Assessment of dimensionality and local independence of state and national basic education Certificate Examinations in National values Education in Benue State

[1]
Nasela Pila [2] J. Gbenga Adewale (Ph.D)
Depaltment of Educational Foundations, Benue State University, Makurdi.
[2]

1nstitute of Education University of Ibadan Abstract

The study compared dimensionality and local independence of Basic Education Certificate Examinations (BECE) National Values Education 2017 test items by Benue State Examinations Board (BSEB) and National Examinations Council (NECO). The study is non-experimental design of Ex-post facto research type, a proportionate to size sampling technique was used to select 48 secondary schools (32 state public and 16 NECO-BECE registered schools), 1500 JSS3 students were randomly selected. BSEB and NECO BECE 2017 National %lues Education multiple choice test items were adopted as research instruments. Data were collected through personal visit to sampled schools. Two research questions were raised and analyzed using linear factor analysis and correlation residual NOHARM and Yén Q 3 software. Findings revealed that BSEB BECE 2017 National VI lues Education test fulfilled the assumption of Unidimensionality, while two dimensions underlie NECO test, which accounted for variations in examinees' performance. Also, out of 45 items for each test, 6 items of BSEB and 12 items of NECO test local independence assumption (correlation residual values ?0.2). The public examining bodies and test developers should adopt IRT approach as used in this study for standardization of test items to ensure quality assessment of basic education in Nigeria.
Keywords: Dimensionality, Local Independence, BSEB, NECO, BECE

Introduction

The administration of achievement test either by classroom teachers or public examining bodies is basically to generate scores that reflect examinees' ability, and to inform decision on individual achievement of instructional objectives. A reliable and valid test is required for both formative and summative assessment purposes. The use of valid instrument in educational assessment is one of the diving forces for national philosophical goals/objectives for any nation of the world. Basic Education Certificate Examinations (BECE) is a public examination at basic education used for promotion and placement of students into senior secondary schools. It requires valid test items in every discipline to lay solid foundation for further educational development of students.

Onuka and Durowoju (2011) conceptualized the general purpose of valid and reliable assessment in teaching and learning process to include: grading and reporting individual learner's achievement, comparing leaners with other homogenous groups, calibrating scores for certification using valid instrument for decision making. It is expected that Basic Education Certificate Examinations (BECE) test developed by Benue State Examinations Board (BSEB) and National Examinations Council (NECO) should be valid in fulfilling the assumptions of Unidimensionality and local independence. The items developed for assessment of students' ability in National Values Education should also be locally independent of one another without providing information that will aid examinees for answering other items correctly.

Adamoah and Acquah (2016) stated that BECE is used in African countries as a transition process through which successful students are admitted into various second cycle institutions such as senior high school or vocational and technical colleges for further educational development. In Nigeria, BECE is conducted by NECO and individual state governments across 36 states of the federation. The state and NECO BECE as public examining bodies, have the same objectives to achieve at basic level of education in Nigeria. However, it is doubtful whether the two examining bodies have the same quality of test items in terms of Unidimensionality and item local independence in assessment of latent trait in National Values Education.

National Values Education is the integration of Social Studies, Civic Education and Security Education as its curriculum content. The aim of National Values Education curriculum at basic level of education in Nigeria is to inculcate into youths the spirit of patriotism, national unity and consciousness, positive attitudes, religious tolerance, citizenship and democratic principles. Also, it can be used to curb national security challenges for effective growth and development. The subject is to inculcate in learners the principles of a real democratic society, a just and equal society, an integrated independent nation, a progressive changing economy and a country with diverse opportunities for citizenry (Onoha&Okam, 2011;Aroge, 2012).

Coe, (2008) observed that a test is said to be valid and reliable when items measure unique attribute (Uni-dimensionality) with moderate difficulty level, and cannot provide information to aid examinees with certain ability or trait to respond correctly to other items that make up a test. The view of Coe is based on the assumption of Classical Test Theory (CT T). The analysis of test items with such characteristics is obtainable using IRT parameter logistic models. According to Nenty (2015), IRT attempts to estimate the parameters involved, explain the process and predict the results of a given measurement. Under IRT, the emphasis is to assess individual trait or ability in answering each item in the test correctly rather than basing it on raw test scores (item-pattern scoring procedure) common with CTT. At presents, the application of IRT models which include: Rash or one parameter, two and three parameters (1PL, 2PL, 3PL and 4PL) models

become increasingly popular in many other fields of study in measurement of students' ability and test quality. There are three parameter models called "parameter logistic models" used in modem day measurement for scoring dichotomous test items. The item parameter logistics include; one parameter (Rasch model), two parameter, three parameter and four parameter logistic models in which the statistical values are used in defining the pattern of a particular Item Characteristics Curve (Hambleton, and Jones, 1993, Coe, 2008; XinmingAn and Yung, 2014).

