



Teacher's Adherence to Test Construction Principles A Correlate of Students' Achievement and Interest in Chemistry

Lotobi Regina Awele

Department of Educational Evaluation and Counselling Psychology
University of Benin, Benin City, Nigeria

Corresponding Author: gina.awaelelotobi@gmail.com

Abstract

The purpose of the study was to find out the extent to which Chemistry teachers' adherence to test construction principles correlates with students' academic achievement and interest in Chemistry. To guide this study, four research questions and four hypotheses were also formulated. Correlational research design was adopted for the study. The population of the study comprised 1100 students in the public senior secondary schools selected. A total of three hundred and twenty-six (326) senior secondary school class two (S.S.2) students and fifteen (15) chemistry teachers that were selected constituted the study sample. The instrument used to generate the needed data was the Students Achievement Test (SAT), the Teacher's Adherence to Test Construction Principles Questionnaires (TATCPQ) and the Student Interest Test Questionnaires (SITQ). Cronbach alpha reliability indices of 0.76 and 0.79 were obtained for TATCPQ and SITQ respectively, while Kuder Richardson, 20 was used for SAT with reliability index of 0.87. The findings of this study reveal that adherence to test construction principles by chemistry teachers does not correlate with achievement but with interest among students. The recommendations include that government should provide funds and necessary encouragement to teachers to foster their interest and skills in test construction among others.

Keywords: Teachers Adherence, Test Construction Principles, Interest Achievement and Chemistry

Introduction

Test used in classroom assessment are locally constructed by the classroom teacher which are called "Teacher Made Test" (TMT). According to Gay (1996) teacher made test serve the purpose of student's class progress in the teaching learning process and identifying areas that need remediation. Teacher made test reflect only the content of a particular unit or course/ subject, administered to monitor individual students, including class progress in the teaching learning situation, and to motivate students. This test reflects only the content of a particular course which

are used to make decisions about the students.

Test preparation is expected to consider a number of criteria or factors including validity and reliability and test preparation principles, (Kelinger & Lee 2000). Test is reliable when it yields the same result when administered again and again, test is valid when it measures what it is supposed to measure. Before going into test construction, there has to be an outline of the steps of a good test. There has to be a subject of study from which topics are listed from which the test constructor will now construct his test items. When this very early conditions

have been fulfilled, the following principles of test construction are recommended: Stating the content to be covered, obtaining list of instructional objectives, develop a table of specification, writing the relevant test items, item analysis

Schools are established for the purpose of learning. One of the ways to know that students have learnt is by giving them a test. Every test that one sets has a purpose and what is pertinent is whether the test actually serves that purpose, also the item generated are expected to follow certain principles if the item is to be considered good. Reports from examination bodies such as West African Examination Council (WAEC), National Examination Council (NECO), have for some time revealed some consistency in student's poor performance in chemistry, thereby suggesting that either the teaching or the learning of the subject is facing a problem. There is possibility, that non-adherence to test construction principles could be the problem. There have been studies that have addressed teaching and learning but there is a need to address the competency or adherence to the principles of test construction by teachers. Do chemistry teachers actually adhere to test construction principles? Could student's poor performance in chemistry linked to chemistry teacher's non-adherence to test preparation principles?

The purpose of this study was to find out the extent to which chemistry teachers are complying with the test construction principles and how this is influencing students' interest and achievement in chemistry in senior

secondary schools. Specifically, the study sought to find out:

1. if adherence to test construction principles by chemistry teacher's influences student's achievement.
2. if adherence to test construction principles by chemistry teacher's influences students' interest.
3. the relationship between chemistry teacher's adherence to test construction principles and male and female student's achievement.
4. the relationship between chemistry teacher's adherence to test construction principles and male and female students' interest.

Hypotheses

The following research hypotheses were formulated:

1. Adherence to test construction principles by chemistry teachers has no significant relationship with student's achievement
2. Adherence to test construction principles by chemistry teachers has no significant relationship with student's interest.
3. There is no significant relationship between chemistry teacher's adherence to test construction principles and student's achievement based on gender.
4. There is no significant relationship between chemistry teacher's adherence to test construction principles and students interest based on gender.

Method

The study adopts correlational research design. This is because the study

sought to find the relationship between chemistry teacher's adherence to test construction principles and student's interest and achievement in chemistry.

