

***Assessments of Teachers' Qualifications and Teaching Effectiveness in Mathematics
in Junior Secondary Schools in Calabar Education Zone of Cross River State***

John Arikpo Okri, Ph.D
*Department of Science Education
University of Calabar, Calabar*
okrijohn@yahoo.com

¹**Allahoki Nimphas D.**
nim963phas@gmail.com

¹**Hassan Bala Saleh**
balgembu1139@gmail.com
¹*Department of Mathematics
College of Education, Zing
Taraba State*

Abstract

The study assessed the influence of teachers' qualification on effectiveness of Mathematics teaching in secondary schools in Calabar Education Zone of Cross River State. The survey design was adopted for the study. A simple random sampling technique was used to select 339 students for the study. One hypothesis, tested at 0.05 level of significance, guided the study. The researchers developed a validated instrument titled "Assessment of Teachers' Qualification and Mathematics Teaching Effectiveness Questionnaire" (ATQMTEQ), to collect data for the study. This had a reliability coefficient which ranged from 0.59 to 0.89 established using test re-test reliability method. The data collected were analyzed using one-way analysis of variance. The findings showed, among other things, that there was significant influence of teachers' qualification on Mathematics teaching effectiveness. The paper recommended among other things that teachers should receive more and regular training through workshop and in-service training. The paper further recommended that to improve and stabilize the teachers' qualification generally, effective monitoring and supervision should be put in place to ensure that teachers do not deteriorate in effectiveness as they acquire higher qualifications.

Keywords: assessment, teachers, qualification, teaching, effectiveness, Mathematics.

Introduction

Despite the notion that education is the bedrock of every development, Nigeria still suffers setbacks because of issues of corruption that observably dominate the education sector; unqualified teachers are recruited, forgetting the fact that, for a nation to effectively take its place in both economic and national development, qualified teachers must be made

readily available so as to inculcate in students the norms and values of nation building. Teachers hold the key to meaningful education, which is vital to nation building. Consequently, any nation desirous of becoming a great country must be committed to making teachers functionally available to meet the requirement of the school system (Sotonwa, 2003).

Ado, Akinbobola and Inyang (2010), opined that the wealth and vitality of a nation rest ultimately upon the development of their people and upon the effective commitment of human energies and talents. Scholars have agreed that the success of any educational programme implementation depends on the adequacy of human elements available to achieve the goal. To this end, Enuokoha (2010) maintained that inadequately qualified teaching staff is a major constraint to the achievement of the educational goal in Nigeria. He identified the teacher's role in the classroom to be three dimensional, namely:

1. To give knowledge, train students in some specified basic skills as stipulated in the curriculum and provide guidance for effective learning activities in the classroom.
2. To help in administration of the school and relate with other teachers so as to perfectly implement the programme for secondary education.
3. To provide a conducive psychological climate in the classroom to facilitate learning and make the students feel as part of the programme of the school.

Many studies by scholars are in agreement with the assertion of Ado *et al* (2010). For instance, the authors in 2010 carried out a study to investigate the status of education human resources in Bayelsa State of Nigeria and their implications in the implementation of the upper basic of the Universal Basic Education (UBE) programme. A total of 181 teachers were involved in the study. The results of the study showed that there were qualified educational human resources for the implementation of the upper basic programme of the UBE in Bayelsa State, Nigeria, but they were inadequate in three basic subjects, English Language, Mathematics and Integrated Science.

Eyoh (2004) asserted that it was no secret that graduates and non-graduates of subjects are teaching English language at Nigerian primary and secondary school stages of education where the foundation for effective performance in the language is supposed to be laid. Obodo (2004) opines that due to lack of qualified teachers to teach Mathematics, the students' learning outcome towards Mathematics was negatively influenced. When an unskilled teacher is allowed to teach a subject not professionally related to him or her, the teaching will lack the rudiments or principles and practices surrounding the subject. The Universal Primary Education (UPE) programme failed as a result of inadequate supply of trained teachers, improper compilation of and unreliable statistical data thereby resulting in wrong projections, financial shortage, poor publicity, and lack of the involvement of those concerned (Madugu, 2000).

