

A Survey of Secondary School Physics Teachers' Compliance with Test Item-writing Rules in Plateau State

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Abstract

Discipline is about keeping to rules and it is necessary for proper functioning of any system including educational evaluation. This study therefore investigated the compliance of secondary school physics teachers with test item-writing rules in Plateau State. The study which employed survey design involved 33 physics teachers as sample. Copies of physics teachers' previous examination questions constituted the instrument for data collection. Judges' ratings on compliance with item-writing rules and percentages were used to answer the three research questions formulated for the study. Results show low level of compliance by physics teachers with public school teachers and nonprofessional teachers exhibiting more of the low compliance. The implication is that valid feedback cannot be collected with such poorly written teacher-made tests for improvement of teaching and learning as well as valid decision-making in schools. Organization of regular seminars and workshops for in-service teachers on test item-writing was therefore recommended.

Introduction

One of the strengths of teacher-made tests lies in their ability to provide teachers with feedback on students' learning in good time to allow for remedial activities. However, students' misconceptions or learning difficulties can only be remedied when they are revealed to the teachers through the results of their tests. For this need to be met the tests need to be of good quality and teachers owe stake holders in the education sector the professional responsibility of ensuring the quality of their tests (Mertler, 2003). One of the qualities of a good teacher-made test is that it is designed to avoid guessing, ambiguity, counteract testwiseness and so on. There are test item-writing rules which if complied with ensure the realization of all these. This means that in the measurement and evaluation of classroom learning outcomes which most times utilize teacher-made tests, rules must be observed to ensure collection of valid information. Since discipline is about obeying rules, the implication then is that discipline is necessary for proper evaluation of learning outcomes in schools.

Test item-writing rules according to Frey, Peterson, Edward, Pedrotti and Peyton (2003) can be summarized under the following heads: Coverage of important concepts, potentially confusing wording requirements, guessing, test-taking efficiency and testwiseness. Teachers' non compliance to the rules have implications such as lowering the quality of the test, rendering the test susceptible to guessing as well as

producing results that are misleading in decision-making. However, the position of Burke (1999) is that a good test should truly reflect students' learning.

Some research findings show that the quality of teacher-made tests is generally poor (Imo, 2010; Haynie, n.d), having a number of flaws (Davis, 1993; Frey, 2005) one of which is violation of item-writing rules (Valentin & Godfrey, 1996). Since use of poorly written test items for classroom assessment of learning makes it difficult for teachers to have correct picture of students' level of mastery of lesson, such acts of indiscipline can affect classroom teaching and learning adversely. It is necessary therefore to investigate the level of compliance of teachers to item-writing rules with a view to determining the level of discipline adopted by the teachers in educational evaluation.

Experience shows that students in private schools perform better than public school students in external examinations most times. The question is what could be responsible for such difference? Could it be that the teachers in private schools comply more with item-writing rules than public school teachers and so get better quality feedback for improvement of the students' learning?

Again, given that the teachers in schools are made up of both professional and nonprofessional teachers, it is necessary to find out the extent of the two groups' compliance with item-writing rules. The professionals having gone through teacher-preparation programmes, are they more compliant than the nonprofessionals? These are the questions the study sought answers to.

Research Questions

The following research questions guided the study:

1. How compliant are Physics teachers with test item-writing rules?
2. To what extent does compliance with test item-writing rules vary according to school-type?
3. To what extent does professionalism affect Physics teachers' compliance with item-writing rules?

Methodology

Design: Survey design was adopted for the study

Population and Sample: The population of the study was made up of all the Secondary School Physics teachers in Plateau State who read physics up to at least bachelor level. The sample of the study consisted of 33 Physics teachers.

Sampling Technique: Multiple stage cluster sampling technique was adopted because a comprehensive list of physics teachers was not available. The three Educational Zones in Plateau State constituted the cluster for the first stage and two Zones were randomly selected. The second stage involved random selection of one Education Inspectorate Area from each of the selected Zones. All the physics teachers who belong to the defined population in the selected Inspectorate Areas were involved in the study.

Instrument for data collection: Data were collected using physics teachers' previous examination question papers and so validation was not required but assessment by experts.

Method of data collection: The researcher visited the qualified teachers who were located during pre-study survey of the selected clusters, interacted with them and collected samples of their previous examination papers.

Method of data analysis: The question papers collected were sent to two physics experts with a letter of request to assess coverage of important concepts. They were also provided with copies of National Physics Curriculum to enable them do the assessment. The coverage was rated using a 3-point rating scale of adequate, fairly adequate and inadequate. The question papers together with copies of item-writing rules by Frey et al (2003) were later sent to two measurement experts in the University of Jos to assess the level of compliance with other item-writing rules aside concept coverage using the same 3-point scale. The inter-rater reliability coefficients were computed using coefficient of concord since numbers were not involved (Ugodulunwa,2008).The values for concept coverage and other rules were 0.88 and 0.96 respectively. Tables of the Judges' assessment of levels of compliance and percentages were used to answer the research questions.

