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ASSESSMENT OF SECONDARY SCHOOLS SCIENCE TEACHERS' EXPERIENCE, PROFESSION AND GENDER INFLUENCE ON KNOWLEDGE OF TESTS CONSTRUCTION PROCEDURES IN HONG LOCAL GOVERNMENT, ADAMAWA STATE

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ABSTRACT
The study assesses secondary schools science teachers' experience, profession and gender on knowledge of test construction procedures in Hong local government area, Adamawa State. The problem of the study was students' poor performance in both internal and external examinations such as end of term and Senior Schools Certificate Examinations. The main objective of the study was to investigate the knowledge of test construction procedures among science teachers' senior secondary schools in the study area. Three null hypotheses were formulated to guide the study, and the hypotheses were tested using T-test at 0.05 level of significance. The research adopted survey research design. 83 subjects consisted of 52 males and 31 females selected from 832 science teachers in senior secondary schools participated for data collection. A structured questionnaire which is a 4-points Likert type scale was used as research instrument for the study. A trial test was conducted in order to validate the instrument and to find the reliability index. A reliability index of 0.75 was obtained using Cronbach alpha through SPSS. The result revealed that trained science teachers display more knowledge of test construction procedures in senior secondary schools than untrained teachers in Hong local government area, Adamawa State. It was also discovered that the experience science teachers had a good knowledge of test construction processes in senior secondary schools unlike the inexperience ones in the study area. On the gender differences, this current study found out that the male and female science teachers' knowledge on test construction in senior secondary schools in Hong local government area were at the same level. Therefore, it is recommended that re-training, workshops, conferences and seminars should be organized for science teachers regularly that they will be aware of test construction procedures. This will expose the students on good test items which the students may encounter during their external examinations; which subsequently prepare them to further their education in higher institutions of learning.

KEYWORDS:
Assessment, science, teachers, trained, untrained, experienced, inexperienced and tests construction

INTRODUCTION

For the last ten years there was a mass employment of science teachers by Adamawa State government. The employees include trained science teachers (professional teachers holding a teaching qualification not less than NCE) with science subject as subject of specialization, Bachelor of Education (B.Ed.), Bachelor of Science Education (B.Sc. Ed), Postgraduate Diploma in Education (PGDE)) and untrained science teachers (non-professional teachers that are without teaching qualifications) into the teaching profession in Adamawa State secondary schools system. This led to influx of untrained and inexperience teachers (teachers in senior secondary schools who have taught for less than ten years) who may not know how to teach and construct good questions that can be used in testing learners.

Testing has always been an integral part of educational system since its inception and is always at the center of what occurs in teaching and learning within the classroom setting in Adamawa State and Nigeria at

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International Journal of Engineering Technology Research & Management

large. Testing is also the process through which conclusions are made about learners' learning process, skills, knowledge and achievement. [1] ascertained that quality testing provides information about the effectiveness of instruction as well as helping both learners and science teachers to make accurate determinations about what an individual learner has learned and what has not been learned. These cannot be possible without science teachers themselves being knowledgeable in the art of construction of an instrument used for the testing process. The instrument can be a test or examination questions [2].

Test is a task administered to students to know what they have learned or not learned. The tests are constructed through standardized agreed procedures. These tests construction procedures and skills are essential devices required by any science teacher if teaching and learning goals are to be met or attained. Test construction skills include drawing table of specification involving item writing, blue print, arrangement of the items according to weightage of the items, item review and editing, Tryout of the items, testing item difficulty levels and considering principles of test construction [3]. A good constructed test reveals the strength and weakness of students in the learning process. Therefore, the significance of tests in school system cannot be over-emphasized since it is the means by which any meaningful educational goals are achieved.

The emphasis being laid on assessment in Nigerian's educational system, especially continuous assessment since 1985 has given boost to the testing system in our educational institutions. Meaning science teachers should assess both (formative and summative) behavior of the students in the subject being taught; as these may reveal the progress made by the individual student during the course of study [4].

