



Item parameter drifts across school type in waec mathematics examination from 2018-2019

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Abstract

The study assessed item parameter drifts across school type in WAEC Mathematics examination 2018-2019. Two research questions guided the study and two hypotheses were tested. The study adopted a descriptive survey research design. The population consisted all the 49,742 SS3 students from the 292 public and 182 Government approved private secondary schools that enrolled for 2022/2023 Senior School Certificate Examination of West African Examination Council (WAEC) in Enugu State totaling 474 schools. A sample of 820 SS3 students from 10% of the 474 schools approved to write WAEC in Enugu State were selected through multistage sampling. The 2018, 2019 and 2020 WAEC mathematics multiple choice examination questions were adopted as instruments for the study. The instruments did not pass through validation and reliability as they were already good questions used by WAEC. Bilog MG software was used to answer the research questions while Analysis of Variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance. The findings of the study among others showed that among the 50 items, eleven items were deemed to have drifted significantly in the distributions of item difficulty indices of 2018 mathematics multiple-choice tests based on school type among the examinees. The study recommended among others that West Africa Examination council should ensure that as items are re-used or repeated, response parameter must be updated and made more accurate to stated criteria before use.

Keywords: Item parameter drift (IPD), school type, WAEC, mathematics

Introduction

Mathematics is essential for the prosperity of a nation in providing device for comprehending science, engineering, technology and other related subjects. It is the study of numbers, sets of points and various abstract elements together with relations between them and operations performed on them (Courant, Robbins and John in Ike 2010) [5]. The inclusion of mathematics as a requirement for admission into scientific and technology-related programmes in Nigerian higher institutions is based on the understanding of its importance to any nation's technological growth. Suffice it to say that a student who does not have a credit in mathematics will find it difficult to pursue most science and technology courses at the university level in Nigeria. Okpala, Okoye and Anene (2018) [10] noted that the place of mathematics in the day to day activities of man points to the fact that mathematics is required by all and this places the subject at a vantage position for scientific, technological, economic and social development. In the words of Kolawole, Oladosu and Ajetunmbis (2013) [6], it is a veritable tool for the enhancement of learning of other school subjects and a vital tool for resolving problem in all discipline. As a vital instrument for the comprehension and subsequent application of science and technology, the subject plays the role of a precursor of the much needed technological development of countries such as Nigeria. This explains why mathematics is one of the compulsory subjects that is offered by students at West African Senior School Certificate Examination (WASSCE) conducted by West African Examination Council (WAEC).

However one of the primary issues confronting Nigerian secondary school education is the inconsistency of student achievement in core subjects, particularly mathematics and English language. Over the years, there has consistently

been a sharp difference in the achievement of students in WAEC mathematics examination. Based on WAEC Chief Examiners Reports (2015), there was a recurrence of secondary school students' unstable achievement in mathematics in senior school certificate examination (SSCE). Candidates achievement in mathematics for the May/June 2011(38.93%), 2012(49%) and 2015 (34.18%) examination significantly differed from those of later years 2013 (36%) and 2014(31.30%). Same unstable performance was experienced in 2018 (48.15%) and 2019 (64.18%) where there was marked variation in the achievement of students between the years in the afore-mentioned examination in mathematics. Several factors among which are school location, school type, gender, study habit among others are accountable for the poor achievement of WAEC candidates in mathematics (Akamolufe and Olorunfemi-Olabisi 2011) [2]. The mathematics achievement of secondary school students is undermining Nigeria's goal for technological growth and economic liberation. There has always been a noticeable disparity in achievement between students of different school type.

School type is a vital variable in the school system. It refers to the classification of schools based on factors such as educational approach, curriculum among many others. Examples of school type include public schools, private schools, charter schools, Montessori schools and others. This study will be using private and public school types. Public schools are owned and funded by Federal and/or State Government as opposed to private schools that are owned and funded by individual(s) or organizations. Whether a school is considered public or private depends on the country and its specific education landscape.

