
Teachers' Competencies And The Assessment Of Senior Secondary School Students Mathematics Performance In Rivers West Senatorial District, Rivers State

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Abstract

This study was designed to evaluate teachers' competencies and the assessment of senior secondary school students mathematics performance in Rivers West Senatorial District of Rivers State. The Study employed the descriptive survey research design, two research questions and two hypothesis were formulated to guide the study, 224 Mathematics teachers constituted the population. The sample size for this study was 144 using Taro Yamene formula. Out of the 56 senior secondary schools in the eight local government areas in Rivers West Senatorial zone a total number of five (5) schools were randomly selected from each local government area, which were total of 40 schools. The instrument developed for this study was a self-constructed rating scale titled "Rating Scale for Mathematics Teachers' Competence in the Assessment of Senior Secondary School Students Skills in Mathematics (RSMTCASSSSM)". The instrument was validated by two experts to critically access, analyze and judge the suitability of the items to ensure construct, face and content validity before pilot testing. The reliability index of the instrument was determined using Cronbach alpha co-efficient at 0.75. The method of data collection for this study was through rating scale. Mean and standard deviation were used to answer the research questions, while t-test statistical analysis was to test null hypothesis at 0.05 level of significance. The findings revealed that there is a low adoption and utilization of Mathematics assessment performance in secondary schools in Rivers West Senatorial District, with the use of marking guide being the most adopted competency, while the use of non-cognitive assessment practice being the least utilized competence, male teachers have a significantly higher level of Mathematics assessment competencies than female teachers in mathematics assessment competencies in secondary school in Rivers State. Based on the finding findings the following recommendations were made that the mathematics teachers should make deliberate effort to improve their competencies in assessing students' mathematics performance. This could be done through training for higher qualification; in-service training and workshops/seminars, lecturers in higher institutions where mathematics teachers

are trained should use the result of this study to improve on their trainee's teachers especially in the area of assessment.

Keywords: Teacher competencies, Assessment, Students Mathematics Performance

Introduction

Education is globally recognized as the bedrock for personal and national development. One of man's basic concerns is the issue of survival, hence the cultivation, utilization, transformation and preservation of those aspects of his culture (viz; knowledge, attitudes, values and skills) are at all times, his preoccupation. Taba as cited by David (2002), defines the school curriculum as the systematic plan of the formal and informal content of learning and the process by which learners gain knowledge and understanding, skills, principles and attitude under the auspices of the school. The systematic procedure is to change the behavior of the learners.

Education provides an environment through which selected knowledge, skills, and values may be communicated/transmitted by those who possess them to those who do not. The school's responsibility is to provide experiences through which individual students are given methods and opportunities to expand their existing knowledge. The school must foster student's inventiveness leading to further discoveries wherein the world is made a better place for human habitation. Asuru (2017) noted that educational system all over the world have continually shown much concern about mechanisms for determining, measuring and monitoring the learning outcomes of the students. In the recent past, the 1990 Justine, Thailand World conference on Education for All and the 2000 Dakar World Forum on Education had deliberated extensively on mechanisms for measuring and monitoring improvement in learning outcomes, to reinforce the assessment and monitoring of learning achievements. This is predicated on the impact of such results on the learner, the teacher, the school, the educational system and the society at large. Thus, the determination of the extent to which learning has taken place has over the years become one of the major concerns of evaluators in particular, and educators in general.

Education at secondary school level often provides a foundation for acquisition of further knowledge and skills in tertiary institutions of learning. It is a bed-rock where future productive human capital is nurtured to serve the dynamic needs of a nation's labour market and the economy in general. Education is regarded as an instrument that can be used to achieve more rapid economic, social, political, technological, scientific and cultural development in a country. Secondary education is a very important instrument for national development that fosters the worth and development of the individual for further education and development as well as the general development of the society. In Nigeria education system, mathematics is a compulsory and an examinable subject offered at all levels of learning except for tertiary institutions where it is selective, yet requisite in some courses at different years of study.

Over the recent years, student's performance in mathematics has attracted attention from various stakeholders and further raised interest in teachers' competence in delivering the subject matter. Some scholars opine that student performance in mathematics is a function of student efforts, attitudes, interest in the subject and intellectual capabilities as well as competence of the teacher. As regards the teachers'

role in student achievement in mathematics, there are various competency standards required in the teaching profession. These standards relate to teacher competence requirements such as the level of educational qualification, training and professional development and work-related experience. Competent teachers who meet the professions' requirement are perceived to be "good" teachers who bring about learning and exhibit desirable traits by upholding the standard and norms of the profession. This study examines teacher competence in the assessment of senior secondary school students' skills in mathematics.