[5] opined that teachers have a need to be knowledgeable consumers of test information and constructors of good tests. According to [6] faulty test items affect students' comprehension, knowledge and ability to provide accurate answers to the items, the inference drawn about what students know and understand may be compromised. In addition [7] report that most test items used for continuous assessments and end of term examinations in the Nigerian secondary schools contain ambiguous and misleading items which may be the reason why some of the students fail their continuous assessment, end of term examinations and external examinations. Therefore, science teachers should be able to have knowledge on tests construction and utilize it in constructing even classroom test.

Therefore, [8] advised that test blue print is important to improve teachers' knowledge on tests construction for classroom use and item analysis is equally important in testing strength of tests. It is in this regard therefore, that construction of a valid test is relevant. Effective assessment involves the extent to which a teacher is able to use test construction skills to enhance learning by creating and maintaining a welcoming and conducive environment within which learners would be able to respond and be encouraged for further learning [9]. It has however been observed that in Nigeria poor quality of teachers recruited has led to lower performance of students in examinations [10]. [10]added that the low performance of students in examinations can be attributed to the use of unqualified teachers for instructional purpose who may not know anything with regards to appropriate test construction for assessment process.

[11] said that teachers need not to be experts in educational measurement and evaluation to construct valid and reliable tests, but should understand basics of test construction skills which every teacher ought to possess to construct quality tests once being an old hand. Lack of test construction skills by teachers might results in false testing of students' achievement. Esomonu cited in [12] see teachers' inability to construct good test as a major causes of examination malpractice in schools by both teachers and students in Nigerian secondary schools. In agreement, [13] noted that test construction skills are major sources of anxiety among less experience teachers even those that are trained. This is supported by [14] who added that, when assessment involves the use of test, teachers hardly emphasize the higher order of cognition such as analysis, synthesis and evaluation but concentrate mostly on lower levels of cognition such as knowledge, comprehension and at times application which might have been responsible for poor performance of students in internal and external examinations. The concentration of the test items on the lower part of the cognitive style domain only might be as a result of test construction knowledge.

[14] report and likes prompted [15] to conduct a study on factors influencing the validity and reliability of teacher made test in Kenya. The purpose of the study was to determine factors affecting teacher made test.

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International Journal of Engineering Technology Research & Management

His study revealed that most teachers' made tests in secondary schools lack validity and reliability. This is because qualification of teachers affects validity and reliability of teacher made test according to his study. [7] investigated the effect of test arrangement on performance in Mathematics among secondary school students in Rivers State. The researchers found that items arrangement based on ascending order of difficulty has positive effect on students' performance than items arrangement based on descending order of difficulty. [16] reported that experienced teachers were more test construction literate than the less experienced teachers. [17] noted that less experience teachers who want to be optimally effective ought to be learning about test construction skills for a long. [12] noted in their study that there is significant difference in test constructed by experience and less experience teachers in favor of the experienced teachers.

Gender parity has been another issue in Nigeria's educational system. This issue is inevitably present with regard to test construction as reported by some researchers. For instance, [18] reported in their study that, significant difference between male and female teachers' knowledge of test construction exist. The study revealed that female teachers had better knowledge of test construction than their male counterpart. [19] opined that male teachers presented higher knowledge of test construction than the female teachers. [12] confirm that the test construction skill inventory is stable across gender and could be appropriately used to assess the test construction skill of both male and female teachers. [10] evaluated knowledge of trained and untrained teachers in Nigerian secondary schools; he found out that trained teachers tend to construct various effective evaluative instruments more than the untrained teachers who may be experienced teachers. [20] argued that the more experienced a teacher (any teacher who has taught in senior secondary school for ten years and above) is, the more he begins to understand, to appreciate and uses some important test construction skills. It does not mean a teacher had to be trained teacher to do that. [11] made similar observation and conclude that years of experience may be a significant factor that affect test.

Over the years, there has been consistent complain by government, parents and authorities about poor performance of science students in both external examinations such as qualifying examinations and Senior Secondary Schools Certificate Examinations (SSCE). Consequently, students' continuous assessment, examination conducted by Ministry of Education has been on the decline. Many reasons have been contributed to the low performance of the science students in examinations. One of the reasons may be poor test construction knowledge of the science teachers in senior secondary schools.