All test developers always fry to construct test items with distinct information to measure examinees' understanding (ability). The popular IRT models identify a single latent trait to account for all statistical dependencies among test items as well as all differences among test takers. It is this underlying trait or ability, known as theta (0), that extricates items in terms of difficulty, and discriminate testees based on their proficiency. Lamenting on the validity and reliability of standardized test conducted by public examinations in Africa, Sick (2010) stated that most examination bodies developed test items that failed to conform to test assumptions of Unidimensionality, local independence and Differential item functioning. That is, most test items failed to measure a single latent trait, and the likelihood of an examinee correctly answering an item is independent of the influence from other test items. Under test dimensionality, test questions that provide a unique contribution to general assessment cannot have or increase construct coverage. Ajeigbe and Afolabi (2014) stated that Undimensionality occurs when each of the items in a test measures a single or unit trait, which in principle assumed local independence.

Many studies conducted in the past on validity of standardized tests using IRT approach revealed that most public examinations like WAEC, NECO, JAIvfB, etc., are multidimensional as regards the measurement of examinee's latent trait. This implies that many standardized achievement tests in Africa violate the assumption of Unidimensionality using IRT measurement model (Oguoma, Metibemu & Okoye, 2016; Okwilagwe & Ogunrinde, 2017).

Demars (2010) stated that when a test reports a single score, it is assumed that the items that produce the score shares a common basic construct in the whole test. When all items in a test measure separate single dimensions without providing the necessary information to a teste with given ability to respond correctly to other items, such items are said to be locally independent. Item Unidimensionality and local independence are assessed using 'Fit statistics that report the extent to which the pattern of observed scores and IRT model used are examined based on item and person fits to the model. Therefore, for BECE National Values Education to be considered valid, the test is expected to be unidimensional and locally independent in measuring examinees' ability with high level of precision.

Another IRT assumption is that of Local Independence which holds that for a person's ability estimate, testee's response to a particular item in a test should not depend on another item in the test. The probability of correct or incorrect response to an item in a test should not be influenced by another item due to communality. Yen (1993) in Xinming An and Yung (2014) opined that the items in a traditionally multiple choice test are carefully designed to be independent of one another so that the success on one item is not influenced by the success of another. He further observed under IRT assumption of local independence that polytomous or dichotomous test items are not chained, and theoretically they could be presented to the examinee in any order without affecting the quality of test items in terms of item difficulty parameter. Yen further states that in classical true scores theory, the assumption is made that errors of measurement are uncorrelated, given the examinee's true score. But under IRT, when pairs of items are locally independent, the

conditional probability given the examinee's ability level or theta (0) of obtaining any pair of scores on the same items is the product of the probabilities for the separate items.

It has been observed from the existing literature that most public examining bodies: WAEC, NECO, JAMB, NABTEB among others in recent past developed multiple choice test items that violate the assumptions of Unidimensionality and local item independence after calibration using IRT approach. This development affects the validity of assessment and the integrity of certificate or decision taken by public examining bodies concerning individual leaners in the society. It is doubtful whether BECE as a public examination in Nigeria does

develop test items in National Values education that conform to the assumptions of Unidimensionality and local independence in measurement of students' ability. It is based on the above development that this study investigated dimensionality and local independence of BECE National Values Education conducted by Benue State and NECO in2017.

Research Questions

l. What are the dimensionalities of BECE National Values education test developed by Benue State and National Examinations Council (NECO)?
2. To what extent does Benue State and NECO BECE 2017 National Values Education Tests fulfil the assumption of local item independence?

Methodology

The study is non-experimental research design of Ex-post facto research type. This design enabled the researcher to find out whether

there were differences in BECE test quality between the two examining bodies in terms of dimensionality and local item dependence. It is a descriptive survey research type because it involves a large sample population of JSS3 students without manipulation of any variable. The target population consists of JSS3 students in the state.

Multi-stage sampling method was used at various stages. At first stage, purposive sampling technique was used to select two senatorial districts (Zones B and C) for fair representation of the two major tribes in Benue State (Tiv and Idoma), where eight local governments (4 from each senatorial district) were randomly selected. Also, the use of purposive sampling was employed because

was used from each selected schools.

most of the NECO BECE registered secondary schools are located in urban settlements of Benue State dominant in the two senatorial districts. At second stage, proportionate to size was used to select 48 secondary schools (32 state public and 16 NECO BECE registered schools) in the state. At the third stage, 1500 JSS3 students were randomly selected. Intact class The adopted NECO and Benue State BECE 2017 National Values Education tests were used as instrument for data collection. Data was collected through personal visit to the sampled schools by the researchers and research assistants using counterbalance method and analyzed using linear factor analysis, correlation residual statistical tools and frequency count with NOHARM and Yen Q3. To answer the research questions, IRT approach was followed where ability and parameters were modelled using R Software.