Findings

Research Question One: How compliant are Physics teachers with test item-writing rules?

Table1: Physics Teachers Level of Compliance With Item-writing Rules

Teacher	Coverage of Concepts	Compliance with other Rules
A	Inadequate	Inadequate
B	Fairly adequate	Fairly adequate
C	Fairly adequate	Fairly adequate
D	Inadequate	Inadequate
E	Inadequate	Inadequate
F	Fairly adequate	Fairly adequate
G	Inadequate	Inadequate
H	Inadequate	Inadequate
I	Inadequate	Inadequate
J	Fairly adequate	Inadequate
K	Adequate	Fairly adequate
L	Inadequate	Fairly adequate
M	Inadequate	Inadequate
N	Fairly adequate	Fairly adequate
O	Fairly adequate	Fairly adequate
P	Inadequate	Inadequate
Q	Inadequate	Fairly adequate
R	Fairly adequate	Inadequate
S	Inadequate	Inadequate
T	Inadequate	Inadequate
U	Fairly adequate	Inadequate
V	Inadequate	Fairly adequate
W	Inadequate	Inadequate
X	Inadequate	Inadequate
Y	Fairly adequate	Inadequate
Z	Fairly adequate	Inadequate
AA	Fairly adequate	Inadequate
AB	Inadequate	Inadequate
AC	Fairly adequate	Inadequate
AD	Inadequate	Inadequate
AE	Fairly adequate	Inadequate
AF	Inadequate	Inadequate
AG	Fairly adequate	Inadequate

The ratings on coverage of important concepts of physics tests by the judges as indicated in Table 1 show that out of 33 tests, 54.5% were rated inadequate, only 3.0% adequate and 42.5% fairly adequate. This means that physics teachers do not sufficiently keep to the rule of covering important concepts in their tests. In compliance with other item-writing rules,

72.7% of the 33 tests were rated inadequate 0.0% adequate and 27.3% fairly adequate. This implies that various item-writing rules were violated by the test constructors showing some high level of indiscipline in educational evaluation.

Research Question Two: To what extent does compliance with test item-writing rules vary according to school-type?

Table 2: Compliance of Physics Teachers in Private and Public Schools With Item-writing Rules

Teacher	School-type	Coverage of Concepts	Compliance with other Rules
A	Private	Inadequate	Inadequate
B	Private	Fairly adequate	Fairly adequate
C	Private	Fairly adequate	Fairly adequate
D	Private	Inadequate	Inadequate
F	Private	Fairly adequate	Fairly adequate
H	Private	Inadequate	Inadequate
I	Private	Inadequate	Inadequate
K	Private	Adequate	Fairly adequate
M	Private	Inadequate	Inadequate
N	Private	Fairly adequate	Fairly adequate
O	Private	Fairly adequate	Fairly adequate
Q	Private	Inadequate	Fairly adequate
S	Private	Inadequate	Inadequate
T	Private	Inadequate	Inadequate
U	Private	Fairly adequate	Inadequate
V	Private	Inadequate	Fairly adequate
W	Private	Inadequate	Inadequate
X	Private	Inadequate	Inadequate
Y	Private	Fairly adequate	Inadequate
Z	Private	Fairly adequate	Inadequate
AA	Private	Fairly adequate	Inadequate
AB	Private	Inadequate	Inadequate
AC	Private	Fairly adequate	Inadequate
AE	Private	Fairly adequate	Inadequate
AG	Private	Fairly adequate	Inadequate
E	Public	Inadequate	Inadequate
G	Public	Inadequate	Inadequate
J	Public	Fairly adequate	Inadequate
L	Public	Inadequate	Fairly adequate
P	Public	Inadequate	Inadequate
R	Public	Fairly adequate	Inadequate
AD	Public	Inadequate	Inadequate
AF	Public	Inadequate	Inadequate

As shown in Table2, the coverage of concepts by public school teachers is lower than that of private school teachers. 75% of the tests from public school teachers were judged to have inadequate concept coverage, while 48% of tests from private school teachers were judged inadequate. Also 87.5% of tests constructed by public school teachers were

rated inadequate on compliance to other item writing-rules, while 68% of tests from private school teachers were rated inadequate, thus showing higher level of compliance on the path of private school teachers. **Research Question Three:** To what extent does professionalism affect Physics teachers' compliance with item-writing rules?