A number of research works have been carried out on teachers' knowledge of test construction procedures in secondary schools. For instance, [7] writing on effect of item arrangement on performance in mathematics in secondary schools and [10] wrote on competencies of professional and non-professional teachers in Nigeria. There are few studies if any that have been carried out on secondary school science teachers experience status, training status and gender on knowledge of test construction procedures in Hong local government, Adamawa State. This study therefore, would assess senior secondary school science teachers' experience, profession and gender on knowledge of test construction procedures in Hong local government area Adamawa State.

OBJECTIVES

The objective of the study was to investigate the knowledge of test construction procedures among science teachers' in senior secondary schools in Hong local government area, Adamawa State. Specifically, the objectives of the study are to ascertain whether: the educational training acquired to be a professional science teacher in senior secondary school has any significant influence on science teachers' knowledge of test construction procedures, the experience of senior secondary school science teachers has any statistical significant effect on knowledge of test construction procedures and gender difference influences science teachers' knowledge of test construction procedures.

METHODOLOGY

The study used survey research involving ex post facto research design which enabled the researcher to collect information using structured questionnaire for the assessment of secondary school science teachers' experience, profession and gender on knowledge of test construction procedures in senior secondary schools in Hong local government area of Adamawa State. The population of the study is all the 832 science teachers in senior secondary schools in the study Area. The teachers' population include; 520 males and 312 females.

iJETRM
International Journal of Engineering Technology Research & Management

The sample for the study was 83 subjects which comprised of 52 male and 31 female science teachers irrespective of their area of specialization in the three pure science subjects (biology, chemistry and physics). The sampling techniques adopted for the study was stratified proportionate random sampling. This involves division of population into smaller groups then the researcher randomly selects the final subjects proportionally from the different strata to ensure that male and female science teachers of senior secondary schools in Hong Local Government were selected proportionally as they existed in the population. To do this, 10% of the science teachers in the senior secondary schools were sampled. Finally, 10% of each male and female science teachers were sampled randomly. For the study, science teachers with less than ten years teaching experience were taken as inexperienced while those that have been in the teaching profession from ten years and above were taken as experienced teachers. The trained teachers are those that hold National Certificate of Education, Post-graduate Diploma in Education or Bachelor of Education.

The instrument used to obtain data in this research work was structured questionnaire, titled "Test Construction Procedures Questionnaire" (TCPQ) consisting of two sections. Section A asked the respondents to supply some demographic data or information such as sex, highest educational qualification, teaching experience and training background in education. Section B itemized procedures used in constructing a valid test some of which were adapted from [12]. The TCPQ is a 4-points Likert type scale, which consists of 40 items before validation; but reduced to 32 items after validation. This instrument was validated using expert in the field of Tests and Measurement to determine the adequacy, comprehensiveness and suitability of the items. Based on the comments and observations of the experts, some questionnaire items were corrected, removed and maintained.

The instrument was trial tested using 20 senior secondary school science teachers. The result obtained was used in determining the reliability of the instrument using Cronbach's alpha from SPSS and it yielded a reliability coefficient value of 0.75. Since the reliability coefficient is higher enough, then the instrument was considered reliable for the study. The responses provided were scored as Strongly Agreed (SA) - 4, Agreed (A) - 3, Disagreed (D) -2 and Strongly Disagreed (SD). The scoring was reversed for negative statements. Data obtained from this study were analyzed using t-test at 0.05 level of significance to test the null hypotheses.

RESULTS AND DISCUSSION

After the data have been collected and analyzed using Statistical Package for Social Sciences (SPSS), the following results were obtained**:**

Hypothesis 1: There is no statistical significant difference between trained and untrained science teachers' knowledge of test construction procedures in senior secondary schools in Hong local government.

Table 1: Summary of t-Test analysis of response scores of professional trained and untrained science teachers' knowledge on test construction procedure

	n	Mean	SD	df	t	p-value
Trained	47	3.50	0.116	81	27.320	.000
Untrained	36	2.23	0.106			

Table 1 revealed that there is statistical significant difference in mean responses of trained and untrained science teachers' knowledge of test construction procedures in senior secondary schools in favor of trained teachers in Hong local government area, Adamawa State. P = 0.000 at df 81; P < 0.05 level of significance. The null hypothesis is then rejected.

