

**CONSTRUCTION AND VALIDATION OF A CHEMISTRY
ACHIEVEMENT TEST FOR SENIOR SECONDARY
SCHOOLS IN AKWA IBOM STATE OF NIGERIA**

BY

EME ETIM ANSA

JULY 1990

TABLE OF CONTENTS

				<u>Page</u>
TITLE PAGE	...	...	...	i
CERTIFICATION	...	...	...	ii
DEDICATION	...	...	...	iii
ACKNOWLEDGEMENT	...	...	...	IV
TABLE OF CONTENTS	...	...	...	v
LIST OF TABLES	...	...	...	viii
ABSTRACT	...	...	...	x
 <u>CHAPTER</u>				
I	-	INTRODUCTION	...	1
		Background of Study	...	1
		Statement of the Problem	...	6
		Purpose of the study	...	7
		Significance of the Study	...	7
		Research Hypotheses	...	9
		Major Assumptions of the Study	...	10
		Scope and Delimitation of the study.		10
		Limitations of the Study	...	11
		Operational Definitions	...	12
II	-	LITERATURE REVIEW	...	14
		Construction of Achievement Test	...	14
		- Planning the Test	...	14
		- Preparing the Test	...	19
		- Examples of Multiple choice Items At All Levels of the Cognitive Domain		23
		Test Validation	...	28
		Factors Affecting Achievement	...	33
		- Effect of Sex on Achievement	...	33
		- Effect of School Location on Achievement.		37
		- Effect of Teacher's Qualification on Students' Academic Achievement.		39
		Summary	...	45

CHAPTER

III	-	RESEARCH METHODOLOGY	...	46
		Design of the study	...	46
		Population and Sample	...	46
		Construction of Instruments	...	47
		Pilot Testing the Chemistry Achievement Test		48
		Validity and Reliability of Instruments		49
		Administration of Instruments	...	52
		Procedures for Data Analyses	...	52
		Summary	...	55
IV	-	PRESENTATION OF RESULTS		
		Pilot Test Result	...	56
		Results from the Main Study		
		- Hypothesis 1	...	57
		- Hypothesis 2	...	67
		- Hypothesis 3	...	70
		- Hypothesis 4	...	71
		Summary	...	71
V	-	DISCUSSION		
		Hypothesis 1	...	74
		Hypothesis 2	...	76
		Hypothesis 3	...	77
		Hypothesis 4	...	78
		Summary	...	80
VI	-	SUMMARY, CONCLUSIONS AND RECOMMENDATIONS		
		Summary	...	82
		Conclusions	...	83
		Recommendations	...	84
		Recommendations for further studies		85
		REFERENCES	...	86
		APPENDICES-		
		- Appendix 1: Objectives to be Assessed.		92
		" 2: A Table of Specification for the CAT.	...	94

Appendix 3: Chemistry Achievement Test.	95
Appendix 4: Answer Key for the CAT	106
Appendix 5: Result of Item Analysis	107
Appendix 6: A Table of Specification for the CAT.	111
Appendix 7: A validated Chemistry Achieve- ment Test. ...	112
Appendix 8: The VCAT Answer Sheet	117
Appendix 9: Students' VCAT and SS 2 Final Examination Scores ...	118
Appendix 10: Chemistry Teachers' Question- naire ...	126

LIST OF TABLES

<u>Table</u>		<u>Page</u>
I	The Relationship Between VCAT scores and the SS 2 Final Examination Scores in Chemistry for School A.	57
II	The Relationship Between VCAT Scores and the SS 2 Final Examination Scores in Chemistry for School B.	58
III	The Relationship Between VCAT scores and the SS 2 Final Examination Scores in Chemistry for School C	58
IV	The Relationship Between VCAT Scores and the SS 2 Final Examination scores in Chemistry for School D	59
V	The Relationship Between VCAT scores and the SS 2 Final Examination scores in chemistry for School E	59
VI	The Relationship Between VCAT scores and the SS 2 Final Examination scores in chemistry for School F	60
VII	The Relationship Between VCAT scores and the SS 2 Final Examination scores in Chemistry for School G	60
VIII	The Relationship Between VCAT scores and the SS 2 Final Examination Scores in Chemistry for School H	61
IX	A Table Showing the Relationship Between VCAT Scores and the SS 2 Final Examination Scores in Chemistry Using the Raw Scores (in percentage) and Ranks for School H. 	62
X	The Relationship Between VCAT Scores and the SS 2 Final Examination Scores in Chemistry in School I.	63
XI	The Relationship Between VCAT scores and the SS 2 Final Examination scores in Chemistry in School J.	63
XII	The Relationship Between VCAT scores and the SS 2 Final Examination scores in Chemistry in School K.	64
XIII	The Relationship Between the VCAT scores and the SS 2 Final Examination Scores in Chemistry for School L.	64
XIV	The Summary Table Showing the Relationship Between VCAT Scores and the SS 2 Final Examination Scores in Chemistry for the sampled schools ...	65
XV	A t-test analysis on the VCAT scores of schools with ... ed and uncorrelated scores. ...	66

XVI	The mean scores on VCAT of males and Females from the participating Schools. ...	68
XVII	A t-test analysis on the difference in the scores of Male and Female Students on the VCAT	69
XVIII	A t-test analysis on the Difference in the scores of males and females of coeducational Institutions on the VCAT	69
XIX	A t-test analysis on the Difference Between the Per- formances of Students from urban and rural schools on the VCAT.	70
XX	A t-test analysis on the performances of students taught by Professionally qualified and the Non- professional teachers on the VCAT. ...	71

ABSTRACT

The purpose of this study was to construct, validate and use a chemistry achievement test for the Senior Secondary two (SS 2) students in Akwa Ibom State. A pilot test was conducted, using an eighty item, multiple choice instrument. An item analysis of the test was carried out from which a forty item Validated Chemistry Achievement Test (VCAT) emerged. The VCAT had items with the discrimination index ranging from 0.27 to 0.63 and an average index of difficulty of 0.59. A reliability coefficient of 0.78 was obtained by the test retest procedure while 0.82 was the result of the split-half analysis. The instrument also had an internal consistency coefficient of 0.78. The validated test was subsequently administered to, three hundred students from twelve schools in six Local Government Areas of Akwa Ibom State.

The study used a correlational cum comparative research design for which four hypotheses were generated. The first hypothesis, sought to uncover the relationship between the students' scores on the VCAT and their scores at their final SS 2 examination in Chemistry in each of the participating schools. The other three hypotheses were to establish the existing differences in scores among the students with regards to their sex, school location and teacher's qualification. The Spearman Rank Order Correlation formula; t-test for relationship; t-test of difference and the Z-score of significance of proportion were used to test the different hypotheses where appropriate. All statistical analysis were carried out at $\alpha = 0.05$.

Results of data analysis showed that, the VCAT scores of students from seven out of the twelve schools correlated significantly with their

SS 2 promotion examination scores, in Chemistry. This study also found that, boys in coeducational institutions performed significantly better than their female counterparts, while students in rural schools were found to achieve significantly better on the VCAT than students whose schools are situated in urban areas. Research results also revealed that, students taught by professionally unqualified teachers performed better on the VCAT than students taught by professionally trained teachers.

Based on the findings and conclusions reached in this study, it was recommended that, teachers should be instructed on the proper techniques of test construction through, seminars and workshops; more attention should be given to girls in coeducational institutions, in order to aid them achieve better in chemistry; and, a research be conducted to investigate into the poor performance recorded by students taught by professionally trained teachers; among others.