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Dimensionality of Multiple-Choice Tests during Joint Mock Senior School Certificate Examinations in Kwara State, Nigeria: Research Evidence from 2018-2019

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ABSTRACT
This study examined the dimensionality of Kwara State Joint Mock Senior School Certificate Examination Multiple Choice Tests in Economics using data obtained from 2018 and 2019; an approach to remove errors in assessment and ascertaining the reliability of assessment instruments. Using descriptive survey design, a total of 1200 students were sampled. The research instruments comprised of standardized 2018 and 2019 Economics tests. Reliability coefficients of 0.71 and 0.70 were obtained for 2012 and 2013, respectively. Descriptive statistics of mean, standard deviation, Skewness and Kurtosis were used to answer research question one while research questions two, three, and four were answered using Cronbach Alpha and Factor Analysis. Findings revealed that students' performance was poor with average performances of 20.37 (2018) and 17.91 (2019). Using Cronbach Alpha and Factor Analysis, the test items complied with unidimensionality assumption. The dimensional structure between the test items used in 2018 and 2019 was relatively consistent. Thus, the need to gather evidence that supports the reliability and validity of score-based inferences is imperative from scientific, ethical, and legal perspectives.
Keywords: Academics performance, assessment, Cronbach's alpha, dimensionality, factor Analysis, unidmentionality.

INTRODUCTION
In any human society, education is seen as an indispensable part of life both personally and socially. All types of education constitute the major force in transforming human potential into effective and efficient resources. In the formal education sector, academic performance is the main measure of the level of education attained, which is meant to achieve the curriculum objective of success and

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prosperity as defined by the society [1]. In Nigeria as elsewhere, educational assessment is used to adjudge the academic performance of individuals. Thus, assessment is an indispensable component of any educational system, owing to the important diagnostic, motivational, guidance, judgmental, confirmatory, and other roles it plays in the educational context. Before recent times, assessments or tests were crude and covered only a few aspects of behaviour, measuring intelligence and human attitude were almost impossible. As of today, however, quite educators, psychologists, evaluators, and personal workers have constructed a lot of diagnostic tools. At present, standardized tests of intelligence, achievement, personality, and interests are accepted as an essential part of the school's materials and equipment. Tests or assessments conducted for the purpose of selecting candidates for specific educational levels or programs, as well as those designed to provide criteria for the certification of successful participants on the completion of such programs or level of education, have tended to be matters of great personal and public concern. This is due to their potential determinative effects on the subsequent careers of those so assessed. These types of assessment have therefore tended to receive very great attention in Nigeria as in many other parts of the world [2].

Statement of the Problem

As we live in a plethora of educational testing practices for high-stake decisions such as admission, placement, diagnosis, promotion and graduation, a comprehensive approach to test validation is necessary. Negligence in rigorous assessment of test dimensionality or misalignment of the psychometric model may result in different scores on the test representing different substantive interpretations. For a long time in traditional testing practices, objective measurement was viewed as an exercise in practicality only in the physical realm giving perception to the erroneous notion that non-physical characteristics do not exist. The concepts of human traits, unlike physical concepts that can be felt, heard, seen, tasted, perceived, or sensed, are latent and thus, such characteristics cannot be measured directly by bringing it in

contact with some formal measurement device. Latent traits only act out as behaviour that can be observed and measured indirectly. To measure these latent traits therefore, there is a need to provoke them to set out and consequently act to capture the intensity of their presence by challenging them with related graded tasks. Such tasks in psychometric are the items, and they must be such that they would elicit or provoke to action, the exact latent trait under consideration [3].

Some researchers make use of Item Response Theory models in the analysis of their test items without verifying if the applications of such are in line with the assumptions of the theoretical framework. Therefore, it is pertinent to examine the evaluation of assessment dimensionality as a necessary stage in the gathering of evidence to support the validity of interpretations based on a total score, particularly when assessment development and analysis are conducted within an item response theory (IRT) framework. As a result, this study assessed the dimensionality of Kwara State Joint Mock SSCE Multiple Choice Tests in Economics using data obtained from 2018 and 2019, as an approach towards removal of errors in assessment and ascertaining the reliability of assessment instrument.

Objectives of the Study

The main objective of this study is to carry out an assessment on the dimensionality of Kwara State Joint Mock SSCE Multiple Choice Tests in Economics using data obtained from 2018 and 2019. Specifically, the study examines:

- The profile of academic performance of students in Economics in 2018-2019 Kwara State Joint Mock SSCE.
- The extent to which 2018 and 2019 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics comply with the assumption of unidimensionality

- The consistency of the dimensional structure between the test items used in 2018 and 2019 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics.

