DEVELOPMENT AND STANDARDIZATION OF AGRICULTURAL SCIENCE ACHIEVEMENT TEST FOR SENIOR SECONDARY SCHOOL STUDENTS IN TARABA STATE NIGERIA

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ABSTRACT

An Agricultural Science Standardized Achievement Test (ASSAT) was developed for Senior Secondary School class one (SS1) students in Taraba State, Nigeria. The test was developed to provide a valid and reliable instrument to be used for diagnosis, placement and guidance services in Taraba state senior secondary schools. A table of specification was drawn by the researchers based on the content of SS1 Agricultural Science Curriculum and used as a guide to generate 60 objective test items. The test items were face and content validated by experts and pilot tested on 48 students in two schools not included in the study. Split half reliability was determined using Spearman Brown Prophecy formula to determine the internal consistency of the test. The test had a reliability coefficient of 0.82. The researchers adopted an instrumentation research design. The final revision of the test items was made and a final copy containing 50 objective questions was administered to three hundred and eighty four students in sixteen schools, using disproportionate stratified random sampling technique. Four research questions were formulated and answered; one hypothesis was formulated and tested at 0.05 level of significance using the Z – test analysis. Data collected were analyzed using the Maximum Likelihood estimation technique of the BILOG MG Computer programme based on one parameter model of item response theory. Norms for the test was based on measures of central tendency and percentile ranks. The result revealed areas of instruction in Agricultural Science curriculum needing greater emphasis It was recommended that the Taraba state ministry of education should integrate the use of the Test in senior secondary schools for placement of students who will offer Agricultural science. Also Agricultural science teachers should incorporate strategies that will reflect critical thinking among agricultural science students during delivery of topics that demand calculations.

Keywords: Test, Development, Standardization

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Introduction

The recent Federal Government reform in education adopted the 9 – 3 – 4 system with emphasis on vocational education and the need to attain the Millennium Development Goals (MDGs), with the main aim of achieving the critical targets of the National Economic Empowerment and Development Strategies (NEEDS) which can be summarized as: value – orientation, poverty eradication, job creation, wealth generation using education to empower the people. This development led the Nigerian Educational Research and Development Council (NERDC) to review and realigned the curricula for senior secondary Schools to fit the reform program (NERDC, 2011). The new curriculum laid emphasis on Vocational Education with the aim of reducing the high rate of youth unemployment. Agricultural Science in the senior secondary schools is indeed an indispensable elective vocational subject which provides skills, knowledge and attitudes necessary for effective employment in agricultural occupations. National Examinations Council, (2014), stated the objectives of teaching Agricultural Science in Nigerian secondary schools which include; stimulation and sustenance of student's interest in Agriculture, Impart functional knowledge and practical skills in Agriculture to students, Prepare students for further studies and for occupation in Agriculture. Shimave, kesiki and Yani (2013) pointed out that, the introduction of agricultural science in the secondary school system is a strategy for increasing agricultural productivity on a long term basis. With these objectives in mind, the education industry is expected to provide effective and adequate training in Agricultural science to students in order to enable schools and colleges provide qualified and competent graduates that can ensure food sufficiency in the country.

The review of Agricultural Science curriculum has been a real educational innovation, which called for new teaching and evaluation techniques considering the fact that senior secondary education is indeed a *sine qua non* to attainment of the new education reform, for it serves as a link between basic education and tertiary education by absorbing the products of the former and supplying entrants into the latter. There are different tools of evaluation in education, but test seems to be the major instrument of evaluation used in schools. In order to find out whether senior secondary students in Taraba state possessed the desired ability as a result of learning the content of SS1 agricultural science curriculum, test are desired. Akpan (2002) conceptualized a test as questions which examinees are expected to respond to from where examiner could infer based on the outcome of the response that the examinees have the desired characteristics inherent in the test. No person can see physically, the amount of agricultural science ability possessed by a student. It could only be inferred through the use of agricultural science test. There are various forms of test depending on the demand, time and economy and may serve different interest. Denga (2003) pointed out that; achievement tests are designed to measure the effectiveness of an executed curriculum. It typically measures recent learning in

specific school subjects and measures present level of knowledge. Denga further draw a distinction between teacher - made achievement tests and standardized achievement tests thus teacher made achievement test specifies no uniform directions for administration and scoring procedures and the sampling of content is left to the class teacher without test blue prints and manuals. Standardization on the other hand stands for uniformity of procedure in administering and scoring the test. An achievement test is standardized in respect of content, administration, scoring and norms. It involves exact content materials, time limits, oral instructions, preliminary demonstrations, handling of examinees queries, and every other detail of the testing situation.