The population of this study consist of all the chemistry teachers teaching senior secondary class (S.S. 2) and 1100 senior secondary class 2 students in all the senior secondary schools in Oshimili North and South local Government area of Delta state. The sample of this study is made up of fifteen (15) teachers and three hundred and twenty-six (326) students from the twenty selected senior secondary schools in Oshimili North and South Local Government area of Delta state. A simple random sampling was used to select 326 students whereas the entire teachers were used. The sample of the students was done by giving each student in each of the selected twenty schools an identification number by the researcher. The numbers for identification was written in advance on a piece of paper placed in a sack bag. All written identification number will be thoroughly mixed, one at a time was drawn by the researcher until the number desired for the sample in each of the schools was reached. Those students that their identification numbers were picked were the ones that wrote the achievement test and the interest test which was used for item analysis. The unequal number of students that was sampled from each school was as a result of the fact that the selected schools do not have equal number of students. Hence the number sampled will be relative to the number of students in the schools. The sample for teachers was only the chemistry teachers teaching chemistry in Senior secondary class two (SS.2) in each of the selected

senior secondary schools in Oshimili North and South Local Government Area of Delta State.

The research instruments used for data collection was Teachers adherence to test construction principles questionnaire (TATCPQ), Students interest test questionnaire (SITQ) and Student achievement test on chemistry. The validity of the instruments was done by the use of three (3) experts in chemistry and measurement and evaluation unit of department of Science Education, University of Nigeria. The reliability index of the instruments was determined using Cronbach alpha technique for to determine the TATCPQ and SITQ while Kuder-Richardson formula 20 was used to determine the reliability index of SAT. The reliability indices obtained were 0.76, 0.79 and 0.87 respectively. The instruments were administered by the researchers. The test statistics used for data analysis was the Pearson product moment correlation coefficient and the fisher-z test.

Results

Hypothesis 1: Adherence to test construction principles by chemistry teachers has no significant relationship with student's achievement

Table 1: Pearson's product moment correlation of teacher's adherence to test construction principles and achievement in chemistry

Variables	N	Pearson's r	Sig.(2-tiled)
Adherence	326	-.025	.655
Achievement			

Table 1 shows a calculated Pearson's r value of -.025 and a p- value of .655.

Testing at an alpha level of .05, the p-value is greater than the alpha level. Therefore, the Null hypothesis which states that “adherence to test construction principles by chemistry teachers has no significant relationship with student’s achievement in chemistry” is retained.

Hypothesis 2: Adherence to test construction principles by chemistry teachers has no significant relationship with student’s interest in chemistry.

Table 2: Pearson’s product moment correlation of teacher’s adherence to test construction principles and interest in chemistry

Variables	N	Pearson’s r	Sig.(2-tailed)
Adherence Achievement	326	.205	.000

a=.05

Table 2 shows a calculated Pearson’s r value of .205 and a p-value of .000. Testing at an alpha level of .05, the p-value is less than the alpha level. Therefore, the null hypotheses which state that “adherence to test construction principles by chemistry teachers has no significant influence on students’ interest in chemistry” is rejected. Consequently, adherence to test construction principles by chemistry teachers has significant influence on students’ interest in chemistry.

Hypothesis 3: There is no significant relationship between chemistry teacher’s adherence to test construction principles and student’s achievement based on gender.

Table 3: Fishers Z table of correlation of teacher’s adherence to test construction principles and achievement in chemistry by gender

Gender	N	Pearson’s r	Zr	Z _{cal}	Z _{crit}
Male	136	-.391	-.412	-4.327	-1.96
Female	190	.077	.077		

a = .05

Table 3 shows a calculated Z of -4.327 and Z critical of – 1.96. Testing at an alpha level of .05, the calculated value falls within the rejection regions. So, the null hypothesis which states that “there is no significant difference in the relationship between teacher’s adherence to test construction principles and achievement in chemistry of male and female students” is rejected. Consequently, there is a significant difference in the relationship between teacher’s adherence to test construction principles and achievement in chemistry of male and female students. Since the r value of the male is higher than that of the female, it shows that adherence to test construction principles and achievement in chemistry is more in males than in females.

Hypothesis 4: There is no significant relationship between chemistry teacher’s adherence to test construction principles and students interest based on gender.