There is a widely-held view that students who attend private schools perform better than those who attend public schools in different parts of the world (Eniayewu, 2015). More so,

Nwazuzu as cited by Eniayewu (2015), observed a significant gap in students' achievement in Public and Private secondary schools. The difference in mathematics academic achievement could be a function of the quality of items developed by examination bodies such as WAEC.

In Nigeria, WAEC constructs and administers test items on various subjects offered by secondary school students for the purpose of certification. Students that take these examinations are expected to record a consistent achievement between test administrations without bias to discipline, location, and school type. However, candidates who participate in the examination conducted by this examination body are in different social and cultural settings and therefore differently toned for personal and environmental reasons (Bandeled and Aborisade, 2018) [3]. More so, there is the likelihood of repeating items over test administrations. Consequently, the issue of item parameter drift can hardly be ruled out in this examination.

Item parameters are some of the indices estimated when a test is analyzed under item response theory. Item parameters are statistical indicators that define the quality of an item in the instrument employed (Orheruata in Oguguo and Lotobi, 2019) [8]. These item parameters include item difficulty, item discrimination and item distractor. This research work focused on item difficulty and item discrimination. Item difficulty is an index which indicates how easy or difficult an item is as an item should neither be too easy nor too difficult. Item discrimination is the ability of an item to differentiate among students on the basis of how well they know the material being tested. It is a measure of how well an item is able to distinguish between examinees who are knowledgeable and those who are not (Okoye, 2015) [9]. Distractors are one of the key components that affect the overall quality of multiple-choice items as well as the items' statistical characteristics (Gierl *et al.*, 2017) [4]. Distractors are used to differentiate between students who do not have the essential knowledge to correctly answer the item and those who do. A well developed test/ examination needs to have its' item parameters at a level where across the years students/examinees will not say there was a year more difficult or easier questions were presented than the other as this may bring about item parameter drift.

Item Parameter Drift (IPD) is a situation in which the difficulty and discrimination indices of an item or items vary over multiple administrations of a test to a certain population. In generic terms, deviations in item parameters from the true value to its successive testing administrations are known as item parameter drift (Wells *et al.*, 2014). Item parameter drift (IPD) is a phenomenon where changes in the statistical properties (difficulty and discrimination) of a test in various testing occasions are different (Akande, 2015) [1]. In the event of this occurrence, items can be considered easier or less discriminating than their true estimates.

Statement of the Problem

Over the years, the reports from the West African Examination Council Chief Examiners indicate that the achievement in mathematics by examinees has been experiencing an unstable trend as some years it is good and for others it is not. This is evidenced by statistics shown by the WAEC Chief Examiners' Reports in candidates achievement in mathematics for the May/June 2011, 2012 and 2015 examination significantly differed from those of later years (2013, 2014) as there was improvement when

compared (WAEC 2013, 2014). Same trend was experienced in 2018 (48.15% pass) and 2019 (64.18% pass) respectively where there is marked variation in the achievement of students between the years in the aforementioned examination in mathematics some researchers asserted that there was a decrease in students' academic achievement in mathematics over time. The issue of average to poor achievements may not only be attributed to teaching methods, instructional materials, teachers' characteristics among others. Several factors such as item parameters drifting, school type and location have been identified as been at the core of students' inconsistent achievement in mathematics over the years. Could it be that the items constructed and eventually administered by the examination bodies over the years drifted along the parameters of difficulty and discrimination lines? Is the achievement of examinees good or bad because of the parameters of the item used?

Examinees that have similar knowledge of the material are expected to perform similarly on individual test items over test administrations, regardless of school type. More often than not, subsequent examinees tend to perform better than their previous counterparts as a result of taking the pedagogical implications of the test items for granted which may have caused the drift in item parameter. As a result of this inconsistent achievement among examinees, the researcher deemed it fit to investigate school type on item parameter drift of mathematics objective examination constructed by WAEC from 2018-2019.

Research Questions

The following formulated research questions guide the study

1. What is the drift in the distributions of item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests based on school type?
2. What is the drift in the distributions of item discrimination indices of 2018-2019 WAEC mathematics multiple-choice tests based on school type?