Teacher qualification entails the level of attainment or achievement in professional training that determines the quality of services offered based on competence of individual teachers. Abe (2014) teacher qualification refers to academic or professional achievement that enables an individual to become a competent teacher. A qualified teacher is one who holds a teaching certificate earned from a reputable and accredited institution and is thus licensed to offer services in his/her area of specialization. A qualified teacher is one who holds a teaching certificate in Postgraduate Diploma in Education (PGDE), Professional Diploma in Education (PDE), and Bachelor of Education (B.ED) among others. These qualification determine the level of competence for each subject teacher.

Competence has mental component involving thoughts and a behavioural component involving competent professional performance. To influence the desired students' performance in mathematics, teacher competence goes beyond mere possession of the requisite knowledge, skills and attitudes. This is because the success of any pedagogical process also relies on other factors such as the mode of delivery of content, teacher's preparedness, learner's engagement in learning process and the learning environment among others. Competence is developed through teacher education, work experience and on-the-job training based on an exposure to a variety of activities that test an individual's ability to cope with different situations.

As observed by Scriven (1967), teachers inevitably are responsible for assessment that requires them to report on student's progress to people outside their own classroom; in addition to informing and supporting instruction, assessment communicates information to people at multiple levels within the school system, serves numerous accountability purposes and provide data for placement decisions. Teachers take on different roles, as coach and facilitator, the teacher uses assessment to help, support and enhance students' learning determine students' achievement at a specific point in time for the purpose of placement, grading, accountability and informing parents and future teachers about students' performance. It is in the light of this that the issue of assessment has taken a front burner in education discourse.

Mathematics, as an integral part of the total education process is a field of endeavour which has its aim to include that students recognize that mathematics permeates the world around us, use inductive and deductive reasoning when solving problems, and develop the knowledge, skills and attitudes. The mathematics teacher just like any other teacher is entrusted with the most precious products on earth, children. The students under the teacher's guidance require specific attention as individuals. A child is complex in make-up and extremely unique in many aspects. He has varying abilities in the numerous physical and mental skills required of him by the culture he inherited and he has certain psychological limitations, he will lack ability. Since it is acknowledged that some students can handle a more difficult course of instructions

than others, how does the teacher choose the right or proper programme for each student? This demands competence in the use of measurement and evaluation techniques which is the focal point of this study. In some schools where mathematics teachers are employed, they have little or no knowledge of assessment techniques like

Formative vs. Summative Assessment.

Formative assessment is designed to assist the learning process by providing feedback to the learner, which can be used to identify strengths and weakness and hence improve future performance. Its main purpose is to catch deficiencies so that proper learning can take place, which allows the learners to master the required skills and knowledge. Here the learner is assessed in the course of teaching. This could take the form of observing, listening to students' answers to questions and comments by other students in order to note their difficulties and to adjust to teaching accordingly. Formative assessment also involves identifying possible misconceptions and taken care of it, in order to prevent future occurrences.

Formative assessment provides the following:

- Insight on the pedagogical strength and challenges to specific course concept.
- Guidance to improve teaching strategies.
- A means of monitoring progress or growth in teaching and learning.

Formative assessment is most appropriate where the results are to be used internally by those involved in the learning process (students, teachers, curriculum developers). It is used as the programme is on the process.

Summative assessment emphasizes on the overall performance of one's effectiveness in teaching and learning. It is conducted at the end of a course or programme. The focus is to measure and document quality indicators for decision making purposes. The information from summative assessment maybe used to improve future teaching performance. It provides information on whether the students have mastered the concepts taught and to what extent. The results of this assessment are given to parents for purpose of knowing the progress of their children.

Summative assessment provides the followings:

- Information concerning teacher's adherence to teaching expectation.
- Bases for comparing teacher's performance to reference group and external performance.
- A means of determining the effectiveness of instructional activities.
- Diagnostic information about strength and weakness of teachers' performance.
- Data to determining achievement or curriculum performance expectation.

Summative assessment is used primarily to make decisions for grading or determine readiness for progression. It is also used to communicate students' abilities to external stakeholders, e.g., administrators and employers (Darling-Hammond, 2016).

Informal vs. Formal Assessment

With informal assessment, the judgments are integrated with other tasks. Informal assessment is most often used to provide formative feedback. As such, it tends to be less threatening and thus less stressful to the student. However, informal feedback is prone to high subjectivity or bias. Most times this type of assessment is not planned or made known to the students.