Sakiyo (2009) commented that, in teacher – made test, sometimes teachers are not sure of what they want, at other times they know what they want but fail to communicate that desire to the students and the possibility of the test items been too difficult or too easy as well as lack of validity and reliability cannot be ruled out. Despite these tests are still used as instruments of evaluation for placement, continuous assessment, prediction and educational guidance in Nigeria. Good tests do not just happen; they require extensive planning so that the goals of instruction, the teaching strategy to be employed, the textual materials and the evaluation procedure are related in some meaningful way. Sakiyo further recommended that standardized achievement test should be a valuable tool teachers should use to assess students' performance penultimate to their sitting for Senior School Certificate Examinations. Steps involved in standardization of test includes; designing, preparing preliminary and final format and administering the final format (Wolanskey, 1984). The use of standardized achievement test in place of the traditional test can bring about many positive changes in the entire domain of testing for it will make testing fruitful, enjoyable and satisfying. Thus, there is need for development of an Agricultural Science Standardized Achievement Test (ASSAT) for SS1 students in Taraba state so that teachers can use to asses students for selection and placement of SS1 students that will offer Agricultural Science in Taraba State.

The researchers observed that in Taraba state, the choice of agricultural science as a subject to offer and register in senior school certificate examinations is done by students without a guide for no standardized tests have been provided by the Taraba state Ministry of Education for effective monitoring of students' progress in any of the school subjects. moreover, students' performance in external examinations are low compared to their performance in internal examinations conducted using teacher made tests given to students in preparation for external examinations. The missing link between the students assessment of the new agricultural science curriculum content is of great concern for this study. This calls for a tool by which the standard of a heterogeneous group of students of the same class such as SSI students from various schools in Taraba State could be compared on the basis of a

common test representing the expected standard of the group. A test standardized for the State such as Agricultural Science Standardized Achievement Test (ASSAT) and used in the last term of the first year, can have a triple advantage of being diagnostic; can be used for placement and guidance services in senior secondary schools in Taraba state, Nigeria

The main purpose of this study is to develop and standardize an agricultural science achievement test for SSI students to be used for diagnosis, placement and guidance services in Taraba state senior secondary schools. The study specifically;

a. Provided a test that can be a valid tool to measure students' achievement in SSI Agricultural Science in Taraba State.
b. Provided a test that can be a reliable instrument to measure students' achievement in SSI Agricultural Science in Taraba State.
c. Identified areas of instruction in SS1 Agricultural Science needing greater emphasis in Taraba State.
d. Determined norms for comparing the performance of the students in SS1 Agricultural Science in Taraba State.

Research Questions

The following research questions were answered in the Study.

1. How valid is ASSAT as a tool to measure student's achievement in SS1 Agricultural Science in Taraba state?
2. How reliable is ASSAT as an instrument to measure student's achievement in SS1 Agricultural Science in Taraba state?
3. What are the areas of instruction in SS1 Agricultural Science curriculum needing greater emphasis in Taraba State?
4. What are the norms for comparing the performance of the students in SS1 Agricultural Science in Taraba State?

Method and Procedure

The study adopted instrumentation research design. Ali (1996) stated that any study that is geared towards the development of an instrument in education is an instrumentation research since its target is to develop a new instrument. The target population for this study comprised of all the 15,112 SS1 students in the 160 Taraba state government owned senior secondary schools distributed in 8 education zones of Taraba State. A sample size of 384 students was statistically obtained using Taro Yamane formula for finite population. 16 schools, 2 from each zone were selected for the study using disproportionate stratified random sampling technique. The 8 education zones constitute the strata and in each zone the schools were grouped in

to rural and urban schools. In each zone a rural school and an urban school were randomly selected using ballots. Twenty four SS1 students were randomly selected from each of the sixteen schools for the test. The researchers adopted this sampling technique because it demands less time and rigor and it allows equal chances of participation by the different groups which make up the population to be represented in the sample.