Research Questions

The following research questions were generated to guide this study:

- What is the profile of academic performance of students in Economics in 2018-2019 Kwara State Joint Mock SSCE?
- To what extent does 2018 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics comply with the assumption of unidimensionality?
- To what extent does 2019 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics comply with the assumption of unidimensionality?
- Is there any consistency in the dimensional structure between the test items used in 2018 and 2019 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics?

MATERIALS AND METHODS

Descriptive survey design was adopted for this study as it sought to describe and analyze the dimensionality of Kwara State Joint Mock SSCE Multiple Choice Tests in Economics. The population for this study comprised all the senior secondary school students in Kwara State. The target population consisted of all the senior secondary school two (SSS 2) students in public schools. As at 2014/2015 academic session, there are 320 public and 157 private secondary schools in Kwara State bringing the total number of secondary schools to 477 (Kwara State Ministry of Education and Human Capital Development, 2014). However, this study was limited to public senior secondary schools in Kwara State because private secondary schools do not partake in this examination. Using Multi-stage sampling technique, 32 senior secondary schools were selected from the 320 public schools in the state.

At the first stage, owing to the total number of public senior secondary schools in the state and since it is not practically possible to collect data from the entire population, stratified sampling technique was used to select 32 senior secondary schools from the three senatorial districts. The breakdown of the schools across the three senatorial districts is as follows: Kwara South is 156, Kwara Central is 93 and Kwara North is 71. Based on these numbers, 10% public senior secondary schools were taken from each senatorial district which is equivalent to 16, 9 and 7 public senior secondary schools respectively. This brings the total number of schools that were sampled to 32 out of the 320 public senior secondary schools in the state. At the second stage, senior secondary school two (SSS II) classes were purposively chosen from each of the selected school because the test applied only to this category of students. Lastly, the respondents were intact class units of Science, Arts and Commercial students (SSS II) in each of the selected school across the senatorial district bringing the total number of respondents to 1200 students.

Instrumentation

The 2018 and 2019 Kwara State Joint Mock Multiple-Choice Economics tests were used in this study. The test items were obtained from the past questions 2018 and 2019 which have been standardized and believed to be content valid.

Reliability

In computing the reliability of these research instruments, split-half method was employed revealing reliability coefficients of 0.71 and 0.70 for 2018 and 2019 respectively.

Methods of Data Collection

Permission was sought and obtained from the schools' authorities' sequel to the consent of sampled students, and the instruments were administered personally with the assistance of teachers of Economics in sampled secondary schools. Using the correct answers files, the

responses were scored in binary format by assigning 1 to correct options and 0 to incorrect options.

Statistical Analysis

Descriptive statistics of mean, standard deviation, Skewness and Kurtosis were used to answer research question one while research questions two, three, and four were answered using Cronbach Alpha and Factor Analysis.

Limitations of the Study

The study was limited to assessing the dimensionality of Kwara State Joint Mock Senior School Certificate Examination Multiple Choice Tests in Economics using data obtained from 2018 and 2019. Hence the study was confined only to students in Kwara State. More so, senior secondary school two (SSS II) classes were purposively chosen because the test applied only to this category of students. Thus, the scope of the study was limited to selected classes of students. Therefore, to generalize the results for larger groups, the study should have involved more participants at different levels. In addition, only public senior secondary schools in Kwara State were selected, this is because private secondary schools do not partake in this examination. Hence, the sample size comprised of 1200 participants. This sample is only a very small proportion of the entire population of students In Kwara State. Therefore, research studies with much larger sample size would be required to ensure appropriate generalization of the findings of the study. The present study used only Cronbach Alpha and Factor Analysis, in analyzing the test items. Consideration of other methods might have revealed interesting findings. Lastly, there was a dearth of literature on research topic, there was scanty statistics and background data was not readily available.

RESULTS AND DISCUSSION

Research Question One:

What is the profile of academic performance of students in Economics in 2018-2019 Kwara State Joint Mock SSCE?

Table 1 and Figure 1 show the statistics and frequency distribution of the Profile of Students' Performance in Joint Mock SSCE Multiple Choice Economics for year, 2018.

Table 1: Profile of Students' Performance in Joint Mock SSCE Economics, 2018

Valid No	1200
Missing No	0
Mean	20.37
Median	20.00
Std. Deviation	6.754
Skewness	0.438
Std. Error of Skewness	0.071
Kurtosis	-0.154
Std. Error of Kurtosis	0.141
Minimum	4
Maximum	40