Zuzovsky (2009) argued that quality teachers were often seen simply as good teachers and seen to exhibit wonderful behaviour and uphold the standards and norms of the profession. She further stated that quality teachers were also considered to be those who

brought about students' learning. These teachers were called "effective" (Berliner, 2005) or "successful" (Fenstermacher & Richardson, 2005). Fenstermacher and Richardson (cited in Ruth, 2008, p. 38) distinguished the difference between good teaching and successful teaching to be the following:

By "good teaching" we mean that the content taught accords with disciplinary standards of adequacy and completeness and the methods employed are age appropriate, morally defensible and undertaken with the intention of enhancing the learner's competence with respect to content. By "successful teaching" we mean that the learner actually acquires some reasonable and acceptable level of proficiency from what the teacher is engaged in teaching.

According to Adeogun (1989), the quality of any educational system depends on the quality of teachers. Rothoft (2004) submitted the important factor that determined students' achievement to be the quality of teachers in place. Musau and Abere (2015) envisaged the need to always assess the characteristics of secondary school teachers in terms of qualification, experience and teaching methodology before employment so as to ensure that quality education was given to the youths.

According to Musau and Abere (2015), a qualified teacher was one who held a teaching certificate or license by the state; owned at least a bachelor's degree from a four year institution and was well-qualified in his/her area of specialization. Akinsola (2004) studied the teacher component of the 6-3-3-4 system of education in Anambra State. The researcher specifically aimed at appraising how teachers coped with implementation of logistics of the programme. Her population comprised all teachers in all the secondary schools in Anambra State. Her instrument was the adapted version of the Educational Policy Test (EPT) designed and validated by a team of researchers in the Institute of Education, University of Ibadan. On the area of supply and demand of teachers, the researcher found that the total number of teachers employed in urban areas was more than those engaged in rural areas where their services were needed most. This result showed that 23% of teachers in urban areas were above the number required, while the rural areas were short of required teachers by 29.7%. On qualification of teachers, the result showed that 25.3% were academically unqualified, and out of the qualified teachers, it was found that 19.3% were professionally qualified.

One of the goals of teacher education as enunciated in the National Policy on Education (FRN, 2013) was the production of highly motivated, conscientious, resourceful and effective teachers for all levels of the education system. This was to be in all fields as none of the fields, be it science, Mathematics, arts, history, religion, business, etc, could advance beyond the quality of the teachers (Idika, Ovat, Achigbe, & Odumo, 2015). Such teachers were expected to be professionally and academically qualified to perform their duties effectively (Fabiye & Fagbamiye, 2001; McDermott, 1990). According to Ademulegun (2001), students taught by more qualified and experienced teachers in terms

of knowledge of subject matter perform better than those taught by less qualified but experienced teachers. A well-prepared teacher was expected to be a strong commander of the subject matter and should present same to his students to solve the problem that may confront them and which they need knowledge of their subject to solve such problems (Idika et al., 2015). However, the authors lamented the present situation offered by the status of present day secondary education in Nigeria which only re-enabled the teeming students to acquire knowledge and fact with little understanding of useful skills and orientation that could help them achieve self-actualization. They noted that this practice had become the leading cause of the current wave of youth restiveness, high dropout rate from school, unemployable graduates, with a good number involving themselves in armed robbery, banditry, kidnapping, destruction of lives and property, hooliganism, prostitution, and political thuggery. Study by Ukwuoma and Ukozor (2014) to assess the effectiveness of Physics teachers' educator preparation colleges of education in South-East Nigeria found among others that the use of a variety of teaching methods by teachers to achieve effectiveness was independent of their qualification. Also, even with availability of teaching resources, teachers could not adequately use them to achieve effectiveness in teaching.

