ANALYSIS OF GENDER AND SCHOOL LOCATION-RELATED DIFFERENTIAL ITEMS IN YORUBA LANGUAGE MULTIPLE-CHOICE ITEMS OF THE QUALIFYING EXAMINATION ADMINISTERED BY THE MINISTRY OF EDUCATION, OYO STATE, NIGERIA

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Abstract
The purpose of the study was to investigate which item show differential item functioning (D I F) for Male and Female students as well as Rural and Urban students in Yoruba language Qualifying Examination conducted by Oyo state Ministry of Education in 2013 in Oyo state. The study was carried out in Ibadan North and Akinyele Local Government Area using the responses of Senior Secondary School Students who sat for May / June 2013 Qualifying Examination in Yoruba language conducted by Oyo state Ministry of Education. Data were obtained from responses of 2,000 students in 50 Yoruba language multiple choice items. The students (examinees) were obtained from ten (10) Senior Secondary Schools randomly sampled from twenty five (25) coeducation schools. D I F was investigated using Scheuneuman modified chi-square Statistics (SS.2). The result of the analysis showed that only one (1) item has guessing parameter of 0.24. The result further indicated that Male and Female examinees function differential in 9 items and no difference in 91% items. Also, Rural and Urban examinees function differential in 3 items and no differential in 97 items. On the basis of the analysis, it become necessary that Oyo state Qualifying Examination body should set and administer items that are fair so that quality Education in terms of Certificate is assured.

Background to the Problem
In our educational system, both the local (teacher-made test) and National examination tests are important partly to calibrate grades, for certification and to give indications of the quality of education, as well as for admission into higher institutions. The qualifying examinations and National examination tests are administered in English, Yoruba,

mathematics, science subjects, and commercial subjects, vocational and technical subjects. One of the aims of both local and National tests is to make grounds for assessment across the state and country as uniform as possible.

At the senior secondary school level, all students are required to choose their subject for either National Examination Council (NECO) examination or West African Senior School Certificate Examination (WASSCE). It is a policy in Oyo state that students should write a qualifying examination in all subjects before they can be allowed to register for WAEC Examination. Only those students that were able to pass the examination with 5 credits including English & Mathematics will be paid for or allow to write the final WAEC Examination in Public Schools in Oyo state.. Every subjects been studied by student in the senior secondary school class is divided into many topics specific to that subject.

In Yoruba language, it is possible to study all the topics in the curriculum. The major topics in Yoruba language are essay writing, comprehension passages phonetics and grammar, literature in Yoruba language, translation and culture. Yoruba language is compulsory at the first three years of primary education and one of the optional subjects at the senior secondary school level in both internal and external examinations.

The National Policy in Education (2004) has stated that the National examination tests should be as valid as possible and as fair as possible to all students. This statement can also be related to the ambition that the education in the senior secondary school must be equal for all students (NPE 2004). A valid test should not consist of biased items. Bias, is said to exist when a test or an item cause systematic errors in the measurement (Ramsted, 1996, Schumacker, 2005). For instance, if test scores indicate that males perform better on a certain test or item than females do, when in fact both groups have equal ability, the test or item provides a biased measure. This means that something else than what was intended to measure was measured .. If certain examination item favoured students either in the rural or urban located school, something else than what was intended is measured in biased item.

Many aspect of a tests and its use have to be considered when discussing test fairness; the way in which test are used, the participant

and the whole testing process (Willingham and Cole. 1997). Willingham and Cole define a fair test as a test that is comparably valid for individuals and groups. Fair test design should according to them provide examiners comparable opportunity, as far as, possible to demonstrate knowledge and skills they have acquired that a relevant to the purpose of the test.

There are many studies that focus on differences between male and female in tests (for instance, Wang and Lare 1996, Willingham and Cole 1997, Gallagher, De Lisi, Holst, Mc Gillicuddy- De Lisi, Morely, and Cahalan, 2000). The above studies indicate that males have better spatial ability than females. This suggests that males use this spatial ability often than females when solving problems which can give them advantages when solving certain problems related issues.

