ASSESSMENT OF PROFESSIONAL ROLES PERFORMANCE OF MATHEMATICS TEACEHRS IN NIGERIA

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This study was designed to assess the teaching effectiveness or professional role performance of mathematics teachers in Nigeria, and how such effectiveness was influenced by three selected teacher characteristics. Two hypotheses were tested. The study sample consisted of 200 mathematics teachers drawn randomly from the population of 285 secondary school mathematic teachers in one of the States in Nigeria. A 48-item questionnaire on professional roles and another on teacher characteristics were used for data collection. Data were analysed using population t-test and 3-way analysis of variance. The results showed that the mathematics teachers in the sample were rated by their students as effective in all the eight dimensions of teaching (professional roles), and this effectiveness was not significantly influenced by any of the three teacher characteristics.

INTRODUCTION

The importance of mathematics in the development of manpower for a nation's economy cannot be over-emphasized in any nation of the world. The Federal Republic of Nigeria has clearly demonstrated this by making mathematics a core and compulsory subject at both the junior and senior levels of secondary (high) school (Federal Republic of Nigeria, 2004). In the universities and other tertiary educational institutions, a credit or ordinary pass in mathematics constitutes a major admission requirement for preparation in the professions. The government of Nigeria has demonstrated commitment to the teaching and learning of mathematics by investing financially and materially in education generally, and particularly in the promotion and popularization of the study of mathematics and sciences at all levels of education (Federal Republic of Nigeria, 2004).

In spite of the orchestrated importance of mathematics and the laudable and substantial investment in the study of it by the Nigerian government, students' performance in the subject has not been impressive over the years. Many of the science and mathematics related academic programmes in the tertiary educational institutions have not been filling their admission quotas largely because of poor performance of Nigerian candidates at the end-of-school external qualifying examinations. In 2000 and 2001, for example, the failure rates in mathematics were 73.25% and 72.65% respectively (Falokun, 1991; Obemeata, 1991; Onwuakpa 1995;).

Many factors have been highlighted as explanations for the poor performance of students in mathematics, but the role of the teachers cannot be undermined or explained away. In any educational system, the academic achievement and performance of the learners largely depend on the quality of the teachers, among other variables. This teacher quality expresses itself mainly in the teaching effectiveness of the teacher. Teaching effectiveness refers to the kind of teaching that produces positive and expected results in the learners. It is the teaching that presents the teacher as a professional satisfactorily playing his/her roles in the classroom, in the areas of, competence in the

subject matter, effective lesson delivery in the class, class management, appropriate use of methods and materials, motivation of learners, teacher-student interaction and evaluation of students' learning, among others.

STATEMENT OF PROBLEM, OBJECTIVES AND SIGNIFICANCE OF THE STUDY

Professional role performance of the teacher in the classroom is very crucial to the realization of the lesson instructional objectives in the learners. Given the poor and unimpressive performance of learners in mathematics, the likely posers are: Are mathematics teachers effective in their teaching? In other words, are they performing their professional roles in the classroom satisfactorily? Do they appear to be more proficient in some roles that they are in other? Are their teaching effectiveness influenced by their characteristics like gender, academic qualification and years of teaching experience? Seeking answers to these posers constituted the problem that this study sought to address.

Specifically, the study was designed to:

(i) Determine the level of teaching effectiveness (or professional role performance) of mathematics teachers in Nigeria, drawing sample from one of the States of the Federation, and using the ratings of their students.

(ii) Determine the influence of teachers' gender, academic qualification and teaching experience on their level of teaching effectiveness.

It is believed that the findings of the study will be of benefit to the teachers primarily as they will receive feedback on their professional role performance. This could lead to their working harder to enhance their professional growth. The educational administrators and Ministry of Education officials could also use the findings of the study as input data in the recruitment, transfer, promotion and deployment of mathematics teachers in the state/country.