On teacher qualification and teacher effectiveness, scholars have noted many conflicting results and findings. Okafor (1990) researched into the competence of social studies teachers in secondary schools. Among the variables measured were teachers' professional qualification and teaching effectiveness. The sample comprised 230 teachers and 2,300 students randomly selected from all secondary schools in Akwa Ibom State. The instruments used were questionnaire and observation technique. Statistical analysis done was with Pearson Product Moment Correlation Coefficient, analysis of variance and percentages. Among the findings obtained by the researcher was that professionalism and academic qualifications do not significantly influence teaching competence in social studies. He concluded that teaching effectiveness was not contingent upon either academic or professional qualifications.

From the discussion above, it is noted that availability of an adequate teaching personnel was a necessary condition for effective implementation of the curriculum in schools. This fact was more relevant in Mathematics teaching, where there was relative dearth of qualified Mathematics teachers handling the subject in most schools; hence, this directly affected teaching effectiveness. Erukoha (2010), however, in a lecture on classroom processes, still maintained that, one of the antecedent variables which significantly influenced students' academic achievement in a subject, was the qualification of the teacher.

In another study, Amos (2002) examined the possible influence of teaching qualification on a teacher's effectiveness cum students' academic performance in Rivers State. Teachers' Personal Data Questionnaire (TPDQ) was administered to 2000 teachers with various qualifications, and 800 students' official grade-two results were used for the study also in 20 selected Local Government Areas. Chi-square statistical analysis was used to

test the hypotheses. The result of the analysis revealed that students taught by qualified teachers performed significantly better than those taught by unqualified/untrained teachers. Enuokoha (2010) again maintained that teachers have special qualities that enable them serve as trusted guides, counsellors and leaders in most schools and social circles. Many research studies have highlighted that the importance of availability and adequate human resources in enhancing teaching effectiveness cannot be over-emphasized.

There is a need therefore, to assess the characteristics of secondary school teachers in terms of qualification, experience and teaching methodology in order to ensure quality of education given to youths. Teachers of Mathematics and other sciences should be strategically empowered and positioned especially where gaps were identified to enable them effectively cope with requirements of the dynamic school curriculum (Murunga *et al.*, 2013). Okri and Aglazor (2020) explain that good and well-equipped teachers introduce to students different task which have been broken down according to objectives of the lesson and for effectiveness of the subject teaching. However, in the course of these activities, they work individually towards the attainment of same tasks, and students are guided to gain knowledge by the teacher's effectiveness and his/her approach to teaching mathematics. This means giving the students the opportunity to manipulate the subject they are studying, for instance with the calculator, ruler, mathematical set and shapes.

It is noted by Musau and Abere (2015) that a qualified teacher is one who holds a teaching certificate and/or is licensed by the state, holds atleast a bachelor's degree from a four year institution and well qualified in his/her area of specialization. Moreover, Musau and Abere (2015) quoted the Pakistani Ministry of Education officials who also described a qualified teacher as one who possesses knowledge of: the subject matter, human growth and development, ethical values, instructional planning and strategies, assessment, learning environment, communication and advocacy, collaboration and partnership, continuous professional development, code of conduct and skilful use of information communication technologies.

Educators, government, parents and society in general have constantly been interested in the academic achievement of students (Lydia & Nasongo, 2009). According to Adeyemi (2010), teachers play an important role in determining students' academic achievement. Researchers have never reached a consensus on specific teacher factors that influence students' academic achievement (Rivkin *et al.*, 2005). Some studies found that teachers' experience and educational qualifications significantly influenced students' academic achievement (Asikhia, 2010). When conducting research on factors contributing to under achievement of Zambian female students at O-Level Physics examinations, Maguswi (2011) found that lack of qualified teachers of Physics had a significant contribution.

Moreover, a study done by Adaramola and Obomanu (2011) in Nigeria found that lack of qualified teachers led to consistent poor performance of students in SMT subjects. But certain educational practices such as rote learning, teachers' desire to provide conclusion and answers, excessive use of word problem may not be appropriate for the students' level

of maturation and experience which tend to hamper optimum development of the understanding of Mathematics and which often lead to failure in the subject (Obilor, 2011).