Results and Discussion

Research Question 1: What is the dimensionality of BECE National Values

Table l: Dimensionality of NECO and State BECE 2017 National Values Education Tests

BECE	Items	No. of Dimension	GFI	RMSR	% Reduction in RMSR Test
BSEB	45		0.9328876	0.011	% < (9.0%) at 2 HD
NECO	45	2 (Fl andF2)	0.96146	0.010147	% < 10 (7.0%) at 3 HD

(F = Factors underlying a test, HD Number of Hypothesized Dimension)

Education test developed by Benue State and National Examinations Council (NECO)? To Table l. shows the dimensionality of 45 set of items by Benue State Examination Board (BSEB) and NECO BECE 2017 National Values Education Tests (NVET). BSEB-BECE 2017 NVET has I dimension (F l), Goodness of Fit Index (GFI) 0.9328876 which is 90%) and the Root Mean Square Residual (RMSR) $=$ 0.011. One dimensional model was parsimonious after calculating percentage reduction in RMSR, the value was < (9.0%) at 2 hypothesized dimensions. The NECO-BECE 2017 NVEThas2 dimensions (F 1 andF2), GFI $=$ 0.96146 which is ($>$ 90%) and RMSR $=$ 0.010147. Two dimensional models were parsimonious after the calculation of percentage reduction in RMSR; the value was < (7.0%) at 3 hypothesized dimensions. This implies that the BSEB test fulfilled the assumption of Unidimensionality. NECO-BECE 2017 NVET is multidimensional, 2 factors (Fl and F2) underlie the test. This means NECO test violated the assumption of Unidimensionality. It also means two factors accounted for variation observed in examinee's performance in NECO BECE2017NVET.

Research Question 2: To what extent does Benue State and NECO BECE 2017 National Values Education Tests fulfill the assumption of local item independence?
To answer this research question, correlation item residual and frequency count were used. The items with correlation residual value ?0.2 were considered locally dependent and should be deleted (Demars, 2010).

answer this research question, linear factor analysis with NOHARM software was used.

Table 2a: Item Local Independence Assessment of State BECE 2017 National Values Education Test

item	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
V.1	1									
V.2	-0.02	1								
v.2	-0.02									
v.3	0.05	-0.02	1							
4	0.15	-0.08	0.09	1						
5	-0.05	-0.13	0.11	-0.00	1					
v.6	0.07	0.01	0.13	0.00	-0.10	1				
7	0.06	0.07	0.12	-0.24	0.05	0.16	1			
v.8	0.01	-0.01	0.12	0.03	0.14	0 05	0.09	1		
v.9	0.05	0.01	0.08	0.05	-0.02	0.09	0.12	-0.01	1	
v.10	0.16	-0.02	0.09	0.15	0.01	0.12	O. 14	-0.00	0.05	1
VII	0.08	0.06	0.16	0.05	0.08	0.04	0.10	0 16	0.06	O. 14
v.12	0.10	0.04	0.05	0.08	0.08	-0.00	0.09	0 07	0.03	0 08
V13	-0.01	-0.07	0.03	0.10	0.07	-0.03	0 06	0 02	-0.02	0 03
V14	0.06	0.02	0.00	0.07	0.06	0.02	0.16	O. 14	0.02	0.15
V15	0.03	-0.07	0.20	0.08	-0.01	0.08	0.00	0 04	0.04	0 09
V16	0.05	-0.12	-0.02	0.10	-0.00	0.08	0.00	0 10	0.05	0 07
V17	0.11	-0.00	-0.00	0.03	-0.02	-0.00	0 05	0	0.04	0 06
V18	0.06	-0.06	-0.03	0.03	-0.02	0.00	0.09	0.03	0.04	0.07
V19	-0.01	-0.07	-0.01	-0.02	-0.00	-0.06	-0.05	-0.02	0.01	0.03
V20	0.00	-0.04	-0.02	-0.03	0.08	-0.05	-0.07	0.11	0.02	0.02
V21	0.00	-0.00	0.02	0.03	0.00	0.08	0.09	0.03	0.02	0.03
V22	0.00	-0.02	-0.10	-0 02	-0.05	-0.05	-0.03	-0.09	-0.03	-0.01
V23	0.03	0 01	0	0.04	0.01	0.02	0 02	0.05	0.03	0.06
V24	0.07	-0.04	0.03	0.00	0.04	0.06	0.01	0 05	0	-0.01
V25	-0.01	-0.03	-0.02	0.03	-0.04	-0.05	-0.05	0.03	0.02	0.07
V26	0.04	-0.01	-0.01	003	-0.04	0.03	0.07	-0.03	003	-0.02
V27	0.02	0 01	0 05	0.03	0.03	-0.01	-0 03	-0.00	0.03	0.04
V28	-0.05	0.01	-0.07	0.02	0.01	-0.01	0.06	-0 01	-0.05	0.03
V29	-0.02	-0.01	-0.08	-0.10	-0.02	0.06	-0.03	-0.06	0.02	-0.06
V30	-0.02	0.00	-0.01	-0 04	-0.02	0.01	-0.05	0.02	-0.03	-0.05
V31	0.02	-0.05	0.10	-0.00	0.03	0.09	0 02	0.04	-0 01	0.08
V32	-0.02	-0.09	0.00	0.02	0.09	0.03	0.06	0 03	0.01	-0.04
V33	-0 04	-0.05	-0.01	-0 06	0 04	-0.01	-0 08	0.05	-0.02	-0 05