THEORETICAL FRAMEWORK/DIMENSIONS OF TEACHING EFFECTIVENESS

The theoretical framework for this study is based on McClelland's need achievement theory, and is an attempt at testing Okpala's model for evaluating teaching effectiveness (McClelland, 1961; McClelland, Matthew & Frank, 1953; Okpala, 1999). McClelland's theory is a theory of human motivation based on human needs classifications, which are (i) need for achievement, (ii) need for affiliation, and (iii) need for power. The need for achievement will theoretically drive a teacher to put up his/her best in performing his/her professional roles in the classroom. An overview of research literature on teaching effectiveness reveals no definite standard commonly agreed upon as the definition or list of teaching qualities. Most studies tend to emphasize qualities such as knowledge and organization of subject matter, skills in instruction and personal qualities and attitudes that enhance rewarding teacher-students interaction. Other criteria like clear goals, adequate preparation, appropriate methods, effective presentation and communication, reflective critique and significant results have been suggested by Boyer (1990) and Glassick (1997).

Contributing to the issue of components of teaching effectiveness, Okpala (1999) has proposed the model for evaluating teaching effectiveness, which portrays the school and societal variables as combining to impact on the teaching-learning process. It identifies eight dimensions or stages in the process, and posits that each stage is subject to evaluation, and the evaluation data from each stage could be used to influence decision at another stage. The model for evaluating teaching effectiveness positions teaching as an integral art of cyclical teaching-learning activities in the classroom. From this model, eight different but inter-related dimensions of teaching (or professional roles) were identified by Obukohwo (2004), and are used in this study. Teachers generally, and mathematics teachers in particular, are expected to perform or show effectiveness in these eight dimensions. These dimensions are (i) Knowledge of the subject matter, (ii) Classroom communication, (iii) Classroom management, (iv) Motivating students to learn, (v) Use of variety of teaching methods, (vi) Effective use of instructional materials, (vii)Sstudent-teacher relationship, and (viii) Evaluation of students' learning.

According to Okpala (1999), evaluation of teaching effectiveness could be conducted by the teacher himself, by the students (learners) being taught, or by an observer. Though riddled with conceptual and methodological issues, student evaluation of instruction is gradually gaining acceptance; and it was the approach adopted in this study.

RESEARCH METHODOLOGY

The research design adopted was a survey, involving the use of ex-post facto research. The research area was supposedly Nigeria, but one of the 36 States of the Federation was chosen for study. This was Cross River State located in the South –South Political Zone of the country. The population for the study consisted of all the mathematics teachers in secondary schools in Cross River State, whether teaching at the junior or senior levels in the year of the study (being 2005). The number of mathematics teachers in the State was 285. Out of this number, a simple random sampling technique was applied to select 200 teachers (100 males and 100 females) as the sample for the study. The research instrument adopted for data collection was one developed by Idowu in 2004 under the supervision of Joshua, and derived directly from Okpala's model. It was named instrument for evaluation of instruction in Mathematics (I.E.I.M). The instrument had 48 items in all, making for 6 items on each of the eight dimensions of teaching (professional roles). Another instrument was designed and used to identify the teachers' gender, academic qualification and years of teaching experience.

With the 48 items, students of mathematics were requested to score or rate their mathematics teachers on the perceived level of teaching effectiveness in the eight different dimensions. A scale of one to ten (1 to 10) was used for the rating, "1" "representing lowest level of effective teaching, and "10" representing of the highest level of effective teaching. This instrument, with the eight sub-scales, had reliability indices ranging between .91 and .98 using Cronbach alpha coefficients, as reported by the initial developers of the instrument (Obukohwo, 2004). For each mathematics teacher in the sample, ten of his/her students were randomly selected to rate his/her teaching effectiveness on all the eight dimensions (professional roles). The sampling was however done in such a way that equal numbers of males and females were represented. The score that each teacher had as an index of his/her teaching effectiveness was the average of the 10 scores (from 10 student

raters) obtained by adding scores on the six items measuring a particular professional role (dimension of teaching effectiveness). The score for each professional role (dimension) varied between 6 and 60. Each teacher in the sample also had a score representing the level of his/her overall teaching effectiveness. This score varied between 48 and 540. The research instrument was administered by the researchers personally with the assistance of teachers in the school visited (excluding the actual teachers that were being rated. In the data collection exercise, the data for 181 (of the 200 teachers) were usable. Data so collected were analyzed, using population t-test for the testing of Hypothesis one (i.e. determining the teaching effectiveness or professional role performance of the teachers), and 3-way analysis of variance for testing of Hypothesis 2.

