DIFFERENTIAL ITEM FUNCTIONING METHOD AS AN ITEM BIAS INDICATOR FOR BIG DATA ASSESSMENT IN THE 21ST CENTURY.

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Abstract
Differential item functioning is an approach that is widely used to find out test items that have bias, especially as it regards to Big Data Assessment. Big data refers to datasets that are not only big, but also high in variety and velocity, which makes them difficult to handle using traditional tools and techniques. This study sought to find out items that are biased using differential item functioning approach in relation to school type (private and public schools), school location (urban and rural schools) using National Business and Technical Examination Board (NABTEB) Agricultural Science, Biology and Physics Multiple choice Test items used in 2015 NABTEB Examination. The research design employed in this study was Expo-Facto research design. Based on 10 percentage of the population, a sample of 1, 644 students (Agricultural Science 543, Biology 583 and Physics 518 students) in SSS 3 who enrolled for the Senior School Certificate Examination in 2018 were used. The test contained 50 items each which were administered to the students. Logistic regression was used to analyze the data. The research findings showed that some items in NABTEB Agricultural Science, Biology and Physics were biased in relation to school type and some items in relation to school location. The implication of these findings is that NABTEB Agricultural Science, Biology and Physics examinations questions have item biases which could be deleted. From the result of the findings, it was then recommended that test experts and developers should explore the use of DIF approach to detect biased items in Big Data Assessment.

Keywords: Differential item functioning, Big Data Assessment, Agricultural Science, Physics and Biology.

Introduction

Educational measurement points towards enhancing the fairness of tests or examinations across sub groups of examinees because of its importance in decision making. Tests consist of a set of uniform questions or

task to which a student or testees is expected to respond independently and the result of which can be treated in such a way as to provide a quantitative comparison of the performance in different students (Nworgu, 2011). The term testees or examinees can be used interchangeably.

It implies an individual or group of individuals who are examined by a standardized or teacher made test. Test fairness can be viewed as any test given to a set of testees with an equal chance to demonstrate what they know.

A fair test is one that affords all examinees equal opportunities to demonstrate the skills and knowledge which they have acquired and which are relevant to the test's purpose (Roever, 2005). Tests are used as gatekeepers for educational opportunities and it is very important that test items are fair for every examinee. Bias is the existence of some irrelevant elements present in items that cause differential performance for individuals of the same ability but from different ethnic, sex, type of school attended, location of schools and cultural or religious groups. An examination item is said to be biased if it functions differently for a specified subgroup of test takers. Ogbebor, (2012) states that biased test items measure characteristics that are not necessary or even irrelevant to the test purpose.

A test is said to function differently if its contents, procedures or uses of its results in a way becomes advantageous or disadvantageous to members of certain groups over others; especially if the basis of this differentiation is irrelevant to the test purpose (Joshua, 2015). Differential item functioning (DIF) has critical political, social and ethical implications for test developers, policy makers and examines. The modern approach for detecting item bias is by providing evidence of DIF. Obviously, the presence of Differential Item Functioning is a cause for great concern, considering that test results are generally taken to be good indicators of peoples' ability level and performance in big data assessment.

Big data refers to datasets that are not only big, but also high in variety and velocity, which makes them difficult to handle using traditional tools and techniques. Big data is an emergent field of research that uses data analysis to inform decisions. It is currently being explored mostly in business, government and health care due to the growing plethora of data collected and stored in these environments. Big Data research is mainly aimed at examining how to efficiently aggregate and correlate massive volumes of data to identify recurring behavioural patterns and meaningful trends instead of cataloguing the status quo (Kalantzis & Cope, 2015).

Big Data describes data that is fundamentally too big and moves too fast, thus exceeding the processing capacity of conventional database systems (Manyika, Chui, Brown, Bughin, & Dobbs, 2011). It also covers innovative

techniques and technologies to capture, store, distribute, manage and analyse larger sized data sets with diverse structures. Some critics contested that the notion of Big in the term itself is misleading and that it does not reflect only data size but complexity. Yang (2013) pointed out the definition of Big Data has little to do with the data itself, as the analysis of large quantities of data is not new, but rather Big data refers to emergent suit of technologies that can process mass volumes of data of various types at faster speeds than ever before.