V34	0.03	-0.04	0.02	-0 04	0.05	0.07	-0.07	0.02	-0.05	-0.03
V35	0.01	-0.08	0.05	-0.04	0.01	0.04	-0 02	0.00	-0 02	-0.06
V36	-0.04	0.00	0.00	-0.08	0.02	-0.10	-0.10	0 01	-0.01	-0.08
V37	0.05	-0.01	0.02	0.05	-0.00	-0.03	-0.01	-0.04	-0.03	0.01
V38	0.07	-0.05	0.05	0 04	0.01	-0.06	-0.02	0.02	005	0.09
V39	0.00	0 04	-0 02	-0.05	-0.00	0.07	0 04	0.02	0.04	o. 10
V40	0.02	-0.09	0.07	0.07	-0.04	0.01	-0.01	0.09	-0.00	0.07
V41	0.01	0.01	-0.00	-0.03	-0.01	-0.04	-0.01	0.08	0.03	-0.01
V42	-0.04	-0.12	-0.01	-0.06	0.05	-0.06	-0.03	-0.03	-0.00	0.03
V43	-0.01	0 04	-0 01	-0.04	-0.03	-0.01	0.06	0.02	0.07	0.01
V44	0 05	-0.06	0.14		-0 01	-0.03	0.09	-0 01	0.05	0.08
V45	0.09	0.06	-0.03				-0.03	0.02	0.01	0.03

	V11	V12	V13	V14	V15	V16	V17	V18	V19	v20
VII	1									
V12	0 1	1								
V13	-	0)5								
V14	0.01	022								
	0 l0									
v15			1							
		0 l l	0 3	1						
	0 l l		0 l5	0.07	1					
V16	-0.02	0)4	0.08	0 l l	0 l2	1				
v17	0·05	0)5	0·07	0·07	0)7	-0.02	1			
V18	0)9	0.02	-0)l	-022	0 l8	-0·23	0)9	1		
V19	0)2	0 l6	-0)0	0 ll	0 l4	-0.03	0)9	0.06	1	
v20	0)5	0)9	0 ll	0)9	0 l3	0 l3	0 l2	0 ll	022	1
1	0 0	0.09	-0)l	0 l4	0.04	0.07	0 l3	0.08	0)6	0)3
v22	-0.02	0)4	-0)4	-0)0	0 l4	-0)l	0	0.05	0 l7	0 l5
			0.01							
			-0.06	-0.02	0.04					

v23	0.07	0)7	-0)5	0.04	0)0	0.09	0.02	0.03	0)7	0)8
v24	0.06	-0)2	0)7	0.01	0)9	0.04	0.02	0.04	0)8	0 7
v25	-0)1	0.01	0)3	0)4	0.04	0,09	0.01	0,07	0)3	0.07
v26	0)I	-0)3	0.01	0.03	0)4	0·04	0I0	0I0	0)3	0)4
v27	0·06	0)5	0·03	0·03	0)9	0·06	0·04	0·00	-0·03	0.13
v28	-0·02	0)2	0·03	0·04	0)2	0·05	0·02	0·09	0·04	0.02
v29	-0)3	-0.02	-0)5	-0)3	-0)2	0·03	0)4	-0)6	0·03	0.07
0	-0)2	-0,04	0.05	0)I	0)I	0.02	-0.03	0.03	-0)I	0.02
V31	0 1	0.05	0)9	0)5	0.14	0.09	-0.01	0.08	-0)5	0)4
v32	0.01	0·02	-0)1	0)5	0·02	0.00	0.04	0.07	-0)1	0)I
V33	-0.01	— 0)I	-0)6	0.07	0)2	0.06	-0,01	0.03	0)I	0 4
4	0)3	-0)4	0)I	0)4	0.09	0,07	0)0	0.08	-0)2	0.05
V35	0.02	-0)4	0.05	-0)6	0)9	0·05	-0.05	-0.01	-0)3	-.01
V36	-0.03	-0)3	-0.02	-0.05	-0)I	-0,2	-0.06	-0)6	0)3	0)4
V37	0·02	-0)I	0·01	0·02	-.01	0	0·03	0·01	0)2	-0 0
V38	0.04	0.09	0)5	0.08	0.05	0·03	0)4	0.01	-0·01	0)8
V39	0)2	0)I	-0.01	-0)I	-0)I	0.02	0)9	0.03	-0)4	0)I
v40	0)I	0)2	-0.03	0)5	0.1	0I6	-0.02	0.08	0)I	0 4
V41	-0 4	0.04	-0)7	0)2	0.06	-0,2	0I0	0,02	0)6	0)4
v42	-0)3	-0·03	0)I	-0)5	-0)3	0.01	-0.03	-0)1	0)1	0.05
v43	-0.01	-0)3	0)0	0.08	-0)I	0.03	0.04	0I2	0I2	0)3
v44	0.02	-0)2	0)2	0.02	0)6	0.02	-0,02	0I2	-0)2	0)3
v45	0.02	0.02	-0)2	0)6	-0)1	0	0.01	0 01	0)I	-0.01