Hypotheses

The following hypotheses were tested at 0.05 level of significance.

1. The drift in the item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests does not depend significantly on the school type.
2. The drift in the item discrimination indices of 2018-2019 WAEC mathematics multiple-choice tests does not depend significantly on the school type.

Methods and Materials

The study adopted a descriptive survey research design. The population consisted all the 49,742 SS3 students from the 292 public and 182 Government approved private secondary schools that enrolled for 2022/2023 Senior School Certificate Examination of West African Examination Council (WAEC) in Enugu State totaling 474 schools. A sample of 820 SS3 students from 10% of the 474 schools approved to write WAEC in Enugu State were selected through multistage sampling. The 2018 and 2019 WAEC mathematics multiple choice examination questions were adopted as instruments for the study. The instruments did not pass through validation and reliability as they were already good questions used by WAEC. Bilog MG software

was used to answer the research questions while Analysis of Variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance.

Results

The two basic assumptions of item response theory-dimensionality and local independence were examined. In terms of dimensionality, DIMTEST statistics was used in this study while local independence assumption of item response theory was investigating based on Yen’s Q3, residuals for any pair of items. Two parameters model was used in calibration of item parameter drifts since the focus of the difficulty and discrimination as stated in the purpose of the study.

Table 1: Dimtest Statistics of WAEC 2018-2019 Mathematics Multiple Choice Test Items

Year	TL	TGbar	T	P-value
2018	16.1071	2.4326	14.1087	0.0000
2019	12.5678	4.5678	10.8991	0.0016

The result in table 3 indicates that WAEC 2018-2019 mathematics multiple choice test items is multidimensional since $p < .05$ level of significance

Local independence assumption of item response theory was investigated based on Yen’s Q3, residuals for any pair of items should be uncorrelated, and generally close to zero. Residual correlations that are high indicate a violation of the local independence assumption (Marais, 2013). For this study, using Yen’s Q3 to screen items for local dependence, most items residual correlations were below absolute value of .2 for the Q3 statistic itself was found for the period under review. This indicates that the assumption local independence of item response theory was not grossly violated.

Research Question 1: What is the drift in the distributions of item difficulty indices of 2018 - 2019 WAEC mathematics multiple-choice tests based on school type?

The results of drift parameter and drift test of item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests based on school type were present in table 1, 2 and 3 respectively.

Table 2: Drift Parameter and Drift Test of Item Difficulty Indices of 2018 WAEC Mathematics Multiple-Choice Tests Based on School Type

Item	Private	Public	Drift Parameter	Drift test	Item	Private	Urban	Drift Parameter	Drift test
1	0.168	7.589	7.693	2.282	26	0.348	-0.019	-1.159	-0.107
2	0.032	7.038	6.920	2.074	27	0.341	-4.857	-2.217	-5.202
3	0.374	-11.752	-12.076	-3.054	28	1.524	-0.900	-1.533	-0.208
4	0.543	0.387	-0.189	0.155	29	0.564	0.135	-1.778	-2.004
5	0.211	-0.121	-1.190	-0.115	30	0.720	-0.147	-1.180	-0.113
6	1.499	-0.405	-1.302	-0.146	31	1.552	-0.428	-1.479	-0.193
7	0.674	6.845	6.839	2.052	32	0.547	-0.304	-1.516	-0.203
8	0.114	-0.074	-1.056	-0.079	33	0.577	-0.295	-1.857	-0.295
9	0.638	0.031	-1.005	-0.065	34	0.796	0.083	-0.737	0.007
10	1.302	0.065	-1.237	-0.128	35	1.181	-0.072	-1.283	-4.140
11	0.365	-0.392	-1.384	-0.168	36	0.308	-0.059	-1.090	-0.088
12	0.472	-0.228	-1.360	-0.161	37	0.975	-0.157	-1.155	-0.106
13	0.635	-0.020	-0.631	3.035	38	0.377	-0.266	-1.369	-0.164
14	0.551	4.703	4.696	2.473	39	1.034	0.013	-1.573	-0.219
15	0.891	0.127	-0.957	-0.052	40	0.459	0.185	-0.682	0.022
16	0.448	0.112	-0.580	2.049	41	1.084	-0.822	-1.799	-0.280
17	0.549	-2.211	-2.854	-0.565	42	0.396	0.503	-0.475	0.078
18	0.326	0.588	0.115	0.237	43	0.594	-0.078	-0.987	-0.061
19	0.346	0.058	-1.114	-0.095	44	0.779	0.423	-0.367	0.107
20	0.512	0.129	-0.956	-0.052	45	0.968	-6.992	-1.212	-7.741
21	0.303	-2.428	-2.826	-0.557	46	0.600	-0.010	-1.150	-0.105
22	0.752	0.017	-1.229	-0.126	47	0.840	-0.239	-1.468	-0.190
23	0.802	14.281	14.131	4.020	48	0.289	-0.128	-1.062	-0.081
24	0.677	-5.392	-5.587	-1.302	49	0.979	-1.514	-1.874	-0.300
25	0.976	-0.324	-1.034	-0.073	50	0.440	-0.019	-0.950	-0.051