The steps followed in the development of ASSAT were a comprehensive study of the SS1 Agricultural Science Curriculum which the contents to be covered with various students' activities and evaluation guide were identified from the curriculum A table of specification was drawn by the researchers based on the content of Agricultural Science Curriculum for senior secondary school class one (SS1) which includes; Basic Concepts, Agricultural Ecology and systems, Agricultural Engineering, crop production, Animal Science, Agricultural Economics and Extension in line with cognitive domains (See Table 1). After preparing the table of specification, the researchers developed test items in line with the table of specification. Each question had four multiple choice options namely: A, B, C, and D, the items were reviewed to eliminate the ambiguous ones and for correction of errors. This was followed by arrangement and compilation of the test items based on the table of specification. The test items were content and face validated and final selection of the test items to be included in the final copy of the test, rating of reliability and finally tryout of the test

Split half reliability was used to determine the internal consistency of the test, the split half reliability was determined by correlating the odd and even numbered items of 48 randomly selected students using Pearson Product Moment Correlation Coefficient formula. To get the consistency of the total test, the Split half test correlation was corrected to the expected full length value of the test using Spearman Brown Prophecy formula. The test had a reliability coefficient of 0.82. This means that the test was internally stable The final revision of the test items was made and verified by the researchers and a final copy was produced containing 50 objective questions which were tried out in the various senior secondary schools within the study area to further establish the reliability of the test.

Table 1: Table of Specification of Agricultural Science Standardized Achievement Test (ASSAT) Items according To the Bloom Taxonomic Levels of cognitive Behaviour.

CONTENT	PERIOD %	Knowledge 30%	Comprehension 30%	Application 20%	Analysis 10%	Synthesis 10%	TOTAL 100%
Basic Concept	10%	1	1	1	1	-	4
Agricultural Ecology and systems	20%	3	3	2	1	1	10
Agricultural Engineering	15%	2	2	2	1	1	8
Crop production	20%	3	3	2	1	1	10
Animal Science	20%	3	3	2	1	1	10
Agricultural Economics and Extension	15%	2	2	2	1	1	8
TOTAL	**100%**	**14**	**14**	**11**	**6**	**5**	**50**

Results

Research Question 1

How valid is ASSAT as a tool to measure student's achievement in SS1 Agricultural Science?

The rater Validity index of ASSAT was determined by the assessment of the test by three experts who validated the instrument. From the analysis of the data scored by three assessors, the test was found to have a rater validity index of 0.75, to further determine the validity of each of the test items of ASSAT; the scores were subjected to chi square analysis using the Maximum Likelihood estimation technique of the BILOG MG Computer programme, based on one parameter model of item response theory as presented in Table 2, which revealed that the Chi Square values ranged from 0.00 to 0.94. This means that the test items of ASSAT had high validity based on one – parameter model of item response theory. Normally, an item is considered valid in one parameter model of IRT if it has a chi-square of less than or equal to 1.50 as stated by Bryce (1981).

Table 2: Validity of Test Items Developed for Measuring Student's Achievement in SS1 Agricultural Science in Taraba State Based on One Parameter Model of Item response Theory.

Item	Chi. Sq.	Item	Chi. Sq.	Item	Chi. Sq.	tem	Chi. Sq.	Item	Chi. Sq.
1	0.00	11	0.00	21	0.02	31	0.95	41	0.27
2	0.20	12	0.33	22	0.16	32	0.17	42	0.37
3	0.81	13	0.24	23	0.61	33	0.89	43	0.62
4	0.14	14	0.14	24	0.24	34	0.07	44	0.54
5	0.79	15	0.92	25	0.12	35	0.09	45	0.00
6	0.51	16	0.27	26	0.94	36	0.56	46	0.83
7	0.35	17	0.07	27	0.73	37	0.49	47	0.54
8	0.91	18	0.88	28	0.89	38	0.57	48	0.45
9	0.65	19	0.21	29	0.08	39	0.38	49	0.29
10	0.54	20	0.31	30	0.03	40	0.00	50	0.16

Research Question 2

How reliable is ASSAT as an instrument to measure student's achievement in SS1 Agricultural Science in Taraba State?