	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30
V21										
V22	0.06	1								
V23	0.13	0.08	1							
V24	0.01	0.10	0							
V25	0.04	0.07	0.13	-0.01	1					
V26	0.06	0.02	0.04	0.08	-0.01	1				
V27	0.04	0.02	0.04	0.11	0.06	0.09	1			
V28	0.05	0.14	0.10	-0.01	0.02	0.19	0.08	1		
V29	0.08	0.04	0.02	-0.06	0.02	0.06	0.05	0.05	1	
V30	-0.05	-0.01	0.02	0.03	-0.04	-0.03	0.00	0.02	-0.03	1
V31	-0.00	-0.02	0.04	0.02	0.02	0.11	0.17	0.13	0.03	0.01
V32	0.05	0.04	0.09	0.00	0.05	0.17	0.08	0.06	0.05	0.02
V33	0.03	0.04	0.00	-0.03	0.05	0.05	0.01	0.07	0.03	0.04
V34	0.01	0.11	0.02	0.02	-0.00	0.06	0.07	0.11	0.01	0.02
V35	0.04	-0.03	0.03	0.02	0.01	0.07	0.03	0.05	0.03	0.02
V36	-0.04	-0.02	-0.03	0.05	-0.02	-0.02	0.01	-0.04	-0.01	0.04
V37	0.01	-0.00	0.00	-0.05	-0.02	-0.04	-0.05	-0.03	0.01	-0.00
V38	0.06	-0.01	0.05	0	0.06	-0.03	0.03	-0.08	-0.04	-0.00
V39	0.03	-0.01	0.02	-0.10	0.04	0.09	0.07	-0.01	0.00	0.02
V40	-0.00	-0.01	0.08	0.05	0.08	0.05	0.03	-0.00	0.01	0.05
V41	-0.00	0.00	0.09	-0.02	0.03	0.05	0.01	0.01	-0.01	0.01
V42	0.01	0.05	0.00	-0.04	0.02	-0.01	0.04	0.00	0.04	0.01
V43	-0.02	-0.05	-0.04	0.00	0.01	0.07	0.02	0.04	0.01	0.04
V44	-0.02	0.00	0.05	-0.04	0.02	0.02	-0.03	-0.02	-0.05	0.01
V45	-0.01	0.05	0.09		0.03	0.03	0 03	0.03	-0.11	0.03
V21	1									
V45	-0.01	0.05	0.09	0.00	0.03	0.03	0.03	0.03	-0.11	0.03

	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40
V.31 v.31	1									
v.32	0.12	1								
v.33	0.10	0.17	1							
v.34	0.09	0.17	-0.21	1						
v.35	0.15	O. 14	0.15	0.11	1					
				0.01						
				-0.06	-0.02	0.04				

v.36 0.02 -0.03 0.09 0.04 -0.05 1
v.37 -0.06 -0.06 -0.03 -0.07 0.02 -0.05 1
v.38 0.01 0.04 -0.04 0.00 -0.11 0.07 -0.02 1
v.39 0.12 0.10 0.13 0.12 0.08 -0.03 -0.06 0.07 1 v.40 0.05 0.05 0.08 0.06 0.12 0.05 0.03 0.09 0.05 1

v.41 0 0.10 0.06 -0.02 0.03 0.07 -0.05 0.08 O. 14 0.21
v.42 0.00 0.04 0.07 0.05 0.09 0.11 o. 01 -0.01 0.19 0.22
v.43 0.04 0.06 0.03 0.08 0.06 -0.01 -0.03 -0.01 0.22 0.05
v.44 0.04 0.03 0.06 0.05 0.06 0.04 0.07 0.09 o. 13 45 0.05 0.06
0.04 0.08 0.09 0.10 0.02

	V41	V42		V43	V44	V45
V41	1					
	0.03					
V42		1				
V43	o. 10	0.10		1		
V44	O. 14	0.10		0.28	1	
V45	0.04	0.05		O. 14	0.10	1

items based on item correlation residual matlix, the following 6 pairs of items violate local independence assumption: items 19 and 20, 39 and 43, 41, 40 42, 44, 4 3 and 44. This is because the correlation residual value of these items is ? 0.2. Therefore, 6 State BECE test items violate item local independence assumption while 39 items fulfilled the assumption in measuring JSS3 student's latent trait in National Values Education.