Source: Fieldwork, 2019

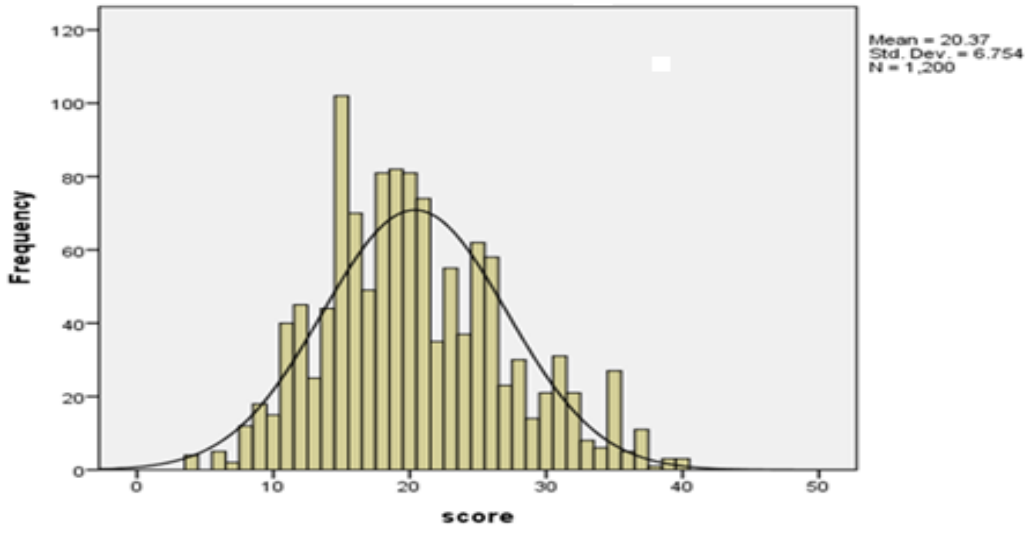

Figure 1: Histogram of Students' Performance in Joint Mock SSCE Economics, 2018
Source: Fieldwork, 2019

Table 1 shows the average performance of 20.37 with maximum score of 40 and minimum score of four. The mean (20.37) is greater than the median (20.00), suggesting that the distribution is asymmetric.

This notion is confirmed by the positive skewness, which shows that the Kwara State Joint Mock SSCE Multiple Choice Economics, 2018 has a right tail. This implies that most of the candidates demonstrated low performance in the subject, as most of the score's cluster on the left side of the distribution, as depicted in Figure 1. Similarly, the negative kurtosis (platykortic) indicates a relatively flat distribution compared to a normal distribution. The standard errors for both the skewness and kurtosis scores allow a simple rule of thumb to be applied. If the scores are divided by their standard errors and the result is greater than ±1.96, it suggests that the data are not normal with respect to the statistic. Applying the rule of thumb of dividing each value by its standard error (Std. Error), gives 0.62 for skewness and -1.09 for kurtosis, both well within ±1.96 limits, suggesting that the departure from normality is relatively moderate. This is confirmed by visual inspection of the histogram of the data shown in Figure 1. In the same way, Table 2 and Figure 2 show the statistics and frequency distribution of the Profile of Students' Performance in Joint Mock SSCE Multiple Choice Economics for year 2019.

Table 11: Profile of Students' Performance in Joint Mock SSCE Economics, 2019

Valid No	1200
Missing No	0
Mean	17.91
Median	17.00
Std. Deviation	6.712
Skewness	0.608
Std. Error of Skewness	0.071
Kurtosis	0.119
Std. Error of Kurtosis	0.141
Minimum	4
Maximum	38

Source: Fieldwork, 2019

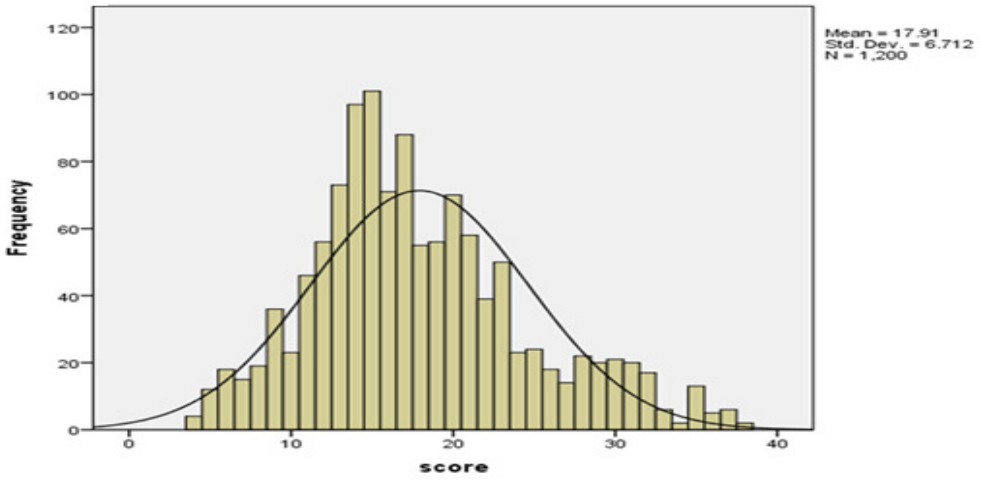

Figure 11: Histogram of Students' Performance in Joint Mock SSCE Economics, 2013
Source: Fieldwork, 2019

