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APPLICATION OF ASSESSMENT INSTRUMENTS OF SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN MATHEMATICS

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Abstract

The implementation of educational policies and practices is closely linked to the assessment of students learning as it enables the monitoring of progress and achievements, improvement of teaching in the classroom, improvement of policies and the assessment of programme effectiveness among many other objectives. Performance in schools is increasingly judged on the basis of effective learning outcome. This study examined the level of various assessment instruments of senior secondary school students' academic performance in mathematics. The sample for the study consists of 1,080 students selected from twenty-eight (28) secondary schools from the three (3) senatorial District of Ekiti State and 108 Mathematics teachers drawn from all secondary schools in Ekiti State. Two hypotheses were raised and tested at p=0.5 and the results showed that there was no significant relationship between the application of assessment instruments, techniques and students' academic performance. Hence it was recommended that in view of the fact that the level of assessment instruments and academic performance was high, Mathematics teachers, supervisors and Principles should be encouraged to sustain the tempo while there is room for improvement.

Keywords: *Assessment, Assessment instruments, Evaluation, Techniques and test*

INTRODUCTION

BACKGROUND TO THE STUDY

Assessment instruments are those academic measuring tools that are used by teachers to discover whether learning has taken place in any students. Such measuring tools are tests, examinations, questionnaire, interview, opinionaire, ratings, observation, assignment and so on. A test is defined as an instrument deigned to measure a change in behaviour. A set of well-constructed stimuli presented to a testee to find out whether learning has already taken place. Alonge (2011) said that testing is the process involved in eliciting a sample of behaviour or a technique or procedure of identifying/assessing certain human behaviours or traits or attitudes which may include performance and interest.

Assessment is defined as gathering information or evidence, and using that information or evidence to make judgments (Williams, 2015). The primary purpose of assessment is to improve students' learning and teachers' teaching as both respond to the information it provides.

Evaluation is the systematic assessment of the worth or merit of an object. Evaluation is therefore, the process of making judgment about the values, worth, merit, importance or quality of something after considering it carefully.

STATEMENT OF THE PROBLEM

Evaluation of assessment instruments used by teachers to teach their students, techniques,

application and its effects, on students' academic performance are the aspects to be considered in the evaluation of the students. In order to ensure that assessment achieves its purposes, it is essential to make an appropriate choice of the learning assessment instruments to be used. In this context, teachers, policy implementers, researchers and staff of the Ministries of Education are frequently faced with the need to select tools for learning assessment. Therefore, this technical note is aimed at people working in the education sector who do not have enough training in the area of assessment apart from the students.

PURPOSE OF THE STUDY

The purpose of the study is to evaluate the various assessment instruments, techniques and application of Secondary School Students' academic performance in Mathematics in Ekiti State.

RESEARCH HYPOTHESES

The following hypotheses were generated and tested at 0.05 level of significance in this study.

H_{01}: Teachers' experience will not significantly influence the application of assessment techniques

H_{02}: Usage of assessment instruments and application of assessment techniques will not significantly contribute to students' academic performance

RESEARCH DESIGN

The research design for this study is a descriptive research of the survey design/type.

POPULATION AND SAMPLE

The population for this study is made up of all senior Secondary School (III) students' in Ekiti State. The sample for this study is made up of 1,080 students selected from twenty–eight (28) secondary schools and 108 Mathematics teachers drawn from all secondary schools in Ekiti.

INSTRUMENTS

Two sets of instruments were used for the study, they are, Assessments Instrument Questionnaire (AIQ) for Mathematics teachers and Mathematics Ability Test (MAT) for students.

In order to confirm the validity of the instrument for the study, both (AIQ and MAT) were subjected to screening by the researcher's supervisor and other experts in the area of tests, measurement and evaluation both within and outside the university. The reliability of the instruments was carried out using item-total correlation which involves the administration of the instruments to 20 Mathematics teachers and 40 students who were not included in the sample. The responses were subjected to statistical data using Pearson Product Moment Method with the Reliability Coefficient of 0.05 and 0.94 for the AIQ and MAT respectively which was high enough.

The statistical tools used in the study were Analysis of Variance (ANOVA) and Multiple Regression Analysis.

RESULTS

The results of the analysis of data in this study are presented in Tables 1 and 2 and hypotheses 1 and 2 as follows.

Descriptive Analysis

Research Question 1

What assessment instruments do teachers used in the classroom?

To answer this question, the descriptive statistics of the assessment instruments used by teachers in the classroom were presented in Table I below.

Hypothesis 1

Teachers' experience will not significantly influence the application of assessment techniques.

One way Analysis of Variance (ANOVA) was used to test this hypothesis and the result was shown in the table below.

Table 1: Analysis of Variance (ANOVA) was used to test the significance influence of teachers' experience on the application of assessment techniques.

Source of Variation	SS	Df	MS	F	P. Value
Between Groups	1112.010	3	370.670	5.906	0.003
Within Groups	2008.295	32	62.759		
Total	312.306	35			

P<0.05

This table reveals the influence of teachers' experience on the application of assessment techniques by Mathematics teachers. The table shows that teachers' experience does affect the application of assessment techniques at F (5.906), df (32, 3) and P.Value (0.003). This implies that the rate at which teachers do make use of different assessment techniques is being dictated by the different categories of teachers' experience.

The significant difference in table 10 above will therefore necessitate a post hoc analysis for multiple comparison of the influence of teachers' experience on the application of assessment techniques using Scheffe' post hoc as presented in table 11 below

Table 2: Scheffe's multiple comparison of the influence of teachers' experience on the application of assessment technique.

