COMPETENCY IN STM ASSESSMENT: THE CASE OF PRIMARY SCHOOL TEACHERS IN CROSS RIVER STATE, NIGERIA.

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This survey of primary school teachers in Nigeria focused on their competency in STM assessment and how this related with some demographic characteristics. Results indicate that females than males, and private than public school teachers were more competent in STM assessment.

INTRODUCTION

Science, Mathematics and Technology (STM) form the bedrock for technological progress and sustained development. Hence, its importance cannot be over emphasized. STM consist of a body of knowledge, concepts and principles as well as a set of processes and skills (Clayden & Peacock, 1994) and is thus considered difficult by learners. The STM teacher's competency in facilitating learning is therefore crucial. Unfortunately, all is not well with STM teaching at the primary school level. Mutemeri and Mugweni (2005) reported low motivation and performance by children during mathematics instruction in Zimbabwe. A comparison of primary school curricula from 14 Asian and Pacific countries and 8 African countries by Peacock in 1995 revealed problems in primary science teaching, which cut across many countries. The situation is not different in Nigeria. Such problems have been attributed to socialization patterns (Okeke, 2000), lack of readiness by learners (Obioha, 1982, Asim, 2000), lack of motivation of learners by science teachers (Umoinyang, 1998), methods of communicating science at the primary school level (Dike and Bolorunduro, 1998), inadequate pre-service teacher curriculum (Asim, 2004) among others.

Suggestions for improvement include, adequate teacher training programmes (Groft, Lanis & Pizzo, 1993); popularizing science (Bajah, 1997), improved school quality (Eisemon & Schwille, 1991); early access to science (Obioha, 1982); improving assessment quality in primary schools in Africa (Bude & Lewin, 1997). Among these researches, focus on STM assessment at the primary school level has suffered least patronage (Asim, 2000). The present study therefore intends to fill this gap.

Objectives of the Study

This study sought to determine how competent the teachers sampled were in STM assessment. It related their competence to sex, educational qualification, school proprietorship, teaching experience (years), geographical location of their school and the class taught.

Significance

The outcome of this study is likely to provide a basis for INSET for practicing teachers and give impetus for curriculum restructuring for pre-service teacher training programmes.

Theoretical Framework

The theories underlying this study are classical test theory (CTT) and the item Response Theory (IRT). The central tenet of the classical test theory (CTT) is that for a given measurement

instrument, there exists a "True Score" for each individual. That is the score that the individual would get on that instrument if the measurement was made without error (METRIC, 2006).

Walsh and Betz (1985) are of the opinion that all test scores contain error (a mistake) made up of previous experience, socio-cultural problems, test administration among others. If such errors arise from teachers due to their incompetence in assessment, the harm may be far-reaching. This is because these errors which are expected to be random and uncorrelated become systematic and correlated thereby resulting in a wrong impression of the quantity of latent trait under measurement. Rust & Golombok (2000) refer to such errors as sabotage in personality assessment. Unlike CTT, Item Response Theory (IRT) is item rather than test-based. IRT assumption is that responses to items can be modeled as a function of a person's level of the trait being measured, theta(Θ) and the item parameter estimates, that is difficulty, discrimination and chance (METRIC, 2006). The basic assumptions underlying IRT are unidimensionality and local independence. According to Nenty (2004) unidimensionality implies that all items on a test measure only one trait, while local independence assumes that performance on pairs of items in a test should not be related. These assumptions underlie the 1 -, 2 -, 3 – parameter IRT models. The implication is that an incompetent teacher may find it extremely difficult to develop a test in which item parameter estimates do not lead to wrong conclusions about measures of latent traits.

RESEARCH METHOD

Design

The research design is a sample survey carried out among primary school teachers in Cross River State, Nigeria.

Sampling and Sample

A simple random sample of 200 teachers was selected from a population of 650 primary school teachers involved in a vacation programme during the 2006 Easter Sandwich session in the University of Calabar, Cross River State, Nigeria. These teachers attend vacation programmes to acquire a Bachelor's degree in Education while on their job.

Instrument

Data were collected using a 42 – item questionnaire divided into 2 sections. Section A elicited information on teachers' sex, educational qualification, school proprietorship, teaching experience, geographical location of school and the class taught. Section B consisted of 36 items focusing on key areas of STM assessment, namely, test planning, item preparation, item analysis, test administration, scoring and interpretation of scores. They were to indicate the ease with which they could carry out STM assessment as regards the 6 components mentioned and also in the cognitive, affective, and psychomotor domains. Response was on a 4 – point scale of very easy, easy, difficult, and very difficult. The assessment of competence is an exciting and promising development and the emphasis is on a search for positive characteristics of persons with clear criteria in appropriate situations (Blabladelis, 1984). In this study a clear criteria of what constitutes competency in STM assessment was extracted from Anikweze's (2006) seven clusters of science teacher competencies. These included planning instruction in science, implementing instruction in

science, evaluating instruction in science, understanding pupils' development and individual differences, using Educational Technology, maintaining discipline, and reinforcing learning.