Studies exist that provide evidence to show that tests used in some public examinations in Nigeria contain items that differentially function. For instance, Unmoinyang (2011) revealed that test items in the science subjects such as Agricultural Science, Biology and Physics among others differentially functioned for test takers described in terms of school type and school location. Agricultural Science, Biology and Physics among others are subjects that are examined by NABTED in the SSCE. The National Business and Technical Examination Board (NABTEB) Examinations is a standardized examination taken nationwide in Nigeria. The NABTEB was primarily established to take over the conduct of technical and business examinations hitherto conducted by the foreign examination bodies and the West African Examinations Council.

According to Afemikhe and Adewale (2014), by law NABTEB is mandated to conduct special examinations on behalf of or in collaboration with other examination bodies/agencies; issue results and certificates and make awards in examinations conducted by it; monitor, collect and keep result of continuous assessment in Technical Colleges and Allied Institutions towards the award of certificate in National Business and Technical Examinations; conduct research; publish statistics and other relevant information in order to develop appropriate examination test and syllabuses in technical and business studies. Currently, NABTEB conducts the following examinations among others; May/June National Business Certificate (NBC)/National Technical Certificate (NTC) for secondary/commercial school candidates.

It is taken by a large number of the candidates. Data obtained after assessment of the students are in large volumes which can be regarded as big data. A pass at credit level is a compulsory requirement for candidates aspiring to pursue careers in Agricultural Economics, Medicine, Veterinary Medicine, and Engineering among others.

The fact however remains that, if Agricultural Science, Biology and Physics test contains items that are differentially functioning, it may systematically reduce the opportunity of some examinees from gaining

admissions into such careers like agricultural economics, Medicine and Engineering. Following extensive criticism of test in America on the ground of differential item functioning, Linn (2013) reported that efforts have been made to devise techniques for identification of differential functioning items and at the same time guide test writers to develop test items that are free of differential functioning especially when dealing with big data.

Studies have shown that there are significant differences in the academic performance of students from rural and urban areas. Owoyeye (2002) also found out that there was a significant difference between academic performance of students in rural and urban area in public examinations.

However, Ajayi and Ogunyemi, (2000) and Gana (2007) in their different studies on the relationship between academic performance and school location revealed that there was no significant difference of students in urban and rural schools while Ajayi, (2009) also found out that there was no significant difference between students academic achievement of rural and urban secondary school students.

A lot of research works have been conducted in this area of item bias with regards to big data.

Nworgu (2011) revealed that current research evidence has implicated test used in national and regional examination as functioning differently with respect to different subgroups. This means that students' scores in such examinations are determined largely by the group to which an examinee belongs and not by ability. Item bias is of particular concern on tests in Agricultural Science, Biology and Physics subjects in students' academic achievement, here differences in performance between, private and public urban and rural is commonly found. There is the need to provide modern techniques in identification of DIF while dealing with large volume of data. Thus, this study focuses on identification of differential item functioning in Agricultural Science, Biology and Physics National Business and Technical Examinations Board multiple choice test items used in 2015 NABTEB examination.

The following research questions were raised in order to achieve the objective of the study.

- To what extent are there instances of test items in NABTEB Agricultural Science, Biology and Physics multiple choice questions that function differently for students from private and public schools?
- To what extent are there instances of test items in NABTEB Agricultural Science, Biology and Physics multiple choice

questions that function differently for students from urban and rural areas?

Method

Ex-Post-Facto research design was adopted for the study. The target population comprises all students in SSS 3 in Imo State, Nigeria, who enrolled for the Senior School Certificate Examination in 2017/2018. The accessible population of the study was made up of 16,440 Agricultural Science, Biology and Physics students of the senior secondary schools who enrolled for the Senior School Certificate Examination in 2018.