Table 4: Fishers Z table of correlation of teacher’s adherence to test construction principles and interest in chemistry by gender

Gender	N	Pearson’s r	Zr	Z _{cal}	Z _{cri}
Male	136	.366	.383	3.03	196
Female	190	.041	.041		

Table 4 shows a calculated Z of 3.03 and Z critical of 1.96. Testing at an alpha level of .05, the calculated value falls within the rejection region. So, the Null hypothesis which state that “there is no significant difference in the relationship between teacher’s adherence to test construction principles and interest in chemistry of male and female students” is rejected. Consequently, there is a significant difference in the relationship between teacher’s adherence to test construction principles and interest in chemistry of male and female students. Since the r value of the male is higher than that of the female, it shows that adherence to test construction principles and interest in chemistry is more in males than in female.

Discussion

The findings show that adherence to test construction principles has no significance relationship student’s achievement in chemistry. The findings in this study are consistent with the finding of Anastasi (1988) who noted that virtually most schools focus progress at the ultimate criterion. Also finding showed that adherence to test construction principles significantly relates with the interest of students in a test. That mastery of performance is determined after the students have respond to a number of test items designed to measure their ability in that course unit. The findings are in agreement with Anastasi (1988) who pointed out that preparation of local classroom test can be substantially improved by an application of the techniques and accumulated experience of professional teachers. It is also necessary that teacher in the preparation

of their classroom test follow specific guidelines to ensure quality test output and attaining the goal of measuring effectively what the student have learned. The findings support those of Olubodun (2007), who found that it is important for teachers to construct test items that will be reliable and have validity so that it will discriminate between good test and poor student. He further advised that the principles of this test construction should be learnt so as to be able to prepare test that is useable and fair to learner assessment, mental ability.

Also finding revealed that there is a significant difference in the relationship between teacher’s adherence to test construction principles and achievement of male and female students. This finding supports those of Erickson and Erickson (1984), Bateson and Parsons-Chatman (1989), who examined the Multiple-choice items in provincial assessments of science achievement in British Columbia in 1986 respectively. Their findings indicate that sex difference favouring males were on items that were more likely to be experience domains of male rather than female.

Similarly, finding revealed a significant difference between the interest position of male and female students in favour of the males. In general, male and female students in favour of the males. In general, male and female student respond positively to their teachers when their interest level is stimulated. According to Kelly (1988), teachers can bring changes in students’ interest by leading by example. This is in line with Sternberg and Grigorenki (2007) whose postulate is that students are



exquisitely sensitive to what teachers' value.

Conclusion

From the analysis of data, the researchers conclude that: Adherence to test construction principles by chemistry teachers does not relate with achievement but with interest among students. Teachers adherence to the principles of test construction make their questions attractive and cause students to have the confidence in putting more effort to their studies. When teachers don't adhere to the principles of test construction, the items generated usually don't challenge the students for improvement in their performance. Adherence to test construction principles is more advantageous to the male students than to the female students in the area of interest.

Recommendations

Based on the findings, the following recommendations

1. Government should provide funds and necessary encouragement to teachers to foster their interest and skills in test construction. In this connection, it is recommended that teachers should take advantage of workshops, seminars and conference to improve their knowledge of test construction.
2. It is recommended that the regulatory and supervisory arms of the educational enterprise should be more strict in ensuring teachers compliance with test construction principles.

3. Teachers should carefully construct their achievement test items by strictly obeying test construction principles while at work. This will enable the teachers to have the confidence that the test items generated will provide useful information about the student's knowledge of learning objectives.
4. Teachers should adhere to test construction principles because it can help a teacher to identify areas that need attention and for a teacher to know what their students are learning, thereby helping the teacher to teach more effectively.

References

- Anstasi, A. (1988). *Psychological testing* (6th ed). New York: MacMillan publishing company.
- Bateson, D.& Parsons-Chatman, S. (1999). Sex-related differences in science achievement: A possible testing artifact. *International journal of science education*, 11, 371-385.
- Erickson, G. L., & Ericksons. (1984). Science Education. *Journal of Science Education*, 88, 63-89.
- Gay, L.R. (1996). *Educational research: Competencies for analysis and applications*. USA: Prentice-Hall Inc.
- Kelly, A. (1988) The customer is always right... Girls's abd boy's reaction to science lessons.



AJSTME, Vol. 6(2): 61-67, July 2021.
ISSN: 2251-0141

School science review 69, 249.

Olubodun, O.J. (2007). Test construction techniques and principles. Ojolubodun [@yahoo.com](mailto:Ojolubodun@yahoo.com).

Stermberg, R. J. & Grigorenko, E.L. (2007) *Teaching for successful interlligence (2nd ed)* corwin press.