Table 2 shows the average performance of 17.91 with maximum score of 38 and minimum score of four. The mean (17.91) is greater than the median (17.00), suggesting that the distribution is asymmetric. This notion is confirmed by the positive skewness, which shows that the Kwara State Joint Mock SSCE Multiple Choice Economics, 2019 has a right tail. This implies that the students did poorly in the subject, as most of the score's cluster on the left side of the distribution, as depicted in Figure 2. Similarly, the positive kurtosis (leptokurtic) indicates a relatively peaked distribution compared to a normal distribution. The standard errors for both the skewness and kurtosis scores when divided by their values resulted to 0.86 for skewness and 0.84 for kurtosis, both well within ±1.96 limits, suggesting that the departure from normality is relatively moderate. This is confirmed by visual inspection of the histogram of the data shown in Figure 2.

Research Question Two:
To what extent does 2018 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics comply with the assumption of unidimensionality?
To test the 2018 Kwara State Joint Mock SSCE Multiple Choice Economics for unidimensionality, the researcher employed two testing

methods, Cronbach Alpha, and Factor Analysis. These results are presented below.

Cronbach Alpha method for 2018

Table 111: Case Processing Summary of Cronbach Alpha Test

		N	%
Case	Valid	1191	99.2
	Excluded[a]	9	.8
	Total	1200	100.0

a. Listwise deletion based on all variables in the procedure.

Source: Fieldwork, 2019

Table 1V: Reliability Statistics of Cronbach Alpha Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.778	0.773	50

Source: Fieldwork, 2019

To establish the presence of unidimentionality using Cronbach's alpha method, the value of the alpha should be greater than 0.70. In the case of the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics, a reliability analysis of the scales measuring the 50 Economics items was carried out as depicted in the Tables 3 and 4. Out of the 1200 cases used for the analysis, nine cases were excluded from the analysis because of missing data. Only 1191 cases were used. The result also revealed an Alpha value of 0.773 based on the standardized items. Therefore, it can be inferred that the Cronbach's Alpha coefficient of 0.773 which is higher than the benchmark of 0.70 showed that the

Kwara State Joint Mock SSCE Multiple Choice Economics items complied with assumption of unidimensionality. Furthermore, Table 5 shows the Item-Total Statistics of "Cronbach's Alpha if Item Deleted" for the 2018 Kwara State Joint Mock SSCE Economics Items.

Table V: Item-Total Statistics for 2018 Kwara State Joint Mock SSCE Economics Items.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Question1	19.68	43.576	.321	.	.772
Question2	19.89	42.929	.369	.	.770
Question3	19.98	43.135	.337	.	.771
Question4	19.98	44.132	.182	.	.776
Question5	19.99	42.818	.388	.	.769
Question6	20.36	45.406	.030	.	.779
Question7	20.19	44.442	.167	.	.777
Question8	19.78	44.177	.187	.	.776
Question9	20.00	43.239	.322	.	.771
Question10	19.75	42.799	.423	.	.768
Question11	20.18	45.081	.054	.	.780
Question12	20.10	43.655	.273	.	.773
Question13	20.19	45.390	.002	.	.782
Question14	19.99	43.071	.348	.	.770
Question15	20.00	43.250	.321	.	.771
Question16	20.02	44.353	.151	.	.778
Question17	20.10	44.247	.178	.	.777
Question18	19.64	43.452	.369	.	.771
Question19	19.73	42.860	.421	.	.768
Question20	19.77	43.486	.300	.	.772
Question21	20.10	42.748	.426	.	.768
Question22	20.09	44.649	.112	.	.779
Question23	19.96	42.964	.362	.	.770
Question24	20.10	44.716	.102	.	.779
Question25	20.19	43.462	.344	.	.771
Question26	19.97	42.835	.383	.	.769
Question27	20.23	45.155	.049	.	.780
Question28	20.18	45.129	.046	.	.781
Question29	20.00	43.785	.237	.	.774
Question30	19.91	43.342	.303	.	.772
Question31	19.91	43.426	.290	.	.773
Question32	19.93	44.800	.080	.	.780
Question33	20.05	43.335	.314	.	.772
Question34	20.07	44.673	.106	.	.779
Question35	20.15	45.313	.011	.	.782
Question36	20.13	43.128	.370	.	.770
Question37	19.89	44.398	.141	.	.778
Question38	20.19	43.629	.314	.	.772
Question39	20.00	44.224	.169	.	.777
Question40	20.01	42.334	.468	.	.766
Question41	20.06	44.710	.099	.	.779
Question42	20.12	43.121	.370	.	.770
Question43	20.06	44.201	.178	.	.777
Question44	20.04	44.977	.056	.	.781
Question45	20.24	44.345	.207	.	.776
Question46	19.98	44.950	.058	.	.781
Question47	19.73	44.701	.111	.	.779
Question48	20.27	45.101	.071	.	.779
Question49	20.17	43.989	.240	.	.774
Question50	20.21	45.272	.025	.	.781