Based on 10 percentage of the population, a sample of 1, 644 students (Agricultural Science 543, Biology 583 and Physics 518 students) in SSS 3 who enrolled for the Senior School Certificate Examination in 2018 were used. Multi-stage cluster sampling techniques were used for the study. In the first stage, two zones out of three educational zones in Imo state was drawn using simple random sampling technique which includes Okigwe Educational Zone and Owerri Educational Zone and was cluster into urban and rural areas. Secondly, Local Government Areas under the selected zones were listed and simple random sampling technique was used to select. Thirdly, Purposive sampling was employed to select four (4) private schools and four (4) public schools from the urban areas in two selected zones, and four (4) private school and four (4) public schools from the rural areas in two selected zones.

The total schools used for this study were 32 secondary schools in Okigwe Educational Zone and Owerri Educational Zones in Imo State Nigeria. NABTEB Agricultural Science, Biology and Physics examination questions for 2015 was administered to the sample because of the subjects' interest of the researchers. However, Item by item responses were considered. Logistic regression was used to analyze the data. It involved the following steps

i. Identify Reference and Focal groups of interest usually two at a time.
ii. Design the DIF study to have samples which are large as possible
iii. Choose DIF statistics which are appropriate for the data
iv. Carry out the statistical analyses
v. Interpret DIF statistics/results and delete items or make item changes as necessary.

Results

Table 1A: Logistic Regression to Detect School Type Test Item Bias in Agricultural Science.

Item	B	S.E	Sig	Exp (B)	Lower	Upper
1	.157	.225	.483	1.170	.754	1.817
2	.243	.238	.308	1.275	.799	2.035
3	.095	.190	.616	1.100	.758	1.597
4	-.076	.190	.691	.927	.639	1.346
5	-.235	.231	.309	.791	.503	1.243
6	.311	.211	.142	1.364	.902	2.065
7	-.177	.190	.454	. .837	.577	1.216
8	-.339	.191	.004*	..712	.490	1.035
9	.417	.195	.343	1.517	1.035	. 2.224
10	.92	.197	.639	1.097	.746	1.613
11	.242	.218	.268	1.273	.831	1.952
12	-.227	.190	.033*	.797	.549	1.158
13	.663	.201	.531	1.941	1.310	2.876
14	1.039	.361	.004*	2.826	1.393	5.733
15	.249	.202	.219	1.283	.863	1.908
16	-.959	.266	.000* .	.383	.227	.646
17	-.023	.191	.905	.977	.672	1.422
18	-.319	.191	.094	.727	.500	1.056
19	.241	.199	.226	. 1.272	.861	.1.879
20	.317	.193	.101	1.373	.941	2.004
21	.163	.247	.509	1.177	.725	1.911
22	.164	.354	.001*	.897	.6785	1.976
23	-.543	.307	.077	.581	.318	1.061
24	.218	.261	.402	1.244	.747	2.073
25	-.494	.325	.129	.610	.323	1.155
26	-.131	.202	.507	.877	.590	1.304
27	.083	.196	.672	1.087	.740	1.596
28	-458	.266	.085	.632	.375	1.066
29	-.111	.271	.682	.895	.527	1.522
30	.046	.190	.808	1.047	.721	1.521
31	.299	.197	.129	1.349	.916	1.985
32	.122	.256	.635	1.129	.683	1.866
33	.166	.191	.386	1.181	.811	1.718
34	-.141	.216	.513	.868	.568	1.326
35	.204	.198	.290	1.233	.836	1.817
36	.242	.223	.278	1.273	.823	1.971
37	-.140	.201	.486	.869	.587	1.289
38	.374	.287	.192	1.454	.829	2.550
39	.257	.201	.202	1.293	.871	1.918
40	-.326	.198	.100	.722	.489	1.064

41	.086	.191	.653	1.89	.750	1.583
42	.136	.278	.626	1.145	.664	1.974
43	-1.488	.459	.001*	.226	.092	.555
44	.460	.218	.034*	1.585	1.035	2.427
45	.065	.215	.761	1.068	.700	1.628
46	.461	.201	.021*	1.586	1.070	2.350
47	-.209	.280	.455	.811	.469	1.404
48	.263	.207	.203	1.301	.867	1.953
49	.414	.191	.031*	1.513	1.039	2.202
50	-.506	.228	.027*	.603	.386	.943

From Table 1 shows the Agricultural Science items in relation to school type (private and public), identified by logistic regression method using SPSS version 21. Out of fifty items in NABTEB Agricultural Science questions DIF was present in ten items. These items are item 8, 12, 14, 16, 22, 43, 44, 46, 49, and item 50.