Bold items statistically significant (Drift test is greater than 1.96)

Table 2 shows that among the 50 items, eleven items were deemed to have drifted significantly for 2018 WAEC in term of difficulty among the examinees. Of these eleven drifting items, the drift parameter was positive for six items,

indicating that they became more difficult for the subsequent group of examinees. The six remaining five items exhibited significant drift became easier.

Table 3: Drift Parameter and Drift Test of Item Difficulty Indices of 2019 WAEC Mathematics Multiple-Choice Tests Based on School Type

Item	Private	Public	Drift Parameter	Drift test	Item	Private	Public	Drift Parameter	Drift test
1	-4.151	22.343	-0.065	3.213	26	6.619	0.054	-0.116	0.049
2	-1.517	-16.272	-0.242	-0.356	27	0.136	-2.544	-0.275	-0.462
3	-4.756	-4.421	-0.014	0.377	28	-0.543	-0.752	0.310	2.419
4	0.338	0.192	-0.516	-1.237	29	-0.405	0.113	-0.096	0.113

5	9.428	-0.037	-0.143	-0.038	30	-0.106	-0.135	-0.043	0.284
6	0.707	-0.134	0.566	2.242	31	0.046	-0.348	0.149	0.901
7	0.159	-10.456	-0.837	-2.269	32	0.271	-0.366	-0.298	-2.536
8	2.535	0.014	-0.662	-1.707	33	-0.866	-0.170	-0.079	0.168
9	-0.120	0.110	-0.451	-1.028	34	0.766	0.056	-0.004	0.409
10	-1.811	0.037	-0.513	-4.227	35	-0.151	-0.011	0.070	0.647
11	-2.115	-0.300	-0.120	0.036	36	1.615	-0.047	-0.402	-0.871
12	-1.750	-0.166	-0.131	0.001	37	-0.925	0.003	0.518	2.088
13	-0.636	0.019	0.004	0.435	38	-1.369	-0.168	-0.204	-4.234
14	-4.056	-16.897	-0.023	3.348	39	0.895	0.065	-0.556	-1.366
15	-2.176	0.067	0.214	1.110	40	1.016	0.175	0.514	2.075
16	-1.125	0.148	0.045	0.567	41	0.046	-0.713	-0.212	-0.260
17	-1.716	-1.326	0.024	0.499	42	0.271	0.427	-0.249	-0.379
18	0.028	0.455	-0.158	-0.086	43	-0.866	-0.058	-0.448	-1.018
19	-2.216	-0.020	-0.041	0.290	44	0.766	0.457	0.036	0.538
20	0.339	0.201	0.015	0.470	45	-0.151	-3.726	0.103	0.753
21	-0.809	-1.668	-0.213	-0.263	46	1.615	0.054	-0.637	-1.626
22	-0.546	0.066	-0.119	0.039	47	-0.925	-0.178	0.179	0.998
23	1.945	-6.235	-0.113	0.059	48	-1.369	-0.037	-0.890	-2.440
24	0.419	-3.899	-0.064	2.216	49	0.895	-0.923	0.187	1.023
25	-0.299	-0.299	-0.149	-0.057	50	1.016	0.101	-0.414	-0.909