The Split half reliability coefficient of ASSAT was found to be 0.82. The developed test was administered to the sixteen senior schools in the study area to further confirm the reliability. Standard errors of measurements (SEM) of mean scores of the test items were analyzed by the researchers based on one parameter Model of item response theory to ascertain the reliability of each item in the test. The standard errors of measurement (S.E.M) of Agricultural Science standardized achievement test (ASSAT) based on one parameter model of item response theory (IRT) as presented in table 3, ranged from 0.01 to 0.37.The standard errors were generally low with all the items (100%) having a standard error below 0.50 indicating high reliability.

Table 3: Standard Error of Measurement of the Test Items Developed for Measuring Student's Achievement in SS1 Agricultural Science in Taraba State Based on One Parameter Model of Item response Theory

Item	S.E.	Item	S.E	Item	S.E	Item	S.E.	Item	S.E
1	0.23	11	0.35	21	0.24	31	0.26	41	0.26
2	0.31	12	0.30	22	0.30	32	0.29	42	0.37
3	0.22	13	0.25	23	0.33	33	0.37	43	0.28
4	0.01	14	0.33	24	0.26	34	0.23	44	0.30
5	0.25	15	0.26	25	0.29	35	0.31	45	0.23
6	0.24	16	0.25	26	0.32	36	0.31	46	0.26
7	0.22	17	0.24	27	0.28	37	0.32	47	0.33
8	0.22	18	0.26	28	0.35	38	0.26	48	0.32
9	0.26	19	0.30	29	0.23	39	0.27	49	0.33
10	0.27	20	0.27	30	0.35	40	0.31	50	0.36

Research Question 3

What are the areas of instruction in SS1 Agricultural Science curriculum needing greater emphasis in Taraba State?

The item difficulty estimates (threshold) of the test items of ASSAT as shown in Table 4 were used by the researchers to determine areas of instruction in SS1 Agricultural Science curriculum that need greater emphasis in terms of teaching and learning. Negative difficulty estimates indicate that the items have high difficulty indices (easy items) while positive difficulty estimates indicate that the items have low difficulty indices (hard items). The results showed that items ranged in difficulty from - 4.16 of item 42 to an index of 4.40 of item 33. Thirty one (54%) of the items had negative difficulty estimates indicating high difficulty indices, meaning that the items were easy. 46% of the items were relatively difficult with positive difficulty indices indicating that, the items were hard.

Table 4: Item difficulty Estimates of Test Items Developed for Measuring Student's Achievement in SS1 Agricultural Science in Taraba State Based on One Parameter Model of Item response Theory

Item	Threshold	Item	Threshold	Item	Threshold	Item	Threshold	Item	Threshold
1	-0.90	11	3.91	21	1.51	31	2.30	41	-2.27
2	3.61	12	-3.06	22	2.96	32	-2.68	42	-4.16
3	-0.11	13	-1.80	23	-3.48	33	4.40	43	3.49
4	-3.15	14	-3.64	24	-1.61	34	-0.49	44	2.93
5	2.30	15	2.37	25	-2.80	35	-3.32	45	1.34
6	-0.96	16	-1.40	26	-3.53	36	3.01	46	2.26
7	0.64	17	1.42	27	-2.31	37	-3.48	47	3.48
8	-0.41	18	1.73	28	3.91	38	2.44	48	3.83
9	-1.40	19	3.41	29	-1.22	39	0.30	49	3.48
10	-2.49	20	2.67	30	3.86	40	4.16	50	-0.30

Research question 4

What are the norms for comparing the performance of the students in SS1 Agricultural Science in Taraba State?