Some studies also indicate that females are better than males in verbal skills (Willingham and Cole 1997) which can give them advantage in items where communication is important. Independent of the interest, all the students have studied the same topics in Yoruba language. The results from the qualifying examination are comparable for different interest, since the students have all taken the same Yoruba topics. However, there are cases of differential in performance of students in some form of examination, test or assessment. In some cases, the differential favours one group of examinee. For instance, females may function significantly better than males or vice-versa or examinees from urban schools may function better than examinees from rural schools or vice-versa. Test with differentially functioning items cannot be used as a tool for taking decision or for certification. This offers an opportunity to study difference between male and female students, Rural and Urban school students and also study difference between topics (units). The purpose of this paper therefore is to study which items that show DIF, for male and female students, students from Rural and Urban schools in 2013 Yoruba language qualifying examination in Ibadan metropolis using Schuneuman modified chi-square method (SSx^2) which is based on Item Response Theory (IRT). Item response theory is the study of test and item scores based on assumption concerning the Yoruba relationship between abilities (or other hypothesized trait) and item responses. It models the relationship between ability and a set of test items, provide the basis for numerous practical applications. It has advantages over the classical

measurement theory. IRT provides a framework for evaluating how well assessments work, and how well individual items on assessments work. The most common use of IRT is in education where Psychometricians use it to achieve tasks such as developing and refining examinations, for example, it allows comparison between results of sub-groups in a population. The comparison between results of sub-groups gives indication of items that are functioning differently for different groups of students. This is regarded as differential item functioning (DIF). Differential item functioning (DIF) is a collection or statistical methods that gives indications of items that are functioning differently for different groups of students. Swami Nathan and Rogers (1991) define (DIF) as an item shows DIF if individuals having the same ability but from different groups, do not have probability of getting the item right. But it can also be added, that in order to be able to determine whether an item that shows DIF is biased or not further analysis have to be done (Camellia and Shepherd, 1994). It is then of interest to determine whether the differences depend on differences of ability of the compared groups (not biases) or the item measuring something else than intended (biases).

For this study, Scheunemer's modified chi-squad method was used because many researchers and authors have classified this method as a major method of detecting DIF. With this method, an item is unbiased if for all persons of equal ability, the probability of a correct response is the same regardless of group membership (Scheuneman, 1987). With the method, each major comparative group is divided into various groups based on the ability level on the basis of the observed total test scores. The P-value for each score group is then computed for comparison using the chi-square (x^2) statistics. In this procedure, each item is separately tested for bias. Ability is measured by the total homogenous test item that measures only Yoruba language ability. All candidates in the reference groups (male and urban school students) should have equal probability of correct response with all candidates in the focal group (females and Rural school students). Where such probability is different for an item, it is described as differential functioning. The first step in this involves grouping the testes into score intervals (Table 1). According to Scheuneman, four or five intervals can be created. The factors that determine number of intervals are difficulty of items; length is the test and size of the sample. The number

of testes that falls within each score interval for the two groups (reference and focal testes) is determined with a total across groups for each interval. The number with item correct (observed frequencies) for the two groups in each interval is determined. This is followed by computation of the proportion correct by dividing observed frequency for each score interval by the total number of testes in each score interval. Expected frequency for each group within a given score interval is obtained by multiplying proportion correct (p) for the score interval by the number in each group (reference or focal) who scored within that range.

Having determined the observed and expected frequencies, the chi-square is calculated. The degree of freedom for this procedure is (k-1) (r-1) where k is the number of the groups (male and female groups, urban and rural students groups) and r is the number of score groups formed. This is symbolically represented as

$$\underline{X^2 = \sum (M_o - M_e)^2 + \sum (F_o - F_e)^2}$$
$$M_e$$

Where,
M_o= observed frequency males with item correct
M_e= expected frequency of males with item correct
F_O= observed frequency of females with item correct = expected frequency of females with item correct.