Formal assessment occurs when students are aware that the task that they are doing is for assessment purposes, e.g., a written examination. Most formal assessments also are summative in nature and thus tend to have greater motivation impact and are associated with increased stress. Given their role in decision-making, formal assessments should be held to higher standards of reliability and validity than informal assessments (McAlpine, 2002).

It is against this backdrop that this study is designed to evaluate the competencies of senior secondary school teachers in assessing mathematics skills of students in Rivers West senatorial district.

Statement of Problem

Mathematics is the science that deals with the logic of shape, quantity and arrangement. It is all around us, in everything we do; it is the building block for everything in our daily lives including mobile device, architecture (ancient and modern). Therefore the teacher's competency in the assessment of senior secondary school student's mathematics performance will be very important to achieve these desired results.

The education system in Nigeria has a comprehensive curriculum that makes mathematics a core subject meaning that it is a compulsory subject for all learners up to secondary school level of education, as such, all students seeking to acquire SSCE Certificates upon completion of secondary education have to study mathematics and sit for it in the SSCE examinations. This is because mathematics relates with other subjects and provide a solid foundation for other fields such as, commerce, medicine, engineering, agriculture among others, in this case, mathematics is at the core of learning at all levels of education. Currently there are some challenges in our school in terms of good assessment skills and these could be as a result of lack of experienced teachers, competency skills possessed by the mathematics teacher and lack of qualified teachers in our senior secondary schools.

This has attracted the attention of many education stakeholders including parents, teachers, the government and other external stakeholders funding education projects. Attakorn, Tayut, Pisithawat and Kanokorn (2014) explain the factors underlying the reported poor assessment skills in mathematics. This study sought to evaluate the competencies of senior secondary school students' performance in mathematics in Rivers West Senatorial District. It is on this basis that the researcher find it fit to relate teachers competence with students performance in mathematics and hence the need to conduct the present study.

Aim and Objectives of the Study

The main aim of the study was to evaluate teachers' competence in the assessment of senior secondary school students' mathematics performance in Rivers West Senatorial District.

Therefore, the investigator is to find out specifically:

- i. If there is any difference between male and female teacher in utilizing their competencies in assessing students skills in mathematics
- ii. If teacher's qualification have any influence on their competence in assessing the students' performance in mathematics

Research Questions

The following research questions were put forward to be answered by the study:

1. To what extent do male and female teachers utilize Mathematics assessment competencies in senior secondary schools in Rivers West Senatorial District?
2. To what extent does the mathematics assessment competences of secondary school teachers in Rivers West Senatorial District differ based on their educational qualification?

Hypotheses

The following null hypotheses were formulated and tested for the study:

- H₀₁:** There is no significant difference in the extent to which male and female mathematics teachers utilize assessment competencies in senior secondary schools in Rivers West Senatorial District?
- H₀₂:** There is no significant difference in the Mathematics assessment competencies of secondary school teachers in Rivers West Senatorial District based on their educational qualifications.

Methodology

This research design was descriptive survey research design. The population for this study consisted of all the 224 mathematics teachers in the 56 senior secondary school in the eight local government areas in Rivers West Senatorial District in Rivers State. The sample size for this study was 144 using Taro Yamene formula. Out of the 56 senior secondary schools in the eight local government areas in Rivers West Senatorial zone a total number of five (5) schools were randomly selected from each local government area, which were total of 40 schools. The instrument developed for this study was a self-constructed rating scale titled "Rating Scale for Mathematics Teachers' Competence in the Assessment of Senior Secondary School Students Skills in Mathematics (RSMTCASSSSM)". The instrument was validated by two experts to critically access, analyze and judge the suitability of the items to ensure construct, face and content validity before pilot testing. The reliability index of the instrument was determined using Cronbach alpha co-efficient at 0.75. The method of data collection for this study was through rating scale. Mean and standard deviation were used to answer the research questions, while t-test statistical analysis was to test null hypothesis at 0.05 level of significance.

Results and Discussion

Research Question One: To what extent do male and female teachers utilize Mathematics assessment competencies in senior secondary schools in Rivers West Senatorial District?

Hypothesis One: There is no significant difference in the extent to which male and female mathematics teachers utilize assessment competencies in senior secondary schools in Rivers West Senatorial District?