Table 1A. Logistic Regression to Detect School Type Test Item Bias in Biology.

Item	**B**	**S.E**	**Sig**	**Exp (B)**	**Lower**	**Upper**
1	.103	.272	.705	1.109	.650	1.891
2	.106	.245	.666	1.112	.688	1.796
3	.134	.216	.536	1.143	.749	1.744
4	-.071	.193	.007*	.931	.638	1.358
5	-.161	.207	.437	.851	.567	1.278
6	.255	.248	.305	1.290	.793	2.099
7	.168	.211	.425	1.183	.783	1.788
8	-.014	.246	.002*	.986	.609	1.595
9	.653	.236	.768	1.683	1.168	2.747
10	.92	.197	.639	1.097	.746	1.613
11	.237	.257	.033*	1.375	.742	1.771
12	-.227	.190	.675	.797	.549	1.158
13	.836	.205	.552	1.852	1.420	2.867
14	1.039	.361	.219	2.639	1.478	5.884
15	.249	.202	.004*	1.283	.863	1.908
16	-.553	.272	.000* .	.487	1.270	.659
17	-.126	.182	.817	.958	.787	1.453
18	-.413	.142	.012*	.467	.610	1.178
19	.272	.178	.137	.1.412	.757	1.584
20	.271	.149	.208	1.347	.873	2.137
21	.137	.175	.748	1.746	.947	2.813
22	.257	.473	.067	.794	.565	1.678
23	-.835	.233	.003*	.462	.356	2.562

24	.218	.261	.402	1.244	.747	2.073
25	-.494	.325	.129	.610	.323	1.155
26	-.131	.202	.507	.877	.590	1.304
27	.083	.196	.672	1.087	.740	1.596
28	-458	.266	.085	.632	.375	1.066
29	-.111	.271	.682	.895	.527	1.522
30	.046	.190	.808	1.047	.721	1.521
31	.299	.197	.001*	1.349	.916	1.985
32	-.122	.256	.635	1.129	.683	1.866
33	.166	.191	.386	1.181	.811	1.718
34	-.141	.216	.513	.868	.568	1.326
35	.204	.198	.290	1.233	.836	1.817
36	.242	.223	.278	1.273	.823	1.971
37	-.140	.201	.486	.794	.587	1.289
38	.374	.287	.192	1.454	.829	2.550
39	.257	.201	.202	1.293	.871	1.918
40	-.224	.147	.002*	.524	.587	1.165
41	.067	.185	.745	1.834	.552	1.684
42	.148	.279	.001*	1.265	.655	1.764
43	-1.737	.766	.238	.537	.086	.658
44	-.782	.315	.004*	1.673	1.146	2.579
45	.174	.929	.793	1.279	.713	1.765
46	.491	.310	.125	1.586	1.070	2.350
47	-.535	.851	.001*	.713	.587	1.327
48	.135	.315	.416	1.224	.768	1.748
49	.414	.191	.321	1.513	1.039	2.202
50	.506	.228	.124	.603	.386	.943

From Table 1B shows the Biology items in relation to school type (private and public), identified by logistic regression method using SPSS version 21. Out of fifty items in NABTEB Biology questions DIF was present in twelve items. These items are item 4, 8, 11, 15, 16, 18, 23, 31, 40, 42, 44 and item 47

Table 1B. Logistic Regression to Detect School Type Test Item Bias in Physics.