The same formula is symbolically presented for urban and rural students.

Research Questions

(1) What are the items parameter estimates of Yoruba language items in the 2013 Oyo state Ministry of Education Qualifying Examination?
(2) Do items in 2013 Yoruba language Qualifying Examination of Oyo state Ministry of Education differentiate significantly between :
    (a) Gender (Male and Female)
    (b) School location (Urban and Rural)

Statement of problem

Many schools and organizations administer teacher made test items that are not of high quality, high standard or do not meet the ability of the testees. This situation leads to poor assessment and judgment of the individual testees. This may be as a result of the fact that these schools and organizations are unaware of what it takes to construct quality test items.

Before Oyo state qualifying exam came on board, each secondary schools conducted promotion examination into SS3 separately during the third term, but the joint qualifying examination came to harmonize and unify the promotion examinations. The separate conduct made the quality and scope of the various promotion examinations vary from school to school. Analyzing of differential item for some subjects in the qualifying examination will strengthen and improve its quality and make the teacher cover subject contents. Analyzing of Gender and school-location-related differential item in Yoruba language multiple-choice items of the Oyo state Ministry of Education qualifying Examination is to ensure that the question paper are of high quality taken care of item parameter Estimates (Difficulty, Discrimination, Guessing of Yoruba items).

The study therefore is designed to analyze Gender and School-location-related differential item in Yoruba language multiple-choice items of the Oyo state unify qualifying examination administered by Oyo state Ministry of Education. Searching through literature, the researcher is not aware of the existence of previous works that have analyzing Yoruba language items for joint qualifying examination administered by Oyo state Ministry of Education.

Methodology

The study adopted instrumentation research design. Multi stage sampling technique was adopted for the study. Ibadan metropolis was stratified into two educational zones. Zone A Ibadan city schools and zone B Ibadan less city schools. Random sampling technique was used to select one Local Government Area each from the two Educational zones. A sample of ten(10) schools were randomly selected from the schools in the two local government chosen for the study with a population of all Senior Secondary two(2) Students, who took Oyo state qualifying Examination in 2013 in Ibadan North Local Government and

Akinyele Local Government areas. In each of the sampled schools, all the students who wrote the qualifying Examination were studied. In all, there were 1020 males and 980 females giving a total of 2000 students. Also there were 1200 students from urban and 800 students from rural schools. The data for the study were gathered from responses of candidates in 50 multiple-choice questions set and Administered by Oyo state Ministry of Education for 2013 Senior Secondary School Qualifying Examination in Yoruba language. Person-by-item response matrix obtained from WAEC office was used to map out the ability for each of the sub-groups for the analysis of DIF. All the candidates from both the reference (male and urban school students) and focal (female and rural school students) groups were grouped into five score intervals with respect to the observed total test scores and both gender and school location. The multiple-choice items were scored 1 for correct option and 0 for wrong option with maximum score of 50 and minimum of 0.

Results

Research Question 1: what are the item parameter estimates of Yoruba language item in the 2013 Oyo state Ministry of Education qualifying examination?

Table 1: Item parameter estimates (difficulty, discrimination, guessing) of 2013, Yoruba language qualifying examination items, Administered by Oyo state Ministry of Education.

Items	Discrimination (a)	Difficulty (b)	Guessing
1	0.896	3.0487	0.235
2	0.150	-4.037	0.001
3	0.156	-3.568	0.001
4	0.174	-3.096	0.001
5	0.177	-3.138	0.001
6	0.145	-3.488	0.001
7	0.154	-3.716	0.001
8	0.192	-2.508	0.0011
9	0.169	-3.122	0.001
10	0.210	-2.295	0.001