Source: Fieldwork, 2019

The values in the column labeled "Alpha if Item is Deleted" are the values of the overall alpha if that item is not included in the calculation. As such, they reflect the change in Cronbach's Alpha that would be seen if a particular item were deleted. The overall Cronbach's Alpha is 0.778 as shown in Table 4, and so all values in this column should be around that same value. Therefore, for values of Alpha that are greater than the overall Alpha if such deletion of that item increases Cronbach's Alpha, then this means that deletion of that item improves reliability. Here, question 6, 11, 13, 22, 24, 27, 28, 32, 34, 35, 41, 44, 46, 47, 48 and 50 were slightly above the overall Alpha coefficient. However, removal of these items would increase Alpha only by 0.038 (i.e., from 0.778 to 0.816). Nevertheless, this increase is not significant and both values reflect a reasonable degree of Alpha coefficient higher than the benchmark of 0.70. This showed that the Kwara State Joint Mock SSCE Multiple Choice Economics items complied with assumption of unidimensionality.

Factor Analysis Method for 2018

To establish the presence of unidimensionality using Factor Analysis, eigenvalues was used by selecting the extraction method using Principal Axis Factoring (PAF) with option to display the Scree plot for eigenvalues greater than 1. The eigenvalues of the factors generated were plotted against the factor ranks to produce the result. Figure 3 illustrates the Eigenvalue Test of unidimensionality using the Scree plot of the 2018 Kwara State Joint Mock SSCE Multiple Choice Economics.

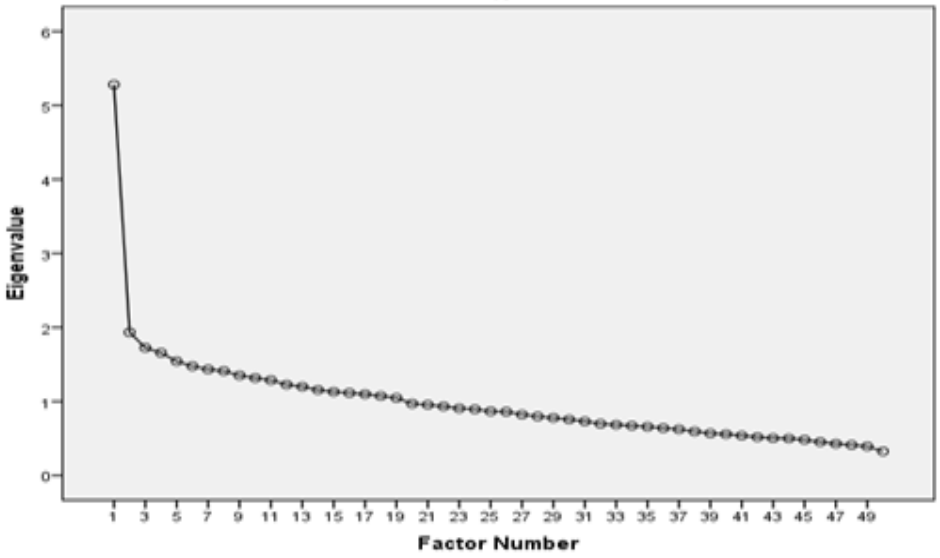

Figure 111: Scree Plot of 2018 Kwara State Joint Mock SSCE Multiple Choice Economics

Source: Fieldwork, 2019

Items may be considered unidimensional if the eigenvalues of the first factor are larger compared to the second factor, and the eigenvalues of the remaining factors are all about the same. From Figure 3, it can be observed that the 2018 Kwara State Joint Mock SSCE Multiple Choice Economics complied with the assumption of unidimensionality. Factor Loading was also employed as one of the basic information derived from factor analysis. This shows the degree to which each input variable is associated with each extracted dimension. The factor loadings are standardized in the output and range from -1 to +1. A general rule of thumb is that a variable meaningfully contributes to an underlying dimension if its factor loading is at or above 0.32 [4]. The factor loadings for the 2018 Kwara State Joint Mock SSCE Multiple Choice Economics Items are displayed in table 6.

Table VI: Factor Matrix of 2018 Kwara State Joint Mock SSCE Multiple Choice Economics [a]

Extraction Method: Principal Axis Factoring.

a. 19 factors extracted. 20 iterations required.