Variable: Levels of Teachers' Experience	Mean	5 Years Below	6-9 Years	10-14 Years	15 Years And Above
5 years below	3.33				*
6-9 years	6.64				*
10-14 years	8.38				*
15 years and above	21.67	*	*	*	

The establishment of the difference in the level of the application of assessment techniques by the categories of the teachers' experience in table 10 above necessitates the post hoc analysis to identify or pinpoint the categories of the teachers' experience in pains, where difference lies in their application of assessment of assessment techniques.

The above post hoc analysis table however shows that there exists no significant difference in the application of assessment techniques among teachers with less than 15 years of experience and further revealed that teachers with 15 years and above seems to apply more of assessment techniques during teaching process compared to others.

This implies that only the highly experienced teachers (15 years and above) do make more use of the different assessment techniques in their teaching as compared to other teachers with lower experience (14 and below) whose application of different assessment techniques seems

Indifferent.

Hypothesis 2
Usage of assessment instruments and application of assessment techniques will not significantly contribute to students' academic performance.
Regression analysis was used to test this hypothesis and the result was shown in the table below.
Table 3: Multiple regression analysis was used to test the significance contribution of the usage of assessment instruments and the application of assessment techniques to students' academic performance.

Model	B	Std Error	Beta	R	R^2	Adj. R	t-value	F	Sig.
Constant	2.168	2.889		0.850	0.722	0.705	0.757	42.839	0.000
Usage of assessment instruments	2.717	0.385	7.048						
Application of assessment techniques	0.401	0.245	1.637						

P<0.05
The above regression analysis shows that the usage of assessment instruments and application of assessment techniques significantly predicts students' academic performance at F (2, 33) = 42.889 and R (0.850). the R^2 (0.722) indicates that usage of assessment instruments and application of assessment techniques is responsible for 72% of the variation in students' academic performance which means the two independent variables cannot account for 28% variation in students' academic performance i.e. other variables are responsible for variation in students' academic performance. The regression equation derived is Y= 2.168 + 2.717 (usage of assessment instruments) + 0.401(application of assessment techniques), this shows that usage of assessment instruments contributes better to students' academic performance than application of assessment techniques does.

DISCUSSION
The level of students' performance was being looked into by the study and it was discovered that many of the students ability in mathematics was actually on average with very few of them found to be on high level, a good number of them were also found to be of low ability which may be as a result of the failure of their teachers to make judicious use of the assessment instruments at their disposal to monitor their performance and achievement continuously, examine individual factors militating against their concentration, interview and counsel students even examine their teaching methods and attitude towards teaching that may affect the students negatively and positively for proper amendment.

This study further examined whether teachers' qualification and teachers' experience will influence the usage of assessment instruments and it was discovered that teachers' qualification does not significantly influence the usage of different assessment instruments by the Mathematics teachers while it was discovered that teachers' experience did significantly influence the usage of assessment instruments in the classroom. The post hoc analysis conducted to ascertain where difference actually lies in the categories of the teachers' experience reveals that there is no significant difference in the influence that teachers with 5 or less and 6 to 9 years of teaching experience has on the application of assessment techniques

while teachers' with 10 to 14 and 15 and above years of teaching experience were said to significantly influence the rate at which they apply different assessment techniques at their disposal in teaching mathematics. This may also be as a result of the fact that virtually all the teachers are in one way or the other like in their course of training or seminars have being acquainted with the series of assessment instruments and techniques useable in teaching as a profession which connotes a non significant difference in its usage as the usage will therefore solemnly depends on individual. Teachers with higher teaching experience were said to be of significant influence on the usage of assessment instruments probably because of their series of encounters with different students' school authorities, head of departments and co-teachers that have in one instance or the other prompt them to see the needs to make more use of assessment instruments.

The contribution of the usage of assessment instruments and the application of assessment techniques was revealed in this study while it was established that both the usage of assessment instruments and application of assessment techniques significantly contribute to students' academic performance. Even though the result made it known that the usage of assessment techniques contributes more to students' performance than the application of assessment techniques, it was observed that 72% variation in the students' performance in mathematics was said to be as a result of changes in the usage of assessment instruments and application of assessment techniques. This may be due to the fact that more focus are on the assessment instruments used by teachers and not on the techniques the Mathematics teachers actually apply. This outcome is in line with that of Armellini and Aiyegbayo (2018), Van Gog (2016), Vonderwell and Boboye (2013) and Dicarlo and Cooper (2014) which in their different studies found out that usage and application of assessment techniques influence students' academic performance.

CONCLUSION

Based on the findings of the study, the following conclusions were drawn: secondary school Mathematics teachers use assessment instruments such as tests and examinations for the improvement of academic performance if students in Mathematics. The qualifications of Mathematics teachers and the application of assessment instruments contribute immensely to the academic performance of students in Mathematics in Ekiti State.

Both formative and summative evaluation improves the academic performance of senior secondary school students in mathematics.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made. In view of the fact that the level of assessment instruments and academic performance was high, Mathematics teachers, supervisors and principals should be encouraged to sustain the tempo.

Since teachers' qualifications, assessment techniques, formative and summative evaluation were significantly related to students' academic performance government at all levels should continue to lay more emphasis on these aspects of assessment instruments in order to improve students' academic performance.

In view of the fact that there was significant difference between teachers' qualifications and academic performance of students, it is recommended that teachers should be encouraged to go for further studies that will be commensurate to teach the students while government should organized seminars, in service trainings and refresh courses for teachers.

It is also recommended that teachers in public secondary schools should be more committed to their job. Parental supports in terms of purchase of textbooks should be more emphasized buy the teachers to improve students' academic performance.

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