11	0.194	-2.229	0.001
12	0.129	-3.735	0.001
13	0.141	-3.945	0.001
14	0.160	-3.557	0.001
15	0.179	-3.061	0.001
16	0.148	-3.454	0.001
17	0.191	2.711	0.001
18	0.174	-3.218	0.001
19	0.163	-3.798	0.001
20	0.214	-2.698	0.001
21	0.160	-3.865	0.001
22	0.172	-3.059	0.001
23	0.380	-1.727	0.001
24	0.333	-1.732	0.001
25	0.330	-1.464	0.001
26	0.308	-1.621	0.001
27	0.313	-1.436	0.0011
28	0.105	-5.743	0.001
29	0.366	-1.525	0.001
30	0.350	-1.432	0.001
31	0.354	-1.182	0.001
32	0.291	-1.581	0.001
33	0.541	-1.067	0.001
34	0.428	-0.899	0.001
35	0.212	-2.544	0.001
36	0.234	-2.433	0.001
37	0.208	-2.903	0.001
38	0.162	-3.091	0.0011
39	0.207	-3.043	0.001
40	0.186	-3.283	0.001
41	0.162	-3.179	0.001
42	0.136	-3.521	0.001
43	0.150	-3.395	0.001
44	0.138	-3.759	0.001
45	0.177	-3.110	0.001
46	0.148	-4.430	0.001
47	0.177	-3.540	0.001
48	0.196	-3.303	0.001

49	0.286	-1.833	0.001
50	0.240	-2.103	0.001

Table 1 show that column 1 is the item number, column 2 is the discrimination index, and column 3 is the difficulty index while column 4 is the guessing index. The table reveals that Yoruba difficulty level ranges from -4.85 to 3.487, the discrimination ranges from 0.105 to 0.896, while the guessing parameter ranges from 0.001 to 0.235. Notability, there is no item with negative guessing or discrimination parameter and that only item 1 has guessing parameter greater than 0.001.

Discussion

Table 1 shows that Yoruba language items were easy with a negative average difficulty level. The difficulty level ranges from -5.74 to 3 . 05, while the discrimination level ranges from 0.001 to o.90. It was only item 1 that has guessing parameter of 0.24. This could be because Yoruba items were very easy and there was no need to guess. There are variations in the "c" of Yoruba items. This is because 3 – parameter mode of IRT was used in the estimation of the parameter.

Research Question 2: Do items in 2013 Yoruba language qualifying examination administered by Oyo state Ministry of Education differentiate significantly between;

(a) Gender (male and female)
(b) School location (urban and rural)

Table 2: DIF analysis for gender in Oyo state Ministry of Education Qualifying Examination Yoruba language items

Item	Male	Female	Difference	Probability
1	-1.504	-0.992	-0.511	0.2271
2	-0.046	-0.086	0.041	0.0734
3	-0.632	-0.47	0.015	0.1480
4	0.394	0.137	0.258	0.5742
5	-0.364	0.276	-0.640	0.3237
6	-0.713	-0.619	-0.095	0.8251
7	-0.932	-0.477	-0.455	0.0051
8	-0.417	-0.323	-0.094	0.5898