Bold items statistically significant (Drift test is greater than 1.96)

Table 3 shows that among the 50 items In 2019 WAEC, twelve items were deemed to have drifted significantly among the examinees. Of these twelve drifting items, the drift parameter was positive for seven items, indicating they became more difficult for the subsequent group of examinees. The five remaining items that exhibited significant drift became easier.

Research Question 2: What is the drift in the distributions of item discrimination indices of 2018-2019 WAEC mathematics multiple-choice tests based on school type? The results of drift parameter and drift test in the distributions of item discrimination indices of 2018-2019 WAEC mathematics multiple-choice tests based on school type were present in table 7, 8 and 9 respectively.

Table 4: Drift Parameter and Drift test of Item Discrimination Indices of 2018 WAEC Mathematics Multiple-Choice Tests Based on School Type

Item	Private	Public	Drift Parameter	Drift test	Item	Private	Public	Drift Parameter	Drift test
1	0.168	-0.320	-0.488	-1.112	26	0.348	1.088	0.740	1.214
2	0.032	-0.304	-0.336	-0.824	27	0.431	0.192	-0.239	-0.641
3	0.378	0.129	-0.249	-0.659	28	1.524	0.562	-0.962	-2.010
4	0.543	0.696	0.153	4.102	29	0.564	0.951	0.387	0.545
5	0.211	1.097	0.886	1.490	30	0.720	0.909	0.189	0.170
6	1.499	0.748	-0.751	-1.610	31	1.552	0.969	-0.583	-1.292
7	0.674	-0.192	-0.866	-3.828	32	0.547	1.122	0.575	0.901
8	0.114	0.870	0.756	1.244	33	0.577	1.308	0.731	1.197
9	0.638	0.988	0.350	0.475	34	0.796	0.828	0.032	-0.127
10	0.365	1.289	0.924	1.562	35	1.181	1.177	-0.004	-0.195
11	0.765	0.845	0.080	-2.036	36	0.308	0.980	0.672	1.085
12	0.472	1.215	0.743	1.220	37	0.975	0.913	-0.062	-0.305
13	0.635	0.845	0.210	0.210	38	0.377	0.952	0.575	0.901
14	0.551	-0.261	-0.812	-4.726	39	1.034	1.349	0.315	0.409
15	0.891	1.244	0.353	0.481	40	0.459	0.772	0.313	0.405
16	0.448	0.773	0.325	0.428	41	1.084	0.901	-0.183	-0.534
17	0.549	0.407	-0.142	-0.457	42	0.396	0.947	0.551	0.856
18	0.326	0.568	0.242	2.271	43	0.594	1.000	0.406	2.581
19	0.346	1.049	0.703	1.144	44	0.779	0.841	0.062	-0.070
20	0.512	1.007	0.495	3.750	45	0.968	0.145	-0.823	-1.747
21	0.303	0.300	-0.003	-0.194	46	0.600	1.216	0.616	0.979
22	0.755	1.150	0.395	0.560	47	0.840	0.929	0.089	-0.019
23	0.802	-0.075	-0.877	-1.849	48	0.289	0.877	0.588	2.926
24	0.677	0.149	-0.528	-1.188	49	0.979	0.277	-0.702	-1.518
25	0.976	0.692	-0.284	-0.726	50	0.679	1.075	0.396	0.562

Bold items statistically significant (Drift Statistics is greater than 1.96)

Table 4 shows that among the 50 items, eight items were deemed to have drifted significantly for 2018 WAEC among the examinees. Of these eight drifting items, the drift parameter was positive for six items, indicating that they

discriminated high above acceptable level for the subsequent group of examinees. The two remaining items that exhibited significant drift became discriminated below the acceptable level.