Table 2a shows the correlation residual item local independent of BSEB BECE 2017 National Values Education. The table pairs 45

Table 2.b: Item Local Independence Assessment of NECO BECE 2017 National Values Education

Item	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
V.1	1									
V.2	0.13	1								
v.3	0.10	0.03	1							
V.4	-0.30	0.04	0.16	1						
v.5	0.20	0 02	0.09	0.0						
v.6	O. 14	-0.02	0.03	0.19	0.16	1				
V.7	-0.06	-0.01	-0.03	-0.12	-0.06	-0.06	1			
v.8	0.07	0.10	0.05	0.20	0.19	0.13	-0.05	1		
v.9	0.12	0.07	-0.05	0.17	-0.01	0 09	-0.11	0.05	1	
v 10	0.10	-0.04	0.17	-0.20	0.08	0 13	-0.09	0.11	0.00	
v.ll	0.15	0.02	0.10	-0.25	0.19	0 06	-0.03	0.18	-0.02	0.18
v.12	-0.04	-0.07	0.04	0.15	0.07	0.02	-0.01	0.03	0.07	0.13
v.13	0.16	0.07	0.06	0.01	0.00	0.10	-0.05	0.15	0.13	0.15
V14	0.13	0.09	0.09	O. 14	0.15	0.14	-0.07	0.13	0.04	0.13
V15	0.06	-0.13	0.02	-0.07	-o. 12	0 01	0.02	-0.07	0.03	-0.05
V16	-0.04	0.00	-0.03	0.00	-0.03	0 06	0.05	-0.01	-0.01	0.02
V17	-0.02	0.00	-0.04	0.02	-0.09	-0.01	0.03	0.09	0.06	-0.01
V18	-0.04	0.01	0.10	-.14	-0.04	-0.01	0.06	-0.03	0.05	-0.06
V19	0.05	0.04	0.02	0.02	0.01	0.09	-0.01	0.02	0.02	0.07
v.20	0.13	0.01	0.03	-0.05	0.00	0.01	-0.06	-0.08	-0.03	0.07
v.21	0.01	-0.05	-0.05	0.17	-0.01	0.10	-0 04	0.05	0.15	O. 14
v.22	0.07	0.08	0.05	0.18	-0.02	0.13	001	0.05	0.13	0.13
v.23	0.07	0.07	0.06	0.05	0.06	0.01	-0.02	0.10	0.00	-0.02
v.24	-0.02	0.01	0.04	-0.04	-0.03	0.05	0.07	0.01	0.09	-0.02
v.25	0.15	0.05	0.11	-0.20	0.17	-0.05	-0.01	0.12	-0.05	0.05
v.26	0.07	-0.03	0.03	0.12	0.04	0.05	-0.03	0.07	0.09	0.02

0.01

-0.06 -0.02 0.04

v.27	0.01	-0.09	0.02	0.17	0.08	0.09	-0 09	0.07	0.12	0.01
v.28	0.10	-0 02	-0.05	0.11	0.05	0.11	0.00	-0 06	0.08	0.08
v.29	0.09	-0.01	0.04	0.08	0.05	0.10	0.06	-0.03	0.03	0.03
v.30	0.07	0.03	-0.01	-0.06	-0.01	-0.01	0.04	0.01	-0.01	-0.01
v.31	0.01	0.01	0.01	-0.08	-0.07	-0.06	-0.01	-0.10	0.02	-0.03
v.32	0.02	-0.06	-0.01	0.05	0.09	-0.06	0.10	-0.02	-0.10	-0.03
v.33	-0.05	0 04	0.02	-0.18	-0.12	-0.04	0.13	-0.08	-0.02	-0.09
v.34	0.04	0.03	0.05	0.19	O. 14	0.02	-0.09	0.07	0.07	0.02

v.35 -0.09 -0.02 0.00 -0.02 0.02 -0.06 0.05 -0.04 0.00 0.08 v.36 0.06 -0.09 -0.03 0 05 -0.01 0.04 0.09 -0.03 0 08 -0.06 v 37 0.09 0.06 0.01 0.27 O. 14 0.07 -0.07 0.18 0.02 0.11

v.38	-0.06	0.04	-0.08	-0.02	0.05	0.01	0.07	0.04	0.07	-0.02

v.39 0.12 0.07 -0.01 0.10 0.11 0.13 -0.12 0.13 0.11 14 V.40 -0.03 0.06 0.01 -0.12 0.01 -0.04 0.06 0.03 -0.01 -0.05 V.41 0.04 0.01 -0.04 -0 04 -0.08 0.05 0.06 0.01 -0 07 -0.05

V. 42	0.00	0.08	0.03	0.00	0.09	0.12	-0.09	0.02	-0.02	-0.02
V. 43	0.03	0.08	0.10	0.00	0.13	0.07	-0.05	0.14		-0.030.19
V44	0.05	-0.02	0.05	0.01	0.18	0.04	-0.13	0.03	0.05	-0.02
V45	0.05	-0.09	-0.05	0.12	-0.03	0.00	0.05	0.08	-0.02	0.07

	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30
V21	1									
V22	0.15	1								
V23	-0.02	0.00	1							
V24	0.10	0.12	0.04	1						
V25	0.13	0.04	o. 10	-0.05	1					
V26	-0 03	0.01	0 03	-0.01	0.06	1				
V27	0.11	0.09	0 06	0.09	0.16	0.18	1			
V28	0.09	0.07	0 05	0.09	0.03	0 11	-0.03	1		
V29	-0.01	0.15	-0.07	0.05	0.06	0 06	0.13	0.07	1	
V30	0.03	0.02	0.01	0.11	-0.02	0.13	0.12	0.17	0.15	1