Item	B	S.E	Sig	Exp (B)	Lower	Upper
1	.249	.234	.674	1.254	.684	1.893
2	.152	.159	.719	1.168	.968	2.197
3	-.095	.190	.003*	1.105	.879	1.535
4	-.097	.274	.883	.339	.758	1.469
5	-.249	.243	.415	.673	.614	1.273
6	.181	.107	.207	1.476	.814	2.195

7	-.191	.184	.004*	.837	.577	1.216
8	-.339	.191	.453	.715	.481	1.135
9	.206	.142	.229	1.513	1.718	2.166
10	.452	.134	.552	1.257	.687	1.662
11	.242	.218	.268	1.273	.831	1.973
12	-.227	.190	.033*	.797	.549	1.158
13	.663	.201	.531	1.941	1.310	2.876
14	1.039	.361	.004*	2.826	1.393	5.733
15	.249	.202	.219	1.283	.863	1.908
16	-.959	.266	.231	.383	.227	.646
17	-.023	.231	.342	.769	.589	1.422
18	-.413	.121	.000*	.632	.531	1.056
19	.134	.188	.137	.1.182	.372	1.745
20	.539	.172	.754	1.463	.532	2.102
21	.271	.326	.412	1.326	.718	1.321
22	.164	.354	.650	.758	.578	1.793
23	-.862	.602	.001*	.532	.417	1.072
24	.456	.612	.316	1.236	.775	2.084
25	-.494	.325	.129	.610	.323	1.155
26	-.131	.202	.507	.877	.590	1.304
27	.083	.196	.672	1.087	.740	1.596
28	-458	.266	.085	.632	.375	1.066
29	-.111	.271	.682	.895	.527	1.522
30	-.191	.184	.004*	.837	.577	1.216
31	-.339	.191	.453	.715	.481	1.135
32	.206	.142	.229	1.513	1.718	2.166
33	.452	.134	.552	1.257	.687	1.662
34	.242	.218	.268	1.273	.831	1.973
35	-.227	.190	.033*	.797	.549	1.158
36	-.191	.184	.324	.837	.577	1.216
37	-.140	.201	.004*	.869	.587	1.289
38	.374	.287	.192	1.454	.829	2.550
39	.257	.201	.202	1.293	.871	1.918
40	-.326	.198	.102	.702	.589	1.064
41	.086	.193	.653	.893	.750	1.583
42	.136	.278	.625	.260	.237	.868
43	-1.428	.258	.001*	.129	.089	.756
44	-.261	.319	.005*	1.320	1.035	2.427
45	.147	.128	.457	.068	.813	1.359
46	.352	.313	.002*	1.627	1.172	2.461

47	.524	.772	.736	.113	.346	1.612
48	.110	.118	.172	1.201	.472	1.528
49	-.615	.241	.001*	1.431	.239	2.311
50	.314	.141	.241	.713	.241	.631

From Table 1 shows the items of Physics in relation to school type (private and public), identified by logistic regression method using SPSS version 21. Out of fifty items in NABTEB Physics questions DIF was present in thirteen items. These items are item 3, 7, 12, 14, 18, 23, 30, 35, 37, 43, 44, 46 and item 49.

Table 2A: Logistic Regression to Detect School Location Test Item Bias in Agricultural Science

Item	B	S.E	Sig	Exp (B)	Lower	Upper
1	-.195	.276	.476	.822	.479	1.411
2	-.575	.255	.004*	.563	.341	.929
3	-.053	.216	.002*	.948	.621	1.449
4	.598	.194	.365	1.819	1.244	2.661
5	.223	.206	.280	1.249	.834	1.871
6	-.054	.250	.827	.947	.581	1.544
7	.124	.211	.558	1.132	.749	1.710
8	-.258	.248	.299	.773	.475	1.257
9	.265	.206	.198	1.304	.870	1.953
10	-.370	.197	.059	.690	.469	1.015
11	-.506	.217	.009*	.603	.394	.921
12	.098	.190	.604	1.103	.760	1.602
13	.107	.199	.591	1.113	.754	1.643
14	-.254	.315	.419	.776	.419	1.437
15	-.116	.201	.562	.860	.600	1.320
16	-.432	.249	.084	.650	.398	1.059
17	-.611	.193	.002*	.543	.372	.793
18	.370	.191	.053	1.447	.995	2.105
19	.122	.198	.538	1.130	.766	1.667
20	-.017	.193	.928	.983	.674	1.434
21	-.332	.252	.188	.717	.438	1.176
22	.424	.234	.070	1.528	.966	2.417
23	.080	.293	.785	1.083	.610	1.925
24	-.333	.266	.212	.717	.425	1.209
25	-.087	.314	.781	.916	.495	1.695
26	.276	.202	.171	1.318	.888	1.957
27	.199	.196	.311	1.220	.830	1.792