Table 5: Drift Parameter and Drift Test of Item Discrimination Indices of 2019 WAEC Mathematics Multiple-Choice Tests Based on School Type

Item	Private	Public	Drift Parameter	Drift test	Item	Private	Public	Drift Parameter	Drift test
1	0.162	-0.104	0.266	-0.144	26	0.357	1.140	-0.783	-3.251
2	-0.075	0.118	-0.193	-0.191	27	0.358	0.360	-0.002	-0.172
3	0.259	0.324	-0.065	4.178	28	1.146	0.633	0.513	-0.119
4	0.347	0.576	-0.229	-0.195	29	0.428	0.913	-0.485	-0.221
5	-0.117	1.069	-1.186	-0.292	30	0.455	1.033	-0.578	-0.230
6	1.054	0.897	0.157	-0.156	31	0.504	1.051	9.453	4.837
7	0.591	0.006	0.585	-0.112	32	0.441	1.212	-0.771	-0.250
8	0.158	0.982	-0.824	-3.255	33	0.561	1.562	-1.001	-0.273
9	0.397	1.036	-0.639	-0.236	34	0.800	0.820	-0.020	-0.173
10	0.382	1.302	-0.920	-0.265	35	1.601	1.211	0.390	-0.132
11	0.621	0.992	-0.371	-0.209	36	0.180	1.031	-0.851	-0.258
12	0.396	1.132	-0.736	-2.246	37	0.902	0.998	-0.096	-0.181
13	0.692	0.611	0.081	-0.163	38	0.083	1.103	-1.020	-0.275
14	0.305	0.007	0.298	-0.141	39	0.726	1.586	-0.860	-4.259
15	0.667	1.084	-0.417	-0.214	40	0.363	0.867	-0.504	-0.222
16	0.378	0.692	-0.314	-4.203	41	3.540	0.977	9.563	4.848
17	0.528	0.643	-0.115	-0.183	42	0.441	0.978	-0.537	-0.226
18	0.269	0.473	-0.204	-0.192	43	0.561	0.909	-0.348	-0.207
19	0.206	1.172	-0.966	-0.269	44	0.800	0.790	0.010	-0.170
20	0.480	1.085	-0.605	-3.233	45	1.601	0.220	1.381	-3.032
21	0.090	0.398	-0.308	-0.203	46	0.180	1.140	-0.960	-0.269
22	0.876	1.246	-0.370	-0.209	47	0.902	1.229	-0.327	-0.205
23	0.451	0.150	0.301	-2.141	48	0.083	0.934	-0.851	-0.258
24	0.996	0.195	0.801	-0.090	49	0.726	0.360	0.366	-4.134
25	0.200	0.710	-0.510	-0.223	50	0.363	0.931	-0.568	-0.229

Bold items statistically significant (Drift Statistics is greater than 1.96)

Table 5 shows that among the 50 items in 2019 WAEC, twelve items were deemed to have drifted significantly among the examinees. Of these twelve drifting items, the drift parameter was positive for three items, indicating they became more difficult for the subsequent group of

examinees. The nine remaining items that exhibited significant drift became easier.

Hypothesis 1: The drift in the item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests does not depend significantly on the school type.

Table 6: ANOVA Test of Item Difficulty Drift Based on School Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	214.900	2	107.450	3.725	.026
Within Groups	4240.397	147	28.846		
Total	4455.297	149			

Table 15: Multiple Comparisons

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2018	2019	-2.196000	1.074174	.105	-4.73931	.34731
2019	2018	2.196000	1.074174	.105	-.34731	4.73931

*. The mean difference is significant at the .05 level.

Table 6 shows that the drift in the item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests is significantly different based on the school type ($F(2,149) = 3.725; p < .05$). A post Hoc comparison shows that there is different between drift in the item difficulty indices of 2018 and 2019 WAEC mathematics multiple-choice tests is significantly different ($M=2.78, SE=1.07, p < .05$).

Hypothesis 2: The drift in the item discrimination indices of 2018-2019 WAEC mathematics multiple-choice tests does not depend significantly on the school type.