V31	-0.09	-0 04	0.05	-0.01	0.02	0.06	-0.02	0.04	0.08	0.02
V32	0.00	-0.06	0.02	-0.02	0.13	0.00	-0.05	0.04	0.04	0 05
V33	-0 04	-0.01	0.05	0.08	-0.05	-0 01	0.03	0.04	0.00	0 17
V34	0.10	0.00	0.01	0.02	0.16	0.09	0.13	0.07	0.08	0.04
V35	0.12	008	-0.06	0.04	0.02	0.04	0.07	0.00	0.03	0.01
V36	0.02	0.11	0.02	-0.01	0.08	0.08	0.06	0 04	-0.23	0 08
V37	0.11	0.11	0.09	-0.04	0.21	0 01	O. 14	0 05	0.12	-0 03
V38	0.04	⁻ O. 04	-0.03	-0.02	-0.04	-0.01	-0.03	0.05	0.10	0.04
V39	0.13	0.12	0.05	-0.05	0.15	0 07	0.15	0.11	0.10	0.08
V40	-0 04	0 08	0.04	0.01	-0.01	-0 03	-0.05	0.01	0 08	0 05
41	-0.02	-0.02	0.01	-0.02	0.05	-0.01	-0.02	0 15	0.02	0.08
V42	0.00	0.09	0.04	-0.03	0.17	-0.03	0.11	0.02	0.08	0.01
V43	0.01	0.07	-0.02	-0.10	0.07	0.06	0.05	0.01	0.09	-0 01
V44	0.05	0.17	0.01		0.11	0.05	0.13	0.04	0.11	0.03
V45	-0.03	-0.08	0.00				-0.13	0 04	-0.11	-0.04

	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40
V31										
V32	0.08									
V33	0.09	-0.01								
V34	-0.01	0.06	0.00							
V35	0.06	-0.01	0.06	0.15						
V36	0.00	0.09	0.09	0.10	0.11					
V37	0.03	O. 14	-0.07	0.03	0.02	0.11				
V38	-0.03	0.05	-0.05	0.08	0.12	0.10	0.13			
V39	-0.04	0.13	-0.03	0.02	0.00	0.07	0.02			
V40	0.02	-0.02	0.01	0.00	0.07	0.05	0.04	0.00	0.02	
V41	0.03	-0.02	-0.01	-0.05	-0.05	-0.01	-0 03	0.02	0.06	0.08
V42	0.00	0.07	-0.13	0.22	-0.01	14	0.28	0.08	0.28	-0.02
V43	0.01	0.00	-0.15	0.25	0.11	0.03	0.30	0.00	0.24	0.05
V44	-0.10	0.12	-0.10	0.18	-0.06	0.11	0.28	0.07	0.28	0.09
V45	0.05	0.01	0.11	0.02	-0.01	0.04	-0.03	0.01	-0.07	-0.01

0.01

-0.06   -0.02   0.04

	V41	V42	V43	V44	V45
V42	0.02				
V43	0.07	0.33			
V44	-0.04	0.40	0.23		
V45	0.04	0.04	0.01	-0.02	

Table 2b shows the con-elation residual matrix of item local independent assumption for NECO BECE 2017 National Values Education test. The table pairs 45 item based on item correlation residual matrix, the following 12 pairs of items violate local independence assumption: items 15 and 43, 34 and 42, 34 and 43, 37 and 42, 37 and 43, 37 and 44, 39 and 42, 39 and 43; 39 and 44, 42 43, 42 44, 43 44. This means the paired items depend on one another because their correlation residual value is > 0.2. Therefore, 12 NECO BECE items violate the assumption of local independence and 33 items fulfill local independence assumption in measuring JSS3 students' latent trait.

Discussion

The study findings revealed that State (BSEB) BECE 2017 test fulfilled the assumption of Unidimensionality, while National (NECO) BECE 2017 National Values Education test is multidimensional (violated the assumption of Unidimensionality). As presented in table l, a single factor accounted for observed variation in examinees' performance in State BECE 2017 National Values Education, while two-factors (Fl and F2) underlie NECO BECE 2017 test which accounted for observed variation in examinees' performance in National Values Education. This variance in test dimensionality could be that the two BECE tests were validated using Classical Test Theory. The findings on State BECE 2017 WET is in conformity with Awopetu and Afolabi (2016) who discovered (NECO) SSCE 2011 mathematics test to be unidimensional. Also, the present findings on NECO BECE 2017 test dimensionality corroborated Oguoma, Metibemu and Okoye (2016) who assessed dimensionality of WASSCE 2014 mathematics multiple choice items in Imo State and found the test to be multidimensional. The study also confirmed that of Okwilagwe and Ogunrinde (2017) who investigated the dimensionality of WAEC and (NECO) SSCE 2013 Geography test, using DIMTEST. It was discovered that the two tests violated Unidimensionality assumption epitomized in IRT.