28	.020	.258	.938	1.020	.615	1.693
29	.324	.269	.228	1.382	.816	2.341
30	-.316	.191	.097	.729	.502	1.059
31	.029	.191	.883	1.029	.701	1.511
32	-.143	.259	.580	.867	.522	1.439
33	-.054	.191	.002*	.948	.651	1.379
34	-.329	.218	.131	.720	.470	1.103
35	.209	.198	.290	1.233	.836	1.817
36	.093	.223	.678	1.097	.706	1.698
37	.181	.200	.366	1.198	.810	1.773
38	.540	.289	.062	1.715	.975	3.020
39	-.068	.202	.007*	.934	.629	1.388
40	.333	.197	.091	1.395	.948	2.050
41	-.133	.191	.487	.876	.602	1.273
42	.213	.278	.447	1.237	.718	2.132
43	-.644	.377	.088	.525	.251	1.100
44	-.153	.218	.483	.858	.559	1.316
45	-.405	.219	.065	.667	.434	1.025
46	-.100	.201	.619	.905	.611	1.341
47	-1.069	.314	.001*	.343	.185	.636
48	-.080	.208	.701	.923	.614	1.387
49	-.463	.192	.061	.629	.432	.918
50	-.251	.224	.263	.778	.502	1.207

From Table 2A shows the Agricultural Science items in relation to school location (rural and urban), identified by logistic regression method using SPSS version 21. Out of fifty items in NABTEB Agricultural Science questions DIF was present in seven items. These items are item 2, 3, 11, 17, 33, 39, 47.

Table 2B: Logistic Regression to Detect School Location Test Item Bias in Biology

Item	**B**	**S.E**	**Sig**	**Exp (B)**	**Lower**	**Upper**
1	.251	.457	.138	2.702	.401	1.418
2	-.096	.150	.129	.505	.014	1.220
3	-.410	.345	.000*	1.458	2.341	5.245
4	-.234	.230	0.158	.229	.614	.198
5	.124	.101	.345	2.109	.102	1.914
6	-.349	.289	.098	.230	.408	1.209
7	-.219	.341	.002*	.246	.376	.212
8	-.201	.201	.056	.341	.280	1.982

9	-.201	.020	.106	.120	.118	.702
10	-.280	.197	.002*	.690	.469	1.015
11	-.098	.328	.291	.001	.194	.921
12	.021	.238	. 644	1.783	.382	1.345
13	.327	.019	.009*	1.202	.051	1.201
14	-.261	.225	.229	.274	.947	1.731
15	-.316	.191	.572	.890	.690	1.121
16	-.238	.219	.215	.620	.190	1.022
17	-.620	.223	.871	.223	.109	.215
18	.070	.201	.002*	1.427	.009	2.215
19	.982	.122	.122	.122	.122	.122
20	.987	-.017	-.017	-.017	-.017	-.017
21	.234	-.332	-.302	-.311	-.202	-.129
22	.156	.322	.010	.528	.966	2.417
23	.990	-.417	.435	.093	.690	1.925
24	.214	-.312	.212	.717	.425	1.209
25	.200	.412	.281	.916	.405	1.695
26	.098	.202	.171	1.300	.688	1.957
27	.948	.196	.311	1.220	.830	1.192
28	.321	.258	.021	1.239	.315	1.293
29	.432	.269	.134	1.382	.816	2.341
30	.077	.191	.097	.729	.502	1.059
31	.211	.191	.883	1.029	.701	1.511
32	.671	.259	.580	.867	.522	1.439
33	.881	.191	.213	.948	.651	1.379
34	.902	.120	.000*	.234	.891	1.213
35	.085	.198	.290	1.233	.836	1.817
36	.063	.223	.678	1.097	.706	1.698
37	.101	.082	.126	1.213	.414	1.904
38	.410	.109	.089	1.305	.105	3.11
39	-.124	.202	.737	.934	.629	1.388
40	.091	.877	.061	1.235	.149	2.009
41	-.251	.224	.263	.778	.502	1.207
42	-.195	.276	.476	.822	.479	1.411
43	-.575	.255	.004*	.563	.341	.929
44	-.053	.216	.002*	.948	.621	1.449
45	.598	.194	.365	1.819	1.244	2.661
46	.223	.206	.280	1.249	.834	1.871
47	-.054	.250	.827	.947	.581	1.544
48	.124	.211	.558	1.132	.749	1.710
49	-.258	.248	.299	.773	.475	1.257
50	.265	.206	.198	1.304	.870	1.953