Table 1: Independent samples t-test of the male and female mathematics teachers' assessment competencies

Gender	N	Mean	SD	Df	t	p	Decision
Male	93	2.63	0.97	142	4.99	0.0001	Reject HO ₁
Female	51	1.81	0.89				p<0.05

From the result shown in Table 1, it can be seen that male Mathematics teachers had a mean rating of 2.63 (SD = 0.97) in their mathematics assessment competencies, while female Mathematics teachers had a mean rating of 1.81 (SD = 0.89). Based on these values, it is indicative that male teachers had a higher level of mathematics assessment competencies than female teachers. Furthermore, when this mean values were tested using independent sample t-test, a t-value of 4.99 was obtained at 142 degrees of freedom, with a corresponding p-value of 0.0001. Since the p-value (0.0001) obtained was lesser than the chosen alpha of 0.05 guiding the study, it therefore indicates that there is a significant difference in the mathematics assessment competencies of male and female teachers in Rivers State. The null hypothesis was therefore rejected.

Research Question Two: To what extent does the mathematics assessment competences of secondary school teachers in Rivers West Senatorial District differ based on their educational qualification?

Hypotheses Two: There is no significant difference in the Mathematics assessment competencies of secondary school teachers in Rivers West Senatorial District based on their educational qualifications.

Table 2: Independent samples t-test of mathematics teachers' assessment competencies based on their educational qualifications in Rivers West Senatorial District

Educational Qualifications	N	Mean	SD	df	t	p	Decision
NCE/Bachelors	102	2.12	0.78	142	1.24	0.22	Retain HO ₂
Post-Graduate Degree	42	2.32	1.08				p>0.05

From the result shown in Table 2, it can be seen that Mathematics teachers with NCE/Bachelor educational qualifications had a mean rating of 2.12 (SD = 0.78) in their mathematics assessment competencies, while Mathematics teachers with post-graduate had a mean rating of 1.08 (SD = 1.08). Based on these values, it is indicative that teachers with postgraduate qualification had a higher level of mathematics assessment competencies than those with lesser educational qualification. Furthermore, when this mean values were tested using independent sample t-test, a t-value of 1.24 was obtained at 142 degrees of freedom, with a corresponding p-value

of 0.22. Since the p-value (0.22) obtained was greater than the chosen alpha of 0.05 guiding the study, it therefore indicates that there is no significant difference in the mathematics assessment competencies of secondary school teachers in Rivers State based on their educational qualifications. The null hypothesis was therefore retained.

Discussion of Findings

The result from the study showed that there is a low adoption and utilization of Mathematics assessment performance in secondary schools in Rivers West Senatorial District, with the use of marking guide being the most adopted competency, while the use of non-cognitive assessment practice being the least utilized competence. This result is not surprising but expected because most teachers are only used to conventional testing practices that test only the cognitive domain without considerations of the other domains of learning. Furthermore, most teachers are only interested in using assessment for promotional and graduation purposes, with many failing to integrate the insight and feedback from the assessment process into the instructional design. The result from this study is similar to those obtained by Egozouwa (2016) who found out that teachers in Eleme Local Government Area of Rivers State had more positive attitude towards summative assessment than towards formative assessment. Similarly, the result obtained by Badu,S and Mendo(2016) showed that most secondary teachers were not interested in school-based assessment in River State.

The result obtained from research question three and the corresponding null hypotheses showed that there is no significant difference in the Mathematics assessment competencies of teachers who had NCE/bachelor and those who have postgraduate qualification. However, those with postgraduate qualification had a slightly higher level of mathematics assessment competencies than those with lesser educational qualification. This result was surprising to this researcher because it was this researcher belief that a higher educational qualification would improve on teachers' skills to utilized more effective assessment practices. However, from the result, it could be assumed that teachers did not defer because most postgraduate programme may not emphasize the need for effective assessment practices, especially in Mathematics as a subject. The result from this study is similar to that obtained by Abe T. O (2014) who found out that educational qualification does not have a significant impact on the extent to which teachers employ effective assessment practices in Rivers State.

Conclusion

The outcomes of this study have been very revealing and in line with the discussion so far, the research study has made some significant evaluations of the competencies of mathematics teachers in the assessment of senior secondary school student's mathematics performance. The findings results could enable the mathematics teachers improve on their competency skills for assessing students' performance in mathematics. The study also bring about an improvement in the teaching and learning of mathematics in the secondary schools.

Recommendations

On the basis of the findings of this study, the following recommendations were made by the researcher.

1. The mathematics teachers should make deliberate effort to improve their competencies in assessing student's mathematics performance. This could be done through training for higher qualification, in-service training and workshops/seminars.
2. The lecturers in higher institutions where mathematics teachers are trained should use the result of this study to improve on their trainee's teachers especially in the area of assessment.
3. The female mathematics teachers should be proud to teach the subject rather than abandoning the subject for other subject. They should also improve their competencies in assessing students' mathematics performance.
4. The school authorities should provide necessary infrastructure and facilities to enhance skills acquisition in the area of assessing students' performance.

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