Table 5: Table of Norms for the sampled students

Measure	Total students	Urban students	Rural students
Mean	20.19	21.27	19.11
Median	19.00	21.00	17.00
Mode	25.00	25.00	20.00
S.D	9.51	10.05	8.96
Range	41.00	40.00	36.00
P10	9.00	9.00	9.00
P20	11.00	11.00	11.00
P30	13.00	14.00	13.00
P40	16.00	18.00	15.00
P50	19.00	21.00	27.00
P60	22.00	25.00	20.00
P70	25.00	26.00	23.00
P80	28.00	29.00	27.00
P90	35.00	37.00	32.90

Norms for ASSAT were determined based on measures of central tendency and percentile ranks as presented in Table 5, which revealed that the test had a mean of 20.19 with the urban respondents having a mean of 21.27 while the rural respondents had a mean of 19.11. The total median score was 19.00 while the urban respondents had a median score of 21.00 and the urban respondents having the

lowest median value of 17.00. The Table of norms also revealed that, the urban and total sampled students had an equal modal score of 25.00 while the rural students had a modal value of 20.00. The urban respondents had a Standard Deviation of 10.5 while the rural respondents had 8.96 and total sample had a Standard deviation of 9.58. The range of the distribution showed that the total sample had a range value of 41.00, urban respondents 40.00 and rural respondents 36.00. At 10^{th} and 20^{th} percentile all the respondents had values of 9.00 and 11.00 respectively, while there were variations among the respondents at percentile ranks of 30 to 90.

Hypothesis

There is no significant difference between the mean scores of the test items of ASSAT due to the location of the school.

To test this hypothesis the scores of ASSAT among Urban and Rural respondents were subjected to analysis by Z –test, the summary of the analysis is presented in Table 6.

Table 6: Z – Test of difference between the mean Scores of ASSAT due to location of the school.

	Urban	Rural
Mean	21.27	19.11
Standard Deviation	10.07	8.99
n	192	192
Standard Error	0.097	
Z - calculated	2.22	
Z - Critical	1.96	

The Z – test results on the test of difference between the mean Scores of ASSAT due to school location revealed that the Z– calculated (2.22) was higher than the Z – critical (1.96). The null hypothesis of no significant difference was rejected. Therefore, with respect to location there is a significant difference in the mean scores of the test items of ASSAT due to school location.

Discussion

The findings of the study were arranged and discussed in the same order with which the research questions that guided the study are arranged. The order of discussion therefore includes validity and reliability of ASSAT as a tool to measure students' achievement, areas of instruction in Agricultural Science curriculum that need more emphasis as well as test norms. Based on the findings from research question one, the rater validity index of ASSAT was found to be 0.75 while the result of the validation of the draft copy indicated that the instrument possesses high face validity when compared with the findings of Farauta, Kesiki and Amuche (2014) whose

instrument for assessing practical's among students in colleges of agriculture in Nigeria also had a rater validity index of 0.75. The results of the validity of ASSAT items based on one - parameter model of item response theory also revealed that the Chi Square values ranged from 0.00 to 0.94. This means that the test items of ASSAT had high validity. Normally, an item is considered valid in one parameter model of IRT if it has a chi-square of less than or equal to 1.50 as stated by Bryce (1981). The test items of ASSAT had a reliability index of 0.82. This reliability is in agreement with the recommendations of Wolansky (1984) that the acceptable reliability index of an instrument is generally in the range of 0.80 and 0.95. Sakiyo (2009) developed a Biology achievement test with a reliability of 0.84 and Farauta, Kesiki and Amuche (2014) also determined a reliability of 0.78 for an instrument for assessing practical's among students in colleges of agriculture in Nigeria. The standard errors of measurement (S.E.M) of Agricultural Science standardized achievement test (ASSAT) items based on one parameter model of item response theory (IRT) ranged from 0.01 to 0.37, indicating high reliability. These results are supported by the finding of Li, and Lissitz (2004) that, the difficulty index of every item in a test is accompanied by its standard error, and the smaller the standard error the better the item. A standard error below 0.50 is an indication of high reliability. This means that ASSAT is useful for students with ability and interest in agricultural science. It therefore implies that the test is a valuable tool for diagnosis and placement of students who will offer agricultural science in senior secondary schools.