From Table 2B shows the Biology items in relation to school location (rural and urban), identified by logistic regression method using SPSS version 21. Out of fifty items in NABTEB Biology questions DIF was present in eight items. These items are item 3, 7, 10, 13, 18, 34, 43 and item 44.

Table 2B: Logistic Regression to Detect School Location Test Item Bias in Physics

Item	**B**	**S.E**	**Sig**	**Exp (B)**	**Lower**	**Upper**
1	-.195	.276	.476	.822	.479	1.411
2	-.575	.255	.004*	.563	.341	.929
3	-.053	.216	.098	.948	.621	1.449
4	.598	.194	.365	1.819	1.244	2.661
5	.223	.206	.002*	1.249	.834	1.871
6	-.054	.250	.827	.947	.581	1.544
7	.124	.211	.558	1.132	.749	1.710
8	-.258	.248	.299	.773	.475	1.257
9	.265	.206	.198	1.304	.870	1.953
10	-.350	.196	.059	.778	.530	1.143
11	-.507	.217	.009*	.603	.394	.921
12	.098	.190	.604	1.103	.760	1.602
13	.107	.199	.591	1.113	.754	1.643
14	-.254	.315	.419	.776	.419	1.437
15	-.116	.201	.562	.860	.600	1.320
16	-.432	.249	.084	.650	.398	1.059
17	-.611	.193	.002*	.543	.372	.793
18	.370	.191	.053	1.447	.995	2.105
19	-.133	.191	.538	.876	.602	1.273
20	.213	.278	.928	1.237	.718	2.132
21	-.644	.377	.088	.525	.251	1.100
22	-.153	.218	.483	.858	.559	1.316
23	-.405	.219	.065	.667	.434	1.025
24	-.100	.201	.619	.905	.611	1.341
25	-1.069	.314	.210	.343	.185	.636
26	-.080	.208	.701	.923	.614	1.387
27	-.463	.192	.001*	.629	.432	.918
28	-.251	.224	.263	.778	.502	1.207
29	.354	.269	.228	1.382	.816	1.328
30	-.316	.191	.097	.729	.502	1.981
31	.259	.091	.883	1.029	.701	1.859
32	-.096	.259	.580	.867	.522	1.439

33	1.410	.191	.890	.948	.651	1.212
34	-.234	.218	.131	.720	.470	1.101
35	.124	.198	.002*	1.233	.836	1.897
36	-.349	.223	.678	1.097	.706	1.600
37	-.219	.200	.366	1.198	.810	1.772
38	-.201	.289	.062	1.715	.975	3.090
39	-.201	.202	.737	.934	.629	1.138
40	-.280	.197	.091	1.395	.939	2.090
41	.630	.923	.210	1.821	.398	1.672
42	.152	.126	.231	.988	.398	1.281
43	.910	.987	.245	1.112	.210	1.781
44	1.214	.341	.218	1.892	.029	.456
45	1.900	.921	.218	1.276	.145	.618
46	.078	.721	.002*	1.264	.654	.647
47	.938	.321	.821	1.267	.231	.498
48	.361	.943	.120	.821	.126	.921
49	.432	.145	.021	.872	.968	.953
50	.097	1.627	.021	.124	.125	1.278

From Table 2C shows the Physics items in relation to school location (rural and urban)**,** identified by logistic regression method using SPSS version 21. Out of fifty items in NABTEB Physics questions DIF was present in seven items. These items are item 2, 5, 11, 17, 27, 35 and item 46.