Table3: Compliance of Professional and Nonprofessional Physics Teachers With Item-writing Rules

Teacher	Status	Coverage of Concepts	Compliance with other Rules
B	Prof.	Fairly adequate	Fairly adequate
I	Prof.	Inadequate	Inadequate
J	Prof.	Fairly adequate	Inadequate
L	Prof.	Inadequate	Fairly adequate
N	Prof.	Fairly adequate	Fairly adequate
O	Prof.	Fairly adequate	Fairly adequate
P	Prof.	Inadequate	Inadequate
R	Prof.	Fairly adequate	Inadequate
U	Prof.	Fairly adequate	Inadequate
AB	Prof.	Inadequate	Inadequate
AC	Prof.	Fairly adequate	Inadequate
AD	Prof.	Inadequate	Inadequate
AE	Prof.	Fairly adequate	Inadequate
A	Nonprof.	Inadequate	Inadequate
C	Nonprof.	Fairly adequate	Fairly adequate
D	Nonprof.	Inadequate	Inadequate
E	Nonprof.	Inadequate	Inadequate
F	Nonprof.	Fairly adequate	Fairly adequate
G	Nonprof.	Inadequate	Inadequate
H	Nonprof.	Inadequate	Inadequate
K	Nonprof.	Adequate	Fairly adequate
M	Nonprof.	Inadequate	Inadequate
Q	Nonprof.	Inadequate	Fairly adequate
S	Nonprof.	Inadequate	Inadequate
T	Nonprof.	Inadequate	Inadequate
V	Nonprof.	Inadequate	Fairly adequate
W	Nonprof.	Inadequate	Inadequate
X	Nonprof.	Inadequate	Inadequate
Y	Nonprof.	Fairly adequate	Inadequate
Z	Nonprof.	Fairlyadequate	Inadequate
AA	Nonprof.	Fairly adequate	Inadequate
AF	Nonprof.	Inadequate	Inadequate
AG	Nonprof.	Fairly adequate	Inadequate

Note: Prof.-professional, Nonprof.- nonprofessional

As shown in Table 3 the coverage of concepts by professional teachers is higher than those of nonprofessional teachers as can be seen from 38.5% and 65% of the tests from the two groups respectively rated inadequate in concept coverage. Although 1 test from the nonprofessional teachers was rated adequate, 65% is still higher than 38.5%. For compliance with other item-writing rules, 69.2% of tests from professional teachers were rated inadequate, while 75% of tests from nonprofessional teachers were rated inadequate. Compliance is higher on the part of professional than nonprofessional teachers both in concept coverage and other rules.

In summary, the findings of the study show that:

1. Various item-writing rules are violated by physics teachers in their test construction.
2. Compliance of private school teachers with rules whether in concept coverage or other item-writing rules is higher than that of public school teachers.
3. Compliance is higher on the part of professional teachers than nonprofessional teachers both in concept coverage and other rules.

Discussion of Findings

The findings of the study show that physics teachers' level of compliance with test item-writing rules is low. This confirms the position of Valentin and Godfiex (1996) that teachers do not comply adequately with rules in test item-writing. Teachers' ability to

properly assess students' classroom learning outcome is said to be in doubt (Haynie.n.d). if teachers live up to their professional responsibility of ensuring use of quality tests for classroom assessment as stated by Mertler (2003), a higher level of compliance to rules will be seen in educational evaluation. The low concept coverage observed has some consequences on teaching and learning. Since the tests do not have fair representatives of important concepts taught in the class, the validity of decisions made with such test results is in question. This is because contrary to Burke (1999) definition of a good test, the test results do not give true reflection of the students' ability. How then can teachers know the students' true level of mastery of lesson objectives?

Low compliance with other item-writing rules included improper arrangement of options, ambiguous wording of questions, improper framing of the stem, use of vague frequency terms, some items were dependent on each other, all parts of an item not appearing on the same page among others. All these reduce the quality of tests and consequently the quality of the information collected with the results.

Higher compliance to item-writing rules observed from private school teachers may be as a result of close monitoring of teachers. Any individual/corporate body that invests in school must ensure that teachers do their work properly in order to attain a standard that will attract more students to the school in spite of high fees paid in private schools.

Again, the higher compliance of

professional teachers over the nonprofessional teachers is only expected. Having gone through teacher-preparation programme, the professionals must have been exposed to some training in measurement which gave them an advantage over the nonprofessionals in test item-writing. The nonprofessional teachers may not even be aware of the rules for test item-writing.

Recommendations and Conclusion

Based on the findings of the study, the following were recommended:

1. Regular workshops and seminars on test item-writing should be organized for in-service teachers.
2. Nonprofessional teachers who wish to continue teaching should go for in-service training.
3. Thorough scrutiny of the quality of teacher-made tests used for assessment in schools.

Physics teachers' low level of compliance with test item-writing rules is an indication of indiscipline in educational evaluation. The low compliance appears to be exhibited more by teachers in public schools and nonprofessional teachers. This is capable of affecting the test results thereby compromising the validity of decisions made with them; this should therefore be of concern to stakeholders in education sector.

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