9	-0.659	-0.723	0.073	0.6996
10	-0.311	-0.365	0.054	0.0677
11	0.061	0.025	0.036	0.0270
12	0.087	0.178	-0.091	0.9926
13	-0.524	-0.576	0.052	0.3360
14	-0.538	0.025	-0.563	0.0326
15	-0.632	-1.125	0.493	0.7374
16	-0.740	-1.066	-0.326	0.9895
17	-0.231	0.053	-0.284	0.3188
18	-0.686	-0.661	-0.025	0.2343
19	-0.618	-0.562	-0.057	0.9000
20	-0.565	-0.934	0.369	0.8291
21	-0.511	-0.309	-0.202	0.1412
22	-0.218	-0.323	0.105	0.3078
23	-0.686	-0.534	-0.152	0.7986
24	-0.740	-0.477	-0.263	0.6903
25	-0.404	-0.281	-0.123	0.0084
26	0.340	0.905	-0.564	0.7781
27	-0.727	-0.818	0.092	0.0250
28	-0.605	-0.449	-0.156	0.8860
29	0.592	-0.435	-0.156	0.5461
30	0.047	-0.100	0.148	0.5988
31	-0.284	-0.647	0.363	0.4845
32	-0.311	-0.421	0.110	0.0811
33	-0.524	-0.184	-0.341	0.9043
34	0.498	0.053	-0.551	0.0416
35	-0.178	0.421	0.242	0.8808
36	-0.578	-0.470	-0.171	0.3033
37	-0.165	0.123	-0.288	0.8177
38	0.047	-0.267	0.315	0.2167
39	-0.271	-0.449	0.178	0.1661
40	-0.605	-0.578	-0.029	0.0133
41	-0.244	-0.633	0.388	0.1896
42	-0.727	-0.718	-0.008	0.0854
43	-0.863	-0.732	-0.131	0.0407
44	-0.205	-0.072	-0.132	0.9656
45	-0.341	-0.379	-0.052	0.5838
46	-1.184	-1.200	0.016	0.9770

47	-0.551	-0.647	-0.096	0.0114
48	-0.006	-0.337	0.031	0.5285
49	-0.672	-0.647	0.026	0.4819
50	-0.444	-0.491	0.047	0.9711

Table 2 show the difficulty level of males and females for each Yoruba language item and the differences between the difficulty level of males and females for each Yoruba item. The table reveals that items 7, 11, 14, 25, 27, 34, 39, 40 and 43 are differentiated significantly between male and female. This is because there were differences in the difficulty level of the groups and the probabilities were less than 0.05. This represents 9% of the total Yoruba items while 91% of the items do not differentiate significantly between males and females. Positive difference implies that females were favored while negative difference suggests that males were favored.

Table 3: DIF analysis for school location in Oyo state Ministry of Education Qualifying examination Yoruba language items

Items	**Urban located school**	**Rural located school**	**Difference**	**Probability**
1	3.390	3.591	-0.201	0.1505
2	-3.260	-2.616	-0.644	0.3846
3	-2.797	-2.968	0.171	0.7599
4	-2.910	-3.243	0.334	0.0346
5	-2.729	-2.334	-0.396	0.4723
6	-3.071	-2.587	-0.484	0.9505
7	-2.488	2.616	0.128	0.5473
8	-2.531	-2.006	-0.525	0.4017
9	-2.910	-2.196	-0.714	0.3603
10	-2.797	-3.243	0.447	0.0461
11	-3.025	-2.196	-0.107	0.8129
12	-2.553	-2.998	-0.445	0.2554
13	-3.048	-2.968	-0.080	0.9647
14	-3.381	-3.187	-0.200	0.5205
15	-3.118	-2.938	-0.180	0.0021
16	-3.333	-2.306	-1.027	0.6734
17	-2.956	-2.674	-2.282	0.8354

18	-2.929	-2.878	0.149	0.6451
19	-3.381	-2.790	-0.591	0.5270
20	-3.025	-3.059	0.034	0.9670
21	-2.337	-2.168	-0.169	0.0267
22	-2.597	-2.502	-0.095	0.7809
23	-2.488	-2.878	0.391	0.9607
24	-2.910	-3.059	0.149	0.3911
25	-2.956	-2.938	-0.265	0.3894
26	-2.597	-2.114	-0.461	0.1616
27	-2.444	-2.530	0.086	0.2494
28	-2.147	-1.872	-0.275	0.9084
29	-1.498	-1.610	0.111	0.6646
30	-1.697	-1.952	0.255	0.2093
31	-2.797	-2.968	0.171	0.9483
32	-2.575	-3.401	0.827	0.3346
33	-2.752	-2.559	-0.193	0.8568
34	-2.887	-2.961	-0.126	0.4068
35	-2.106	-2.819	0.714	0.5026
36	-3.236	-2.587	-0.649	0.6942
37	-3.455	-3.212	-0.242	0.9300
38	-2.864	-3.900	-1.035	0.5366
39	-3.236	-3.086	-0.147	0.3618
40	-3.002	-3.837	0.829	0.3457
41	-2.864	-2.849	-0.015	0.9718
42	-2.842	-3.059	0.217	0.7135
43	-2.553	-2.938	0.385	0.5837
44	-2.597	-2.968	0.371	0.5025
45	-2.641	-2.645	0.004	0.3580
46	-3.095	-2.223	-0.872	0.1305
47	-3.308	-3.596	0.287	0.0571
48	-3.381	-3.275	-0.106	0.3067
49	-3.284	-3.797	0.512	0.7852
50	-3.118	-3.530	0.412	0.3145