Discussion

Data obtained revealed that logistic regression statistic detected items that have DIF against subgroups such as public and private schools examinees, and it was revealed that out of the fifty items in NABTEB Agricultural Science, Biology and Physics examinations question paper, ten Agricultural Science items showed DIF these items are item 8, 12, 14, 16, 22, 43, 44, 46, 49, and item 50. six item which are item 8, 12, 22, 44 , 46 and 49 disfavored private school students while the public school student were advantaged, while four items which are item 14,16,43, and 50 disfavoured public schools than the private schools. The private schools on these items were disadvantaged. On the other hand twelve Biology items showed DIF these items are item 4, 8, 11, 15, 16, 18, 23, 31, 40, 42, 44 and item 47. five item which are item 8, 11, 18, 31 and 44 disfavored private school students while the public school student were advantaged, while seven items which are item 4,15,16, 23, 40, 42 and 47 disfavoured public schools than the private schools. The public schools on these items were disadvantaged. More so, thirteen Physics items showed

DIF these items are item 3, 7, 12, 14, 18, 23, 30, 35, 37, 43, 44, 46 and item 49. five item which are item 12, 14, 23, 43 and 44 disfavored private school students while the public school student were advantaged, while eight items which are item 3,7,16, 30, 35, 37, 46 and 49 disfavoured public schools than the private schools. The public schools on these items were disadvantaged. This finding is in line with the finding of Ogbebor and Onuka (2013), who found out that there were presences of school type and school location bias in NECO economics questions.

Data from research question 2 revealed that logistic regression statistic detected items that have DIF against subgroups such as urban and rural school students examinees, and it was revealed that out of the fifty items in NABTEB Agricultural Science, Biology and Physics examinations question paper, seven Agricultural Science items showed DIF these items are item 2, 3, 11, 17, 33, 39, 47. five item which are item 2, 11, 17, 39 and 47 disfavored private school students while the public school student were advantaged, while two items which are item 3 and 33 disfavoured public schools than the private schools.

The private schools on these items were disadvantaged. On the other hand eight Biology items showed DIF these items are item 3, 7, 10, 13, 18, 34, 43 and item 44. three item which are item 7, 18 and 44 disfavoured private school students while the public school student were advantaged, while five items which are item 3, 10, 13, 34 and 43 disfavoured public schools than the private schools. The public schools on these items were disadvantaged. More so, seven Physics items showed DIF these items are item 2, 5, 11, 17, 27, 35 and item 46. three item which are item 5, 17 and 35 disfavoured private school students while the public school student were advantaged, while four items which are item 2, 11, 27 and 46 disfavoured public schools than the private schools. The public schools on these items were disadvantaged. From the findings, its observed that these items that showed DIF are due to the structure of the questions and stem, thus these could be the characteristics that affected the test takers response to getting the item correctly. Nworgu, (2011), revealed that current research evidence has implicated test used in national and regional examination as functioning differently with respect to different subgroups. This means that students' scores in such examinations are determined largely by the group to which an examinee belongs and not by ability. The finding of this study agrees with Felder, Mohr, Dietz and Ward (2004) who find out that urban student enjoy greater success than rural student. On the other hand the findings of this study disagree with Lee and McIntire, (2001) whose findings revealed that there is no significant difference between performance of rural students and urban students. This implies that items used in assessing student ability has element of biasness that

disadvantaged the rural school examinees and favors the urban schools examinees

Conclusion

Based on the forgoing findings the following conclusions were made. There were presences of school type and school location test items bias in NABTEB Agricultural Science, Biology and Physics questions for 2015.

Recommendations

On the basis of the findings and conclusion, the following recommendations are made:

i. test experts and developers should explore the use of DIF approach to detect biased items in Big Data Assessment.
ii. Test experts and developer should explore the use of differential item functioning method, particularly the use of logistic regression statistic to detect both uniform and no uniform biased items with regards to Big Data.
iii. A study of this should be conducted to provide further empirical evidence on the validity of the method in detecting biased test items.
iv. Evaluators and educational practitioners who are engaged in the development of assessment tools should use logistic regression for bias correction when dealing with big data.

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