The test items of ASSAT showed positive difficulty estimates in all the questions that needed calculations and 87.5% of the questions from Agricultural Economics and Extension section meaning that the items were hard. For effective teaching and learning, these aspects of agricultural science require critical thinking and the use of models, charts and excursions. In a situation where education is underfunded and teachers are not motivated to improvise instructional facilities, this discovery is not a surprise. The researchers discovered that the student's achievement scores in ASSAT were higher on lower cognitive levels, this shows that the students are at the lower level of cognition. Students could recall facts but could not apply their knowledge to new situations. This development may be due to inadequate practical lessons and in-depth teaching that could promote the application of knowledge by students.

Result of the analysis also revealed that, performance of the urban students in ASSAT was better than their rural counterparts. Therefore, with respect to location there is a significant difference in the mean scores of the test items of ASSAT due to school location. Oruonye (2014) agreed with this finding and maintained that a better performance by urban students is due to higher concentration of qualified teachers in the cities and urban schools are better equipped. With a mean achievement score of 20.19 the students' performance was not promising. This could mean that, the use of local agricultural resources available within the students study environment were

not been utilized as instructional materials in the teaching of practical agriculture which could sustain students interest and ability for good results in examinations.

Conclusion and Recommendations

Based on the findings of this study, it can be concluded that the test items of agricultural science standardized achievement test have been found to be valid and reliable as a tool to measure student's achievement in SS1 Agricultural Science. It has also satisfied other psychometric properties of test based on item response theory and could be used for diagnosis, placement and guidance services in senior secondary schools.

Based on the findings, conclusion and implications of this study, the following recommendations are made by the researchers.

- Taraba state ministry of education should integrate the use of the Test in senior secondary schools for placement of students who will offer Agricultural science in senior secondary schools.
- Agricultural science teachers should incorporate strategies that will reflect critical thinking among agricultural science students during delivery of topics that demand calculations.
- An articulated policy that will improve the teaching and learning of agricultural science in rural senior secondary schools should be developed and implemented by the Taraba State ministry of education to enable the rural schools compete favorably with their urban counterpart.

References

Akpan, S.M. (2002). *Tests and Measurement Concepts and Practices (Revised Edition*), Lagos: Executive Publishers. P 3 – 4.

Ali, A. (1996). Fundamentals of Research in Education. Awka: Meks Publishers.

Bryce, T.G.K. (1981): Rash Fitting. *British Educational Research Journal*. 7 (2):137 – 153. Retrieved from http://www.ingentaconnect.com/content/routledg/cbe

Denga, D.I. (2003). *Educational Measurement, Continuous Assessment and Psychological Testing*. Calabar: Glad Tidings Press Ltd. P 176

Farauta, K. G., Kesiki, W.B. and Amuche, C. I., (2014). Development and Standardization of an Instrument for Assessing Practicals among Students in Colleges of Agriculture in Nigeria. *International Journal of Education and Research. 2(6): 399 – 414 Retrieved* from http://*www.ijern.com*

Li, Y. H. & Lissitz, R. W. (2004). Application of the Analytically Derived Asymptotic Standard Errors of Item Response Theory Item Parameter Estimates. *Journal of*

Educational Measurement, 10 (2): 85-117. Retrieved from http://www.onlinelibrary.wiley.com/journal/10.1111/(ISSN)1745-3984/issue

National Examinations Council. (2014). *Regulations and Syllabuses for Senior School Certificate Examination (Revised Edition)*. P 52 – 80 Enugu Otuson Nigeria Limited.

Nigerian Educational Research and Development Council.(2011). Senior Secondary Education Curriculum in Agricultural Science for SS 1 – 3 (Revised Edition). Lagos: NERDC press

Oruonye E. D. (2014). The Challenges of Quality Secondary Education in Taraba State. *Journal of Educational and Social Research,* 4(3): 499 – 505. doi:10.5901/jesr.2014.v4n3p499

Sakiyo, J. (2009). Development and Standardization of Biology Achievement Test for Senior Secondary School Students in Adamawa State .*Journal of Technology and Development. 11 (1):78-83*

Shimave, A.G., kesiki, W.B., and Yani, J.P. (2013). An Evaluation of the Performance of Secondary School Farms in Taraba State, Nigeria. *Journal of Agricultural Sciences and Policy Research*. 3(1):28 – 45. Retrieved from http://www.isdrejournals.com

Wolanskey, W. D. (1984). Evaluating Students' Performance in Vocational Education. Ames; Iowa University Press.

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