Standardized Educational Assessments Using PROC FACTOR	Factor																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Question5	.529			-.442															
Question19	.527																		
Question40	.520																		
Question10	.497																		
Question 21	.496																		
Question 14	.465																		
Question 2	.444																		
Question 42	.443																		
Question 23	.442																		
Question18	.440																		
Question26	.422																		
Question1	.409																		
Question25	.405	.323																	
Question36	.397																		
Question3	.371																		
Question38	.361								- .311										
Question20	.359	-.302																	
Question15	.357																		
Question12	.348																		
Question9	.347																		
Question30	.343																		
Question33	.332																		
Question31	.322																		
Question45																			
Question39																			
Question34		-.354		.347															
Question6		.341																	
Question13																			
Question16			.350																
Question47																			
Question37																			
Question41				.323															
Question44																			
Question17																			
Question28																			
Question43					.379														
Question48																			
Question4						-.382													
Question11						.308	.446												
Question49								-.370											
Question32																			
Question22																			
Question8										-.331									
Question29																			
Question24																			
Question27																			
Question46																			
Question35																			
Question7																			
Question 50																			

Source: Fieldwork, 2019

Unidimensionality is indicated if the first factor loadings for all the items are significant and have the same sign + or –. Therefore, from Table 6, it can be observed that 23 items were loaded in the first factor. This confirms the information from the Scree plot.

Research Question Three:

To what extent does 2019 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics comply with the assumption of unidimensionality?

To test the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics for unidimensionality, the researcher also employed, Cronbach Alpha and Factor Analysis. These results are presented below.

Cronbach Alpha method for 2019

Table VII: Case Processing Summary Cronbach Alpha Test

		N	%
Case	Valid	1190	99.2
	Excluded?	10	.8
	Total	1200	100.0

a. Listwise deletion based on all variables in the procedure.

Source: Fieldwork, 2019

Table VIII: Reliability Statistics Cronbach Alpha Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.777	0.770	50

Source: Fieldwork, 2019

It can be observed as shown in Table 7 and 8, that out of the 1200 cases that were used in the analysis, 10 were excluded from the analysis

because of missing data. Only 1190 cases were used. A total number of 50 items were considered. The result revealed an Alpha value of 0.770 based on the standardized items which is greater than the benchmark of 0.70 showing that the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics items complied with the assumption of unidimensionlity.

Table 9 presents the "Cronbach's Alpha if Item Deleted" for the 2019 Kwara State Joint Mock SSCE Economics Items.

Table IX: Item-Total Statistics for 2019 Kwara State Joint Mock SSCE Economics Items.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Question1	17.43	44.673	.246	.	.773
Question2	17.61	44.378	.297	.	.771
Question3	17.80	44.446	.206	.	.775
Question4	17.63	44.545	.275	.	.772
Question5	17.59	43.187	.484	.	.764
Question6	17.65	45.246	.168	.	.775
Question7	17.50	43.872	.366	.	.768
Question8	17.66	45.053	.200	.	.774
Question9	17.50	43.772	.382	.	.768
Question10	17.66	45.872	.070	.	.779
Question11	17.68	45.956	.059	.	.779
Question12	17.68	44.749	.254	.	.772
Question13	17.75	46.364	.000	.	.780
Question14	17.59	43.373	.453	.	.765
Question15	17.59	44.079	.341	.	.769
Question16	17.56	44.965	.201	.	.774
Question17	17.65	45.739	.090	.	.778
Question18	17.23	44.414	.349	.	.770
Question19	17.33	43.861	.394	.	.768
Question20	17.41	44.156	.329	.	.770
Question21	17.58	44.002	.352	.	.769
Question22	17.74	44.952	.241	.	.773
Question23	17.58	45.216	.164	.	.776
Question24	17.66	43.772	.408	.	.767
Question25	17.50	43.710	.391	.	.767
Question26	17.79	45.477	.164	.	.775
Question27	17.65	45.273	.164	.	.776
Question28	17.67	44.128	.351	.	.769
Question29	17.65	44.446	.294	.	.771
Question30	17.91	46.923	-.117	.	.781
Question31	17.86	45.892	.117	.	.776
Question32	17.54	45.108	.178	.	.775
Question33	17.71	44.506	.305	.	.771
Question34	17.54	44.839	.219	.	.774
Question35	17.64	46.046	.042	.	.780
Question36	17.71	45.953	.024	.	.783
Question37	17.76	45.910	.078	.	.778
Question38	17.60	45.707	.091	.	.778
Question39	17.86	46.228	.044	.	.778
Question40	17.64	44.968	.210	.	.774
Question41	17.69	45.380	.153	.	.776
Question42	17.80	44.700	.317	.	.771
Question43	17.71	44.686	.275	.	.772
Question44	17.50	43.796	.378	.	.768
Question45	17.78	46.463	-.015	.	.781
Question46	17.63	44.768	.237	.	.773
Question47	17.78	45.612	.137	.	.776
Question48	17.66	44.332	.316	.	.770
Question49	17.72	46.400	-.009	.	.781
Question50	17.58	43.576	.419	.	.766

