they have been taught. Since education is globally recognized as an instrument for social and economic reconstruction, the new curriculum for the 9-year basic education is thus a vehicle for achieving this goal. Also, as the key components for the UBE scheme include provision of infrastructure, teacher development, and instructional materials as revealed in the study have not been adequately provided for, the following recommendations were made:

(1) Workshops, seminars, and short-term training should be organized more regularly;

(2) More mathematics teachers should be involved in workshops and seminars;

(3) Workshops on specific subjects should be organized separately for more effective coverage. Special workshops should be organized to handle specific themes where special difficult content/themes should be treated for greater understanding;

(4) Information should be generously circulated to all the schools in the state since all of them (public and

private) take the same final examination and are still under the same state. Private school teachers should be included in the special re-training programme;

(5) The state government should provide mathematics laboratory, especially in all the schools alongside other laboratories to safeguard mathematics equipments, concretize the teaching of mathematics, and also projects produced during workshop for further use;

(6) Workshop organizers should make use of comment reports made after each workshop while preparing for subsequent workshops for better performance;

(7) Seminars should be organized for teachers before implementation of any new policy to educate and intimate them on the aims and objectives of such programme thereby creating awareness on the part of teachers.

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