Table 8: ANOVA Test of Item Discrimination Drift Based on School Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	98.646	2	49.323	1.512	.224
Within Groups	4795.223	147	32.621		
Total	4893.869	149			

Table 8 shows that the drift in the item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests is not significantly different based on the school type ($F(2,149) = 1.512; p > .05$).

Discussion of Findings

Drift in the Distributions of Item Difficulty Indices of 2018-2019 WAEC Mathematics Multiple-Choice Tests Based on School Type

The researcher found out that among the 50 items, eleven items were deemed to have drifted significantly in the distributions of item difficulty indices of 2018 mathematics multiple-choice tests based on school type among the examinees. Of these eleven drifting items, the drift parameter was positive for six items, indicating that they became more difficult for the subsequent group of examinees. The five remaining items that exhibited significant drift became easier. In 2019 WAEC, twelve items were deemed to have drifted significantly among the examinees. Of these twelve drifting items, the drift parameter was positive for seven items, indicating that they became more difficult for the subsequent group of examinees. The five remaining items that exhibited significant drift became easier.

Corresponding hypothesis shows that the drift in the item difficulty indices of 2018-2019 WAEC mathematics multiple-choice tests is not significantly different based on the school type. A post Hoc comparison shows that there is difference between drift in the item difficulty indices of 2018 and 2019 WAEC mathematics multiple-choice tests is significantly different from zero. The above finding is in line with Krause (2012)^[7] study that some items examined drifted significantly and became easier, consistent with item exposure. Furthermore, Oguguo and Lotobi (2019)^[8] study on three consecutive years of WAEC past questions in mathematics across sampled private and public schools found out that item parameter drift with respect to item difficulty and item distractors-aspects of item parameter.

Drift in the Distributions of Item Discrimination Indices of 2018-2019 WAEC Mathematics Multiple-Choice Tests Based on School Type

The researcher also found out that among the 50 items, eight items were deemed to have drifted significantly in the distributions of item discrimination indices of 2018 WAEC mathematics multiple-choice tests based on school type among the examinees. Of these nine drifting items, the drift parameter was positive for six items, indicating that they became more difficult for the subsequent group of examinees. The two remaining items that exhibited significant drift became easier. In 2019 WAEC, twelve items were deemed to have drifted significantly for among the examinees. Of these twelve drifting items, the drift parameter was positive for three items, indicating that they became more difficult for the subsequent group of examinees. The nine remaining items that exhibited significant drift became easier. Corresponding

hypothesis shows that drift in the item discrimination indices of 2018-2019 WAEC mathematics multiple-choice tests is not significantly different based on the school type. The study is in agreement with that of Lee and Geisinger (2018) reported that items used in most examination drifted significantly and became easier, consistent with item exposure. This was also supported with Krause (2012)^[7] study that some items examined drifted significantly and became easier, consistent with item exposure. Furthermore, Wu *et al* (2006)^[12] (2019) study on mathematics across sampled urban and rural schools found out that item parameter drift with respect to item difficulty and item distractors-aspects of item parameter

Conclusion

The empirical evidence in this study did not support two hypotheses. There was some evidence that some of the items in the WAEC 2018 to 2019 mathematics drifted and became easier over time, consistent with the behavior of exposed items.

Recommendations

The researcher wishes to recommends the following for further studies:

1. Items identifying as displaying parameter drift could be targeted for review by content experts. Items could be kept or discarded from the item pool based on the judgment of the content specialists and test developers. Each examination bodies has policies in place that specified that items should be discarded should be discarded when certain amount of parameter drift is identified
2. It is advisable for examination bodies to periodically determine parameter drift of their examination items in order to drastically reduce drift especially if drift is unidirectional. Also, sources of drift should be considered and addressed to possibly block future occurrence.
3. West Africa Examination council should ensure that as items are re-used or repeated, response parameter must be updated and made more accurate to stated criteria before use.
4. To ensure continuous quality, the calibrated items could be recalibrated with modern techniques such as item response theory to ensure that the items when reused are valid, reliable and interpretable.

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