Source: Fieldwork, 2019

The values in the column labeled "Alpha if Item is Deleted" are the values of the overall Alpha if that item is not included in the

calculation. As such, they reflect the change in Cronbach's Alpha that would be seen if a particular item were deleted. The overall Cronbach's Alpha is 0.777 as shown in Table 8, and so all values in this column should be around that same value. Therefore, for values of Alpha that are greater than the overall Alpha if such deletion of that item increases Cronbach's Alpha, then this means that deletion of that item improves reliability. Here, question 10, 11, 13, 17, 30, 35, 36, 37, 38, 39, 45 and 49 were slightly above the overall Alpha coefficient. However, removal of these items would increase Alpha only by 0.036 (i.e., from 0.777 to 0.813). Nevertheless, this increase is not dramatic and both values reflect a reasonable degree of Alpha coefficient higher than the benchmark of 0.70. This showed that the Kwara State Joint Mock SSCE Multiple Choice Economics items complied with assumption of unidimensionality.

Factor Analysis for 2019

The following results were presented to explain the presence of unidimesionality using factor analysis.

Figure 4 illustrates the Eigenvalue Test of unidimensionality using the Scree plot of the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics.

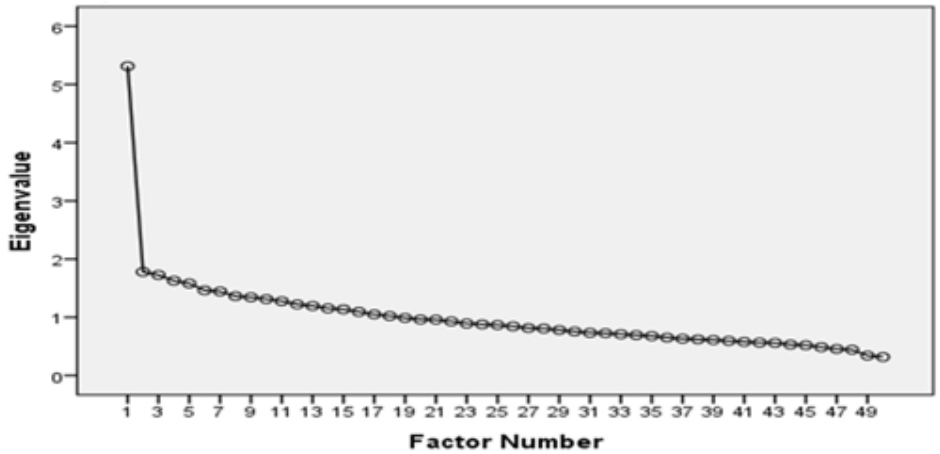

Figure IV: Scree Plot of 2019 Kwara State Joint Mock SSCE Multiple Choice Economics

Source: Fieldwork, 2019

To plot the eigenvalues of the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics, factor analysis was used. This is done by selecting the extraction method using Principal Axis Factoring (PAF) with option to depict the Scree plot for eigenvalues > 1. This automatically produced the plot of the eigenvalue above. The result of this analysis revealed that the eigenvalues of the first factor is larger compared to the second factor, and the eigenvalues of the remaining factors are all about the same. This implies that the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics complied with the assumption of unidimensionality. The factor loadings for the 2019 Kwara State Joint Mock SSCE Multiple Choice Economics Items are also displayed in Table 10.

Standardized Educational Assessments Using PROC FACTOR	Factor																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Question5	.625	-.475																
Question14	.589	-.434																
Question50	.550	-.456																
Question19	.479																	
Question18	.445																	
Question 24	.436																	
Question44	.434																	
Question 9	.432																	
Question 25	.432																	
Question 7	.428																	
Question28	.397																	
Question15	.390																	
Question21	.385																	
Question20	.377																	
Question48	.356																	
Question29																		
.356																		
Question42	.344																	
Question4	.336																	
Question43	.329																	
Question2	.322																	
Question33	.320																	
Question1																		
Question12																		
Question46																		
Question22																		
Question34																		
Question41																		
Question10																		
Question45																		
Question11																		
Question3																		
Question6																		
Question38																		
Question27																		
Question8																		
Question23						.314												
Question16																		
Question35																		
Question32																		
Question31								.372										
Question37																		
Question47																		
Question17																		
Question39																		
Question30																		
Question26																		
Question40												-.359						
Question36																		
Question49																		
Question 13																		

Table X: Factor Matrix of 2019 Kwara State Joint Mock SSCE Multiple Choice Economics [a]

Extraction Method: Principal Axis Factoring.

a. Attempted to extract 18 factors. More than 25 iterations required. (Convergence=.003). Extraction was terminated.