Statement of the problem

Education remains the instrument for lifelong learning and sustainable national development in any developing country like ours. Education and sustainable national development are interwoven, interconnected and geared towards producing or creating something new for the society and its members. The place of education for national development cannot be over-emphasized in nation building and development. However, institutions for teacher training have very critical situations that need urgent attention; this will help to produce teachers who are properly grounded in assessing pedagogical content and as well having the impetus to effectively deliver and function with other professionals in a working environment. Literature has shown that students' low performance in Mathematics could be traced to teachers' qualification on the subject matter. Therefore there is the need for further studies to confirm or disprove this. The above situations have created the need for this paper to assess teachers' qualification and teaching effectiveness of Mathematics in junior secondary schools in Calabar education zone.

Research question

1. To what extent does educational qualification of teachers influence their level of effectiveness in the teaching of Mathematics?

Hypothesis

Ho1: Teachers with different educational qualifications do not significantly differ in their level of effectiveness in the teaching of Mathematics.

Methodology

The study adopted survey design, and the population comprised all 6,420 junior secondary school three (JSS 3) students in all the 25 secondary schools in Calabar Educational Zone of Cross River State. The simple random sampling technique was used to sample 6 schools out of the 25 schools in the zone. Calabar metropolis (Calabar Municipality and Calabar South LGAs) has 18 schools, Odukpani Local Government Area (LGA) has 4, while Akpabuyo LGA has 3. Out of the 18 schools, 4 schools were selected from Calabar metropolis while one school each was chosen from Akpabuyo and Odukpani Local Government Areas. The selection yielded a sample of 339 students that were used for the study; of these 179 were boys while 160 girls.

The instrument for data collection was a well-validated questionnaire developed by the researchers; this was titled "Assessment of Teachers' Qualification and Teaching Effectiveness of Mathematics Questionnaire" (ATQTEMQ). The questionnaire was validated by submitting items measuring the different variables, to two experts in Measurement and Evaluation unit of the Department of Educational Foundations in the University of Calabar for vetting. Their modifications led to the final copy. To determine

the reliability of the questionnaire, the researchers carried out a trial-test with a total of 30 junior secondary three students, who were not part of the study sample; these were randomly selected and administered the questionnaire by researchers. After three weeks, the instrument was re-administered to the same thirty students, who had responded earlier to the questionnaire. The scores from the two administration of the instrument were subjected to Pearson Product Moment Correlation coefficient and the value obtained ranged between 0.59 to 0.89. These values were recognized as high and adequate for studies in social and behavioural sciences. Consequently, the instrument was accepted as appropriate and suitable since it was consistent over time. Data collected from this study were analyzed using one-way analysis of variance (ANOVA).

Presentation of results

Ho1: Teachers with different educational qualifications do not significantly differ in their level of effectiveness in the teaching of Mathematics.

To test this hypothesis, a one-way analysis of variance in teacher effectiveness was done given the different educational qualifications. The result of the analysis is presented in table 1.

Table 1: One-way analysis of variance of influence of teacher qualification on teaching effectiveness in Mathematics

Teachers Qualification	N	\bar{x}	SD		
NCE	100	43.27	5.91		
First Degree	169	49.60	5.08		
Master/Ph.D	70	46.75	7.79		
Total	339	47.47	6.46		

Source of Variation	SS	Df	MS	F	p-value
Between Group	2584.00	2	1292.00		
Within Group	13179.00	337	34.96	36.96*	0.001
Total	15763.00	339			

*P<.05; df = 2,337, critical value = 3.02

Table 1 showed that the result of the analysis gave an F-value of 36.96 and a p-value of 0.001. This F-value at .05 alpha level and with 2 and 337 degrees of freedom was found to be greater than the critical f-ratio of 3.02. The null hypothesis was thus rejected. This

finding means that teachers with different educational qualifications do differ significantly in their level of effectiveness in the teaching of Mathematics.

