

## Gender Analysis of Students Performances in Matching and Completion Test Formats; A Chemistry Achievement Test

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### Abstract

*This study compared the difficulty and discriminatory indices of boys and girls in matching and completion test format of chemistry achievement test. The research design was a descriptive survey type, the sample consisted of four hundred (400) SS 111 Students randomly selected from eight (8) public Senior Secondary Schools in A do Local Government Area of Ekiti State, The instrument was made up of two parallel objective test format on Chemistry Review Questionnaire (matching and completion formats). The first is a 60-item matching test which is essentially a replica of the sixty 60-item completion test. Both tests were strictly based on the same content. The two instruments were administered simultaneously. Data collected were analysed for P-values and d-values using correlation analysis, t-test and z-test. Two hypotheses were generated and tested at 0.05 level of significance. The result of the analysis showed that there is significant difference between the performance of male and female students in the completion test format of chemistry test; there is significant difference between the performance of male and female students in the matching test format of chemistry achievement test. It was therefore asserted that completion test and matching test can be used as complementary test item with the other forms of test in use presently.*

**Keywords:** Matching Tests, Difficulty Index, Difficulty Level, Discriminating Index, Completion Items, Items

### Introduction

A test is a specific instrument procedure for observing one or more characteristic of a student using either a numerical scale or classification scheme, Kolawole (2001). It is a systematic procedure for comparing the performance of an individual with a designated standard of performance. A test is regarded as an un-bias and objective measure of some parameter which has the characteristics way of behavior like the entire population. The teacher, school administrator, counsellor, the psychologists are continuously involved in making decisions about people hence the role of tests and measurement procedures to provide the information that will make informed and appropriate decision to be taken is very paramount. In other words test is a systematic method of observing certain human behaviors, in such a way that figures are assigned to the behaviour. It is also an instrument to elicit a sample of behavior or human traits or attributes, the end product of a test is measurement score (Kolawole 2001).

A test could either be in essay or objective form. Objective test is the type of test where the student is required to pick the correct option from the many options presented to him, while in the essay test, the students is giving the opportunity to organize and present his response in his own view points. Due to population explosion in the schools today, objective test items including matching and completion test seem to become a very useful and important evaluation technique and efficient instrument to assess a large sample of subjects in a wide expanse of content area. It was discovered from observation that the matching and completion test formats are not commonly used in chemistry examinations. The main reason for this could not be ascertained. Whether it could be due to the fact that it does not discriminate well between the brilliant and poor student or the difficulty level is too high or too low for effective differentiation to be made within the students or the difficulty level could not

be determined or what are the difference in the discriminating and difficulty indices of chemistry completion and matching test formats, is what the study is set out to discover.

Tests are often constructed and administered by most classroom teachers with little or no concern for the qualities that every measurement procedure should possess in most, if not all of Nigerian Educational system from primary to university levels. Issues of level of difficulty of items in test formats or whether the items will help to discriminate positively or negatively between the groups of students in their classes and psychometric properties like validity, reliability etc. seem to hardly bother them. In construction of test, item analysis should be done to actually ascertain the worth of test items so that the objectives for which the administration of the test is based could be achieved. In this study, matching and completion test items will be compared using item analysis. Possible test analysis include test reliability, item difficulty, test efficiency, item susceptibility to score variation due to guessing index of discrimination, item efficiency and item scoring. Only some of these properties would be considered; – item difficulty and index of discrimination with a view of enhancing informed educational decision on test selection and use.

### **Statement of the problem**

The researcher observed that despite the fact that objective tests are now widely used in Nigerian Schools, some types of objective tests like matching and completion tests seems not to be among the commonly used ones especially in chemistry papers. Though the use of objective tests rests on the teachers who set the questions but the big question is whether the questions are either too difficult or simple to construct for the teacher or for the students to answer or may be the questions do not discriminate between the lower and upper ability students or whatever could be the major reason why these two objective test types are not in common use is what the researcher is set out to discover therefore the study is set out to answer the following questions.

1. What is the distribution of female students' performance in matching test?
2. What is the distribution of male students' performance in matching test?
3. What is the distribution of female students' performance in completion test?
4. What is the distribution of male students' performance in completion test?

### **Purpose of the Study**

The purpose of the study was to:

- 1) Determine whether there would be differences in the difficulty and discriminating indices of matching test formats of chemistry achievement test.
- 2) Determine whether there is difference in difficulty and discriminating indices of completion test format
- 3) Compare the performances of boys and girls in matching and completion test formats of chemistry achievement test.

### **Research Hypotheses**

The following null hypotheses were generated and tested from the above questions to facilitate thorough investigation into the main study.

1. There is no significant difference in the performance of both male and female students in the completion test format of chemistry achievement test?
2. There is no significant difference in the performance of both male and female students in matching test format of chemistry achievement test?

### **Research Method**

The research design used in the study was a descriptive survey design.

This survey research studies both large and small population by selecting and studying samples chosen from the population to discover the relative incidence, distribution and inter-relation of sociological and psychological variables. The population for the study comprised of all Chemistry students in Senior Secondary School (SS111) in the 14 Public Secondary Schools in Ado Local Government Area of Ekiti State. The sample comprised of 400 SSIII students randomly selected to take part in the study. The 400 were selected using simple random sampling based on sex. Fifty students were randomly selected from each of the eight schools used. Each of the groups (of 50 students) was randomly assigned the two variant formats of the chemistry Reviewed Questions (CRQ) and the sampling technique used was stratified random sampling.