Source: Fieldwork, 2019

As shown in Table 10, 21 items were loaded in the first factor. This conformed to the assumption of unidimensionality. That is, if the first factor loadings for all the items are significant and have the same sign + or -. Thus, 2019 Kwara State Joint Mock SSCE Multiple Choice Economics is unidimensional.

Research Question Four:

Is there any consistency in the dimensional structure between the test items used in 2018 and 2019 Kwara State Joint Mock SSCE Multiple Choice Tests in Economics?

The consistency of the dimensional structure between the test items were investigated by comparing the factor patterns and descriptive statistics such as mean and standard deviation. Scree plots for the items level factor analysis has presented in Figures 3 and 4, showed that the first factors were larger compared to the second factors, and the eigenvalues of the remaining factors were all about the same, suggesting unidimensionality within the test's items for the two years (i.e., 2018 and 2019 Kwara State Joint Mock SSCE Multiple Choice Economics). In 2018 Kwara State Joint Mock SSCE Multiple Choice Economics, 23 items were loaded in the first factor while four items were loaded in the second factor. Similarly, in 2019 Kwara State Joint Mock SSCE Multiple Choice Economics, 21 items were loaded in the first factor while three items were loaded in the second factor. This indicated a reasonable degree of consistency in the dimensional structures between the test items for each year.

Table 11 contains the list of the individual means and standard deviations for each item for the two years.

Table XI: Mean and Standard Deviation for 2018 & 2019 Joint Mock SSCE Economics items

2018			2019		
Item	Mean	Standard Deviation	Item	Mean	Standard Deviation
1	.76	.430	1	.57	.496
2	.54	.498	2	.39	.488
3	.45	.498	3	.20	.623
4	.45	.498	4	.37	.482
5	.44	.497	5	.40	.491
6	.08	.266	6	.35	.476
7	.25	.431	7	.50	.500
8	.65	.476	8	.34	.473
9	.44	.496	9	.50	.500
10	.69	.464	10	.34	.474
11	.26	.437	11	.32	.467
12	.34	.473	12	.32	.466
13	.24	.429	13	.25	.431
14	.44	.497	14	.41	.492
15	.43	.495	15	.41	.492
16	.41	.493	16	.44	.496
17	.33	.472	17	.35	.478
18	.79	.404	18	.77	.421
19	.70	.456	19	.67	.472
20	.66	.474	20	.59	.492
21	.33	.470	21	.42	.494
22	.34	.474	22	.25	.436
23	.48	.500	23	.42	.494
24	.34	.472	24	.34	.473
25	.24	.427	25	.50	.500
26	.46	.499	26	.21	.409
27	.21	.404	27	.35	.476
28	.25	.434	28	.33	.471
29	.44	.496	29	.35	.478
30	.53	.499	30	.09	.285
31	.52	.500	31	.13	.341
32	.50	.500	32	.46	.499
33	.38	.486	33	.29	.452
34	.36	.481	34	.46	.498
35	.28	.451	35	.35	.479
36	.31	.461	36	.29	.625
37	.54	.498	37	.24	.428
38	.24	.427	38	.40	.490
39	.44	.496	39	.14	.343
40	.42	.494	40	.36	.479
41	.38	.485	41	.31	.464
42	.31	.463	42	.20	.399
43	.38	.485	43	.29	.452
44	.39	.489	44	.50	.500
45	.19	.394	45	.21	.410
46	.46	.498	46	.37	.487
47	.71	.455	47	.22	.414
48	.16	.368	48	.34	.473
49	.26	.440	49	.28	.450
50	.22	.415	50	.42	.493

Source: Fieldwork, 2019

Table 11 shows some variation in the mean and standard deviation of the two tests items. This is so because the items in each test are ordered by difficulty in the construction process. However, the distributions of

the mean and the standard deviation correlations of the two tests appear to be very similar.

CONCLUSION

The need to gather evidence that supports the reliability and validity of score-based inferences is imperative from scientific, ethical, and legal perspectives. As a result, it is important to investigate assessment dimensionality as a necessary stage in the gathering of evidence to support the validity of interpretations based on a total score. Particularly when assessment development and analysis are carried out within an item response theory (IRT) framework. Thus, this study assessed the dimensionality of the Kwara State Joint Mock SSCE Multiple Choice Tests in Economics using data obtained from 2018 and 2019. This approach helps in removing errors in assessment and ascertaining the reliability of the assessment instrument.

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