DATA ANALYSIS AND RESULTS

There were two hypotheses tested in the study.

Hypothesis 1

The level of teaching effectiveness (professional role performance) of mathematics teachers in Cross River State is not significantly high.

In testing this hypothesis, the researchers reasoned that for a teacher to be considered effective on any dimension of his/her teaching, he/she should score 6 out of 10 on each of the six items measuring each professional role. Thus, the reference mean score for each of the each eight professional roles (dimensions of teaching) was 6 x 6 = 36. For the overall teaching effectiveness (sum of the eight dimensions), the reference mean score was 36 x 8 = 288. Thus, any teacher who was rated 36 and above on each of the professional roles was considered to be professionally effective/active in that role/dimension. Any who was rated 288 and above on the overall dimension was judged to be effective on the whole. The test statistic applied in testing this hypothesis was population t-test (also known as t-test of one sample mean). The data analysis results showed that the mathematics teachers in the sample were rated as being effective in all the eight dimensions of teaching (or professional roles). Specifically, the teachers were effective in their professional roles as shown in Table 1.

S/no	Professional roles (dimensions of teaching)	Sample mean	Sample SD	Hypothe-sized mean	t-value
1	Knowledge of subject matter	55.52	2.38	36.00	110.3
2	Classroom communication	56.09	2.01	36.00	106.0
3	Classroom management	55.70	2.50	36.00	106.0
4	Motivating students to learn	55.54	2.67	36.00	98.5
5	Appropriate choice of teaching methods	49.27	2.84	36.00	62.9
6	Effective use of instructional	49.31	2.82	36.00	63.9

	materials				
7	Teacher – student relationship	55.65	2.51	36.00	105.3
8	Evaluation of students' learning	49.04	2.57	36.00	68.3
9	Overall teaching effectiveness	426.10	8.07	288.00	230.2

Table 1: Results of population t-test analysis of the significance teaching effectiveness of mathematics teachers in Nigeria.

Hypothesis 2

There are no significant effects of teachers' gender, academic qualification and teaching experience on the level of overall teaching effectiveness of mathematics teachers in Cross River State.

The independent variables in this hypothesis are three. These are 'gender', with the traditional two classifications; 'academic qualification', with three classifications (those with Nigeria Certificate in Education – NCE- lowest; those with Bachelors Degree; and those with qualification above Bachelors Degree – as highest. Teaching experience also had three classifications (those with 0-5 years, those with 6 – 10 years, and those with above 10 years). To test this hypothesis, 3-way analysis of variance was applied on the data and the analysis results showed that the level of overall teaching effectiveness of mathematics teachers studied was not significantly influenced by the teachers' gender, academic qualification and teaching experience. In other words, Nigerian mathematics teachers in the sample were generally effective in discharging their professional roles (as rated by their students); and no particular group (on account of their gender, academic credentials and years of teaching experience) was found to be more effective than others. However, there was an interaction effect of gender and academic qualification on the overall teaching effectiveness of the teachers. Among teachers with NCE (lowest qualification), females were found to be more effective than the males; but among teachers with post-graduate degrees (highest qualification), males were found to be more effective than the females. There was no shift of position among graduate teachers. The finding that mathematics teachers in Nigeria (represented by those in the sample) are substantially effective is quite informative, and tends to support the feeling among some educational practitioners that the decline in mathematics achievements of students in Nigerian schools is not in the instructional effectiveness of mathematics teachers, but in many other factors external to the teacher. Thus, teachers, and mathematics teachers in particular, are effective in performing their professional roles.

CONCLUSION AND RECOMMENDATIONS

Based on these findings, it was concluded that mathematics teachers in Nigeria (represented by teachers in Cross River State) are generally affective in performing their professional roles (exemplified in the eight dimensions of teaching selected for study). It was recommended that mathematics teachers should offer themselves for periodic assessment of their professional roles, and they should utilize the feedback from such assessment for the improvement of their role performance, and the enhancement of their professional growth.

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