IRT 3PL model was discovered to fit the data set most and was chosen for estimation of examinees' ability and item parameter Also, the result from the study findings revealed that 6 out of 45 items of State BECE test violated item local independence assumption, while 12 out of 45 items of NECO BECE test also violated item local independent assumption. This finding negates Olabode (2014) who discovered that 2014 WAEC Mathematics multiple choice test items fulfilled the assumption of local item independence. However, the present study findings corroborate with Okwilagwe and Ogunrinde (2017) who discovered that 10 items of WAEC and 15 items of NECO 2013 Geography Achievement Test violated the assumption of item local independence. The detection of Locally dependent BECE items is also in line with Olabode (2014) who detected violation of local item independence assumption for reading passage in PISA and mathematics, based on global context local dependence (combination dependency) and specific pairwise local dependence that occurs when the required information for answering two or more items were linked in the stimulus (item stem).

Conclusion

Based on study findings, it is concluded that Benue State BECE 2017 National Values Education test conformed to the assumption of Unidimensionality while National (NECO) BECE 2017 violated the assumption of Unidimensionality implicit in IRT. Also, National BECE test has more items that violated the assumption of local independence than State BECE test. Therefore, State BECE test is better than that of National BECE and examinees can perform better in state than National BECE national Values Education Test.

Recommendations

The study made the following recommendations based on its findings:

■   Public examining bodies should employ Item Response Theory to validate and enhance the quality of the measurement instruments for assessing student ability in every subject discipline.

■   National Examinations Council (NECO) should train and retrain test developers to ensure that BECE test conforms to the assumptions of Unidimensionality and local item independence. This will enhance the validity their NECO test for effective decision making

■   Federal Republic of Nigeria Ministry of Education should set up a committee of psychometricians to monitor test development process to achieve good quality of test items for public examinations in Nigeria.

References

Adamoah, Y K., & Acquah, J. (2016). Determinants of Students' Performance in Basic Education Certificate Examination (BECE) in The Upper East Region of Ghana: A Case Study of Kassena-Nankana West District (Knwd). American Journal of Research and Communication, 4(10) 91-107.

Ajeigbe, T.O.& Afolabi, E.R. 1. (2014). Assessing Unidimensionality and Differential Item Functioning in Qualifying Examination for Senior Seconda1Y School Students, Osun State, Nigeria. www.sciedu.ca/wje. World Journal of Education tion. 4(4):30 − 37

Aroge, S.T. (2012). Civic Education a Panacea to Electoral Malpractices in Nigeria. Business and Management Research 1(1), 141-146

Awopetu, O. A. and Afolabi, E. R. I. (2016). Comparative Analysis of CTT and IRT Based test Parameter Estimate of SSCE Mathematics.

Coe, R. 2008. Comparability of GCSE Examinations in Different Subjects: An Application of the Rasch Model. Oxford Review ofEducation 34, 1-28

Demars, C. (2010). Item Response Theory.

Understanding Statistics and Measurement. Oxford University Press.

Hambleton, R. K. & Jones, R. V. (1993). Comparison of Classical Test Theory and Item Response Theory and their Application to Test Development. Educational Measurement: Issues and Practices, 12(3); 38-47

Nenty, H.J. (2015). Conjugal Relationship Between Research and Measurement. A Keynote Address Delivered at 2015 EARNiA Conference in Cameroon on 23 ld -27th November, 2015.

Oguoma, C.C., Metibemu, M.A., & Okoye, R. O. (2016). An Assessment of Dimensionality of 2014 WASSE mathematics Objective test scores in Imo state, Nigeria. African Journal of Theory and Practices of Educational Assessment, 4, 18 - 33

Okwilagwe, E.A. &Ogunrinde, M.A. (2017). Assessment of Unidimensionality and Local Independence of WAEC and NECO 2013 Geography Achievement Tests. African Journal of Theory and Practice of Educational Assessment (AJTPEA) vol 5, p 31 − 45

Olabode, J. (2014). Comparative Analysis of WAEC and NECO 2012 Mathematics Test Items. Unpublished M.Ed Project, Institute of Education, University of Ibadan.

Onuka, O.A., &Durowoju, O.E. (2011). Curtailing Examination Fraud for Improving Quality Assurance in the African Examination system. A Paper Presented at the Conference of the Association for Educational Assessment in Africa, Nairobi, Kenya I — 5 August, 2011

Onoha, J. C. and Okam, C. C. (2011). Repositioning Social Studies Education in Nigeria: Issues and Challenges. Nigerian Journal of Social

Studies and Civic Education (N J S S C E) 1 (1), 2 0   3 6 . www.soscean.org/index.php?option=c om accessed on 10 september, 2016

Sick, J. (2010). Assumptions and Requirements of Rasch Measurement. SHII<EN: JALT Testing & Evaluation SIGNeMBletter, 14(2), 23 − 29.

Xinming A. & Yung, Y F. (2014). Item Response Theory: What It is and How to Use IRT Procedure for its Application. SAS Institute Inc