The study group was found to be relatively homogeneous in chemistry such that the result of the study should decline to reflect not only abilities of the subjects but also the differences in the question formats. The sample did not provide a skewed distribution in form of sex and age

### Research Instrument

The instrument used for this study is in two distinct parts. The first part is a 60-item chemistry, completion test based on the O'level syllabus. The second and alternative test is also item matching test which is essentially a replica of the 60-item completion test. Both tests were strictly based and spread across 'O' level chemistry syllabus. The duration of the test was 1hour 30 minutes.

### Validity of the Instrument

All the 60 completion items and 60 items of matching test passed through the process of item analysis (validation, difficulty and discrimination and item selection). The test forms were certified to have contents validity by comparing it using the table of specification and face validity by three experts in Chemistry and two specialists in Tests and Measurement and thus found to be standard research instrument suitable for administration.

### Reliability of the Instrument

The reliability of the instrument was ascertained by using Test re-test and Kuder Richardson formulae 21(KR21) to get  $r=0.85$  and  $r=0.77$  respectively. The difficulty index of the 60 items completion test and 60 items matching test from pre-test ranged from 0.30 to 0.70. Also the discriminating index ranged from 0.00 to 0.97. However, the final form of the questionnaire used reflected the suggestions and recommendations of the panel of reviewer as well as the results of the pre-test stage.

### Administration of the Instrument

The four hundred (400) subjects randomly selected for the study reacted to two variant formats of chemistry Reviewed Questionnaire (CRQ). Copies of the test instrument were distributed to the subjects under test condition. The subjects were not aware of the discrepancy in the question formats.

### Hypothesis 1;

There is no significant difference in the performance of male and female students in the completion test format of chemistry achievement test. To test the hypothesis, the mean and the standard deviation of performance of Male and Female in completion test format of chemistry achievement tests were found and subjected to t-test analysis.

The results are as presented in table 1 below

Table : t-test summary showing Sex Differences in Completion Test Format.

Variable	N	$\bar{X}$	SD	df	t-calc	t-table
Male	200	3.45	0.77	198	2.26	2.21
Female	200	2.68	0.98			

$P < 0.05$  (Result is significant)

From the analysis on table 1, the standard deviation were 0.77 and 0.98 the means were 3.45 and 2.68. The mean for the male is more than the mean for the female which is an indication that the male perform more brilliantly than the female in the test. To test for the significant difference, the mean and the standard deviation were subjected to t-test, the result shows the calculated value of 2.26 and t-table value 2.21,  $t_{calc} > t_{table}$ . Hence the hypothesis of no differences between performance of male and female in the completion test format in chemistry achievement test is rejected; hence there is a significant difference in the performance of male and female in completion test format of chemistry achievement test.

### Hypothesis 2:

**Table 2:** t-test summary showing Sex Differences in Matching test format of chemistry achievement test

Format	N	X	SD	df	t-calc	t-table
Male	200	52.88	9.99	198	2.42	2.21
Female	200	49.41	7.81			

P < 0.05(Is significant)

From Table 2 analysis the standard deviation obtained for male and female were 9.99 and 7.81 respectively while the mean obtained were 52.88 and 49.41 respectively. To test for the significant difference, the mean and the standard deviation s were subject to test analysis. The result shows a calculated value of 2.42 while the table value show 2.21. Hence we reject the null hypothesis. In other words, there is a significant difference between male and female performance in matching test format with the males performing better.

## Discussion

Hypothesis one sought to find out if there is any significant difference in the performance of male and female students in completion test format in chemistry achievement test. When the hypothesis was statistically analyzed, the result showed that there is significant difference in the performance of male and female students with male student possessing higher mean value. Hypothesis two also sought if there was any difference in the performance of male and female students in the matching test. The result of the analysis showed that male student performs better than their female counterpart. In other words the hypothesis of no difference between the performances of male and female in matching test was rejected. This study has therefore revealed the suitability of the completion test item particularly for classroom tests where matching test items might have been used. Validity is the most important single characteristics of a test findings of Alonge (1988) showed that the validity coefficient of a matching test is not significantly higher than that of a completion test and that both are equally capable of eliciting the desired responses that reflect the trait or characteristics that the test is measuring. For any test to be reliable and valid, it must not be too difficult nor too easy, in addition it must be able to discriminate between the higher and lower achievers. The findings also agrees with that of Omirin,1988 This agrees with the findings of Adebule (1995) that matching tests items could discriminate more between the bright and dull students. In support of the above, Omirin (1988)revealed that there was a significant relationship in the difficulty and discriminating indices of matching and completion types of test formats in a research study. Alonge (1988) found that there was no significant difference between the reliabilities of a 3-alternative MC and 4-alternative MC tests. Since item analysis involves reliability, Alonge's findings support the result of this study.

## Conclusion

This study revealed the suitability of matching and completion test for differentiating between the dull and brilliant student in any setting especially in a classroom. It can be concluded that the males performed better than the females in both matching and completion formats of tests items.

## Recommendations

From the findings and conclusion above, it is recommended that whenever possible, teachers should combine the two types of formats for effectiveness as the two tests could complement each other.

The curriculum development and continuous assessment units of the Ministry of Education and Examination Bodies like WAEC,NECO,NABTEB,JAMB e.t.c could use a combination of matching and completion test format to measure achievements of students,

## Suggestion for further studies

The research method employed in the present study should be improved upon by using standardized test items in the comparative study of matching and completion test items.

A larger student sample, different course content and a different empirical formula to ascertain the authenticity of the results arrived at in this study should be used.

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