Discussion:

The finding of this research question "Does Oyo State Ministry of Education administered qualifying examination 2013 in Yoruba language items differentiate significantly between (a) gender (male and

female), school location (urban located schools and rural located schools) show that some items in Yoruba language showed significant DIF in gender and location of school". Table 1 which shows there was significant DIF in gender achievement in Yoruba language supports Madu (2012) who found out that out of 50 mathematics multiple choice items administered by West African Examination Council (WAEC) in Nsukka Local Government Area (LGA) of Enugu state, 39 items show significant DIF in gender. The findings also corroborate other research findings in gender difference in achievement in mathematics (Ezeameyi, 2002, Hopkins, 2004). However, this does not support Igbokwe (2004) who found out that there was no significant difference between boys and girls when she developed item back in mathematics for NECO common entrance examination.

The findings also revealed in table 3 that a total of 3 Yoruba items showed significant DIF in students' mode of schooling. This supports the findings of Charleston (2004), Reeves (2005), Williams (2005) and Owoeye (2011) that location can affect achievement in mathematics. However, Johnson (1998) concluded that there is no difference in achievement as a result of location. The differences in location could be as a result of more qualified teachers in urban area schools compared to rural schools. There are lots of infrastructures in urban schools compared to rural schools. Teachers with subject specialization are more in the urban located schools.

Also, the finding showed that more items in Yoruba language favored students in urban schools compared to rural schools. This could be as a result of close monitoring and supervision of students and strict adherence to academic timetable enjoyed in urban located schools. It could also be attributed to a good reading culture enforced in urban schools which do not always exist in rural located schools.

Conclusion

The study analyzed gender and school location related differentiated item in Yoruba language multiple-choice items of the Oyo state unify qualifying examination. Based on the findings, there is need for the ministry, examination agencies and schools to involve specialists and evaluators in the development and management of these internal or external examinations. This will enable them to examine their students with items that are free of bias or items that do not exhibit DIF so that

no student will be disadvantaged. This will also help in solving the problem of recurring mass failure in examinations in Nigeria as witnessed in the recent times.

Although there were few items that showed the existence of DIF in Yoruba language items in one or two situations, an appreciable number of their items did not show the existence of DIF. Oyo state Ministry of Education, other examining bodies, schools and individual teachers should ensure that the items they use to examine their students even in continuous assessment tests are of high quality, within the ability of their students and does not give under advantage to any group by developing item banks in the subjects they use to examine testees.

Recommendations

Based on the findings of this research work, the following recommendations are made;

i. That Oyo state Ministry of Education should train its staff in management of examinations so that they can analyze, differentiate items in other subjects offered in the qualifying examination or commission private individually or organization to do it. This will further improve the quality of the examination.
ii. Oyo state Ministry of Education should ensure that items to be used to examine their students are free from any form of DIF.
iii. Some faculties, teaching personnel and other conditions in urban located schools should be put in place in rural located schools. There should be close monitoring and supervision of rural located schools as it is in the urban located schools.
iv. Workshops and seminars should be organized for Yoruba language teachers on how best to improve the teaching and learning of Yoruba language in schools. This will help the students to achieve more and make Yoruba language less difficult. Students should also, have positive attitude towards Yoruba language and see it like every other subjects.

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