In terms of assessing instruction, Ashibi, (2005) and Anikweze (2006) highlighted the following abilities as important: constructing valid and reliable tests to evaluate learners' progress in science, developing and using questions that ask for recall, application and reasoning, making use of informal procedures like interviews, and observation for collecting information about pupils, analyzing test results, using test results to improve teaching and learning. Thus in developing the instrument, competence was operationalized as ease of carrying out the requirements of the different components of the task involved in STM assessment. Cronbach reliability estimate of the instrument was 0.86.

Data Collection Procedure

The instrument was administered to the randomly selected teachers during their orientation for the vacation programme. Two hundred (200) copies of the instruments were administered over a period of one week, though 34 copies were invalidated by incomplete responses. For the purpose of analysis, 166 copies were utilized.

Data Analysis

On the basis of the responses in section A of the instrument, the sample was categorized as shown in table 1. The 4-point scale in section B was scored as follows: very easy – 4points; easy – 3points; difficult – 2points; very difficult – 1point. For the 36 items, scores range from 36 to 144. To have 2 groups (competent and incompetent) the population mean scale value of 90 (2.5 x 36) was used to avoid a redundancy of scores that may not fall on direct scale values(cf Isangedighi, Joshua, Asim, & Ekuri, 2004). The values so generated were used to compute chi square test of independence between each of the listed variables and competence in STM assessment at p< .05. The question, the chi-square test of independence addressed was whether the observed frequencies mirrored what would have been obtained if for instance, school proprietorship and competency in STM assessment were actually independent of each other. The critical chi-square value at Idf and p< 0.5 is 3.841. Therefore any computed X^2 value $\geq$ 3.841 will warrant the rejection of the hypothesis of independence between pairs of variables in the study.

Result

The results of the chi square analysis are presented in table 1.

S/N	Variable	Group	Competency		Total	X^2
			Competent	**Incompetent**		
1.	School Proprietorship	Private	20 (11.70)	9 (17.30)	29	11.96*
		Public	47(55.30)	90 (81.70)	137	
			67	99	166	
2.	School Location	Urban	52 (54.89)	84 (81.11)	136	1.41
		Rural	15 (12.11)	15 (17.89)	30	
			67	99	166	
3.	Qualification	NCE holders	24 (19.78)	25 (29.22)	49	2.15
		Below NCE	43 (47.22)	74 (67.78)	177	
			67	99	166	
4.	Sex	Male	10 (20.18)	40 (29.82)	50	12.32*
		Female	57 (46.82)	59 (69.18)	116	
			67	99	166	
5.	Teaching Experience	Above 7years	27 (24.22)	33 (35.78)	60	0.84
		7years and below	40 (42.78)	66 (63.32)	106	
			67	99	166	
6.	Class Taught	Junior primary	31 (26.23)	34 (38.77)	65	2.33
		Senior primary	36 (40.77)	65 (60.23)	101	
			67	99	166	

*p< .05

Table 1: Teacher and school variables by competence in STM assessment among primary school teachers in Cross River, Nigeria

Findings

Results in table 1 show that only 67 (or 40.4%) of the 166 teachers studied were competent in STM assessment while 99 (or 59.6%) could be rated 'incompetent'.

The chi square values were only significant for school proprietorship (X^2=11.96; p<.05) and teacher's sex (X^2=12.32; p<.05). Thus the teachers' competency in STM assessment is a function of school proprietorship and teacher's sex but not that of school location(X^2=1.41; p>.05), teaching qualification (X^2=2.15; p>.05), teaching experience (X^2=0.84; p>.05) nor the level of class taught (X^2= 2.33; p>.05)

Discussion of results

The competency for STM assessment in this study has been found to be independent of teacher and school characteristics like teacher qualification, experience, class taught and school location. This finding agrees with that of Ashibi (2005) who found that teachers' demographic variables could not be used to explain their application of testing skills. The present study gives an indication that competencies not acquired during pre-service training may not be easily compensated for by on-the-job experiences especially for STM subjects. STM subjects are abstract, especially when taught by generalist primary school teachers (Berg, 1993). More private school teachers than public school ones were found competent in STM assessment. This outcome can be accounted for by smaller class sizes in private than public schools. Class size is a major issue in assessment (Asim & Bassey, 2004).

The fact that more females than males were found competent in STM assessment even though found themselves in large classes and were generalist teachers like the males may be explained by the fact that females have less favourable opportunities of attrition from teaching (Bassey, 1998). Thus they are more likely to put all it takes to perform their job (including STM assessment) credibility and thereby maintain it.

CONCLUSION AND RECOMMENDATIONS

This study sought to find out if primary school teachers were competent in STM assessment and if their competences or incompetence was dependent on school proprietorship, school location, their qualification, sex, teaching experience and class taught. Results indicate that majority of them are incompetent in STM assessment. Among the competent, private school teachers and female teachers expressed more competence in STM assessment. The implication is that as long as teachers fail to acquire required assessment skills during teacher training as result of curriculum inadequacies STM teaching and assessment at the primary school level would suffer.

It is recommended that the assessment component of pre-service training curriculum should be given more emphasis. In service training in assessment should be given serious consideration. Specialist STM teachers need to be trained for the primary schools and class sizes should be reduced to improve STM assessment.

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