Table 2: Post hoc analysis on the influence of teachers' qualification on teaching effectiveness in Mathematics

Teachers' Qualifications	NCE (n = 90)	First Degree (n = 210)	Masters/Ph.D (n = 80)
NCE	43.27 ^a	-8.55*	-3.82*
First Degree	-6.33 ^b	49.60	3.65*
Master/Ph.D	-3.48	2.85	46.75

MSW no = 34.96

- a. Group means are along the diagonals
- b. Differences between group means are above the diagonal
- c. Fishers LSD t-values are below the diagonal significance at .05 alpha level

Given the significant F-value, a detailed multiple comparison analysis using Fisher's least significant difference (LSD) was done to determine exactly which of the teachers' qualification differed significantly from that of the other in determining its influence on their teaching effectiveness. This analysis presented in Table 2 showed that the mean effectiveness of teachers with first degree in Mathematics was significantly higher than the level of effectiveness of teachers with NCE, and those with Masters/PhD. In summary, the mean teaching effectiveness of teachers with Masters/PhD was significantly higher than the effectiveness of teachers with N.C.E qualification. These results showed that teachers with qualification of first degree and above were more effective in teaching Mathematics than teachers with only N.C.E qualification.

Discussion of the findings

In relation to the hypothesis, the finding showed that teachers with different educational qualifications differ significantly in their teaching effectiveness. It was further found that teachers with first degree (B.Ed, BA, and B.Sc.) teach Mathematics more effectively than those with Nigeria Certificate in Education (N.C.E). However, the finding contradicted Okafor (1990) who found no significant differences in teaching effectiveness between the professionally qualified; this could however, be accounted for by the fact that Okafor (1990) compared graduates from different Universities and difference was more to difference in teacher professionalism but the present study compared three levels of educational qualifications (NCE, First Degree and Master/Ph.D). The plausible reasons for the significant difference could be that the graduate teachers were exposed more to a body of knowledge relevant to Mathematics in teacher preparation at the University level. Such additional certification tended to make them more thorough in teaching. This of

course is with adequate methodological skills which they had imbibed than those with only Nigeria Certificate in Education (NCE), whose teaching preparation was loaded more with methodological variations than vast knowledge exposure. Thus, when the three groups were compared in terms of teaching effectiveness, those with first degrees tended to teach more effectively than those with the Nigeria Certificate in Education (NCE). Surprisingly, they also did better than those with master's degrees. This trend of teacher effectiveness was however, a concern to researchers and called for further investigation.

Conclusion

Based on the findings, the study concluded that the higher the educational qualification, the more effective the teachers in teaching of Mathematics, particularly in the case of the first degree and the NCE holders. Therefore, there is need for policymakers and educational administrators to encourage teachers to always upgrade themselves academically in order to get appraised with new methodologies and improve the quality of their certificate, knowledge and skills. This can only be achieved through the assistance of educational governing council through creation of educational programmes and study fellowship. However, based on the findings that showed that first degree teachers were more effective than their M.ED/Ph.D in the teaching of Mathematics, it was important that further effort be made to research into this as this could pose serious policy implication and negative actions on the part of teachers in terms of furthering their career.

Recommendations

Based on the findings of this study, these recommendations were made:

1. The Mathematics teacher should make effort to update their qualifications through enrolling in the B.Sc(Ed) degree programmes that can relevantly enhance their effectiveness.
2. Educational governing council should create educational programmes and study fellowship to update teachers' knowledge especially in Mathematics discipline.
3. Mathematics teachers training workshop should be organized, encouraged and sustained across the country. These workshops should be focused on teaching and the planning and implementation of innovative instructional strategies that enhance the learning of Mathematical science in senior secondary schools in Nigeria.
4. Effective monitoring and supervision should be put in place to ensure that teachers do not deteriorate in their effectiveness as they acquire the B.Sc(Ed) qualifications.

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