Hypothesis 2: There is no statistical significant difference between experience and inexperience science teachers' knowledge of test construction procedures in the study area.

Table 2: Summary of t-Test analysis of response scores of experience and inexperience science teachers' knowledge on test construction procedure of achievement test in senior secondary school, Hong local government area, Adamawa State.

iJETRM
International Journal of Engineering Technology Research & Management

	n	Mean	SD	df	t	p-value
Experienced	44	3.38	0.213	81	8.321	.000
Inexperienced	39	2.36	0.340			

Result in table 2 showed that there is a statistical significant difference between experience and inexperience science teachers knowledge of test construction procedures in senior secondary schools in favor of experienced teachers in Hong local government area, Adamawa State. P = 0.000 at df 81; P < 0.05 level of significance. Hence, the null hypothesis is rejected.

Hypothesis 3: There is no statistical significant difference between male and female science teachers' knowledge of test construction procedures in senior secondary schools in Hong local government area.

Table 3: Summary of t-Test analysis of response scores of male and female science teachers' knowledge of test construction procedure

	N	Mean	SD	df	t	P-value
Male	51	2.36	0.085	81	-12.16	.052
Female	32	3.09	0.170			

Result in table 3 above revealed that there is no statistical gender difference in science teachers' knowledge on test construction procedure in senior secondary schools in Hong local government area. P = 0.052 at df 81; P > 0.05 level of significance This null hypothesis is therefore not rejected.

Outcomes of this study indicated that trained science teachers in Hong local government area, Adamawa State, displayed good knowledge of test construction which enable them to construct valid and reliable instruments more than untrained science teachers. This finding is in agreement with the study carried out by [10] on trained and untrained teachers, the researcher found out that trained teachers tend to construct valid and reliable instruments more than the untrained teachers. He reiterated that trained teachers use various testing techniques correctly, which is not so with the untrained teachers. The study is in disagreement with the study of [11], who observed that both trained and untrained teachers generally write good items once being an old hand in the educational system.

Again, the result of this research indicates that experienced science teachers in Hong local government area have knowledge of test construction more than the inexperienced science teachers. This study is in line with the study carried out by [11]. He observed that there was a significant difference in the mean ratings of experienced teachers than the inexperienced teachers in terms of test construction. This difference observed is an indication that test construction skills (TCS) is sensitive to years of experience. The study is again in disagreement with the study carried out by [12], they noted in their study that there is no significant difference in test constructed by experienced and inexperienced science teachers.

The finding also showed that there is no significant difference between science teachers' knowledge on test construction procedure in senior secondary schools in Hong local government area. This study agrees with the study conducted by [12], they reported in their study that there was no significant difference between male and female teachers' knowledge of test construction skills. The study is also in disagreement with the study carried out by [18], who reported that, significant difference between male and female teachers' knowledge of test construction exist, unlike [19] who opined that male teachers presented higher knowledge of test construction than the female teachers.

ACKNOWLEDGEMENT

The authors of this study would like to acknowledge Dr. S.T. Kojigili for his assistance and advise throughout. Those that responded to the questionnaire of this study are also whole heartedly appreciated for their cooperation which led to the successfulness of this research. The administrators of the schools who permitted

iJETRM
International Journal of Engineering Technology Research & Management

the researchers to use their staff as respondents are also not left out. Thank you all. The researchers are grateful to miss Humility J. Bika and mr Joses J. Bika for their contributions during the paper preparation to the completion. May God bless you all.

CONCLUSION

The study was on assessment of secondary school science teachers' experience, profession and gender on knowledge of test construction procedure in senior secondary schools in Hong local government area of Adamawa State, Nigeria. The study has discovered that trained science teachers and experienced science teachers have knowledge of test construction procedure than the untrained and inexperienced ones in senior secondary schools in the study area. The exposure of the inability of the untrained and inexperienced science teachers to construct reliable and valid test items in the study area can trigger search for its solution. This implies that the large number of untrained science teachers who are at their early resumption employed into teaching job needs to be trained. Gender on the other hand has no influence on knowledge of test construction procedures. Hence there is a need for training to be offered for the non-professional and the inexperienced teachers on test construction in order to improve students' performance.

