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ASSESSMENT OF CONCEPTUAL AND PROCEDURAL KNOWLEDGE OF STUDENTS WITH SPECIAL NEEDS IN MATHEMATICS IN BENUE STATE

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ABSTRACT: *This study assessed conceptual and procedural knowledge of students with special needs in Mathematics in Benue State. Four research questions and three hypotheses guided the study. Descriptive survey design was adopted for the study. A population of 36 Senior Secondary School (SS1) students in 3 Special Education Schools in Benue State during 2019/2020 academic session were used for the study. The sample size was the same as the population. Two-Tier Algebraic Diagnostic Test (TTADT) item cycle I and cycle II were adapted and validated by two experts in Mathematics Education, one specialist in the field of Test and Measurement all from Benue State University, Makurdi, and one expert in Special Education from Federal University Lafia as well as one SS1 Mathematics teacher from Government Model School, Makurdi. Trial testing was carried out on 10 SS1 students from Dunama Special School Lafia and reliability of TTADT was calculated using Pearson Product Moment Correlation Coefficient and was found to be 0.96. Mean and Standard Deviation were used to analysed data to answer the research questions, while t-test statistics was used to test the null hypotheses at 0.05 level of significance. The first finding of the study shows that the Mean scores of the SSN in Concept Knowledge and Underlining Reasoning were very low below 40% (31.25% and 21.08% respectively), while that of Procedural Knowledge is 40.69%. The second finding of the study shows that there exists a significant difference between the performance of SSN in Conceptual Knowledge and Procedural Knowledge in Algebra in favour of Procedural Knowledge ($t=-5.39$; $P=0.00<0.05$). The third finding of the study shows that there exist a significant difference between the performance of SSN in Conceptual Knowledge and Underlining Reasoning in Algebra in favour of Conceptual Knowledge ($t=5.71$