REFERENCES

[1] Cruickshank, D. R. (2009). *The act of teaching,* 5th edition. McGraw-Hill Education.

[2] D'Agostino, J. V. (2007). *Quantitative Research Evaluation and Management Section.* Ohio State University 29 W. Woodruff Avenue, Columbus, OH 42310-1177 USA.

[3] Kojigili, S. T. (2018). *Test and testing.* In S. T. Kojigili: Approaches to Testing, Measurement and Evaluation in Education, (1st edition). Kaduna, Wazobia Printing and Publishing Company, Nigeria.

[4] Muhammad, B. A. (2007). *Effects of continuous assessment on academic achievement of NCE chemistry students,* Kaduna, Nigeria. An M.Ed degree thesis ABU Zaria, Faculty of Education.

[5] Rudner, L. M. & Schafer, W. D. (2002). *What teachers need to know about assessment.* Washington, D. C: National Education Association.

[6] Koksal, D. (2004). Assessing Teachers Testing Skills in EIt and enhancing their professional development through distance learning on the net. ISSN 1302-6488. Turkish onlines. *Journal of Distance Education.*5 (1), 1- 3.

[7] Opara, I. M. & Uwah, I. V. (2017). Effect of test item arrangement on performance in Mathematics among junior secondary school students. *Journal of Education,* 5(8), 1 - 9.

[8] Fives, H. & Didonato-Barnes, N. (2013). The power of a table of specification. *Practical Assessment. Research & Evaluation,* 18 (3), 18 - 22.

[9} Nenty, H. J. (2007). Assessment-related obstacle to Education for all (EFA) and the realization of the millennium development goals (MDG) in African countries. A paper presented 2nd to 5th July at 12 biennial Boleswana international symposium on education research.

[10] Ololube, N. P. (2008). Evaluation Competencies of Professional and Non-professional Teachers in Nigeria, *Studies in Educational Evaluation (SEE).* 34 (1), 44 - 51.

[11] Silker, R. T. (2003). *Teachers and test.* London: Basil Blackwell.

[12] Agu, N. N.; Onyekuba, C.; & Anyichie, A. C. (2013). Measuring teachers' competence in test construction classroom-based tests in Nigerian Secondary Schools: Need for test construction inventory. *Educational Research and Review,* 8 (8), 431 - 439.

[13] Ebinye, P. O. (2001). Problems of testing under the continuous assessment programme. *Journal of Quality Education.* 4(1), 12-19.

iJETRM
International Journal of Engineering Technology Research & Management

[14] Kolawole, E. B. (2010). *Principles of tests construction and administration,* Lagos: Bolalay Academic Publishing Consultant.

[15] Okunya, C. (2014). Validity and reliability of teacher-made tests: Case study of Year Two Physics in the Nyahururu District of Kenya. *African Educational Research Journal*, 2 (2), 61 - 71.

[16] Mertler, C. A. (2004). Secondary teachers assessment literacy: Does classroom experience make a difference? *American Secondary Education.* 33 (1), 49 - 64.

[17] Popham, W. (2009). Assessment literacy for teachers: Faddish or Fundamental. *Theory into Practice.* 48 (2), 4 - 11.

[18] Bandele, S. O. & Oluwatayo, J. A. (2013). Assessing teachers degree of emphasis on assessment in senior secondary school Chemistry. *International Journal of Research in Education, Ghana.* 1 (1), 102 - 109.

[19] Derri, V. (2012). What do Greek physical education teachers know about elementary student assessment? *Journal of Human Sport and Exercise.*7(3), 7-9. ISSN 1988-5202. Doi:10.4100/jhse.

[20] Dosuma, C.T. (2002). *Issues in teacher-made-tests*: Olatunji and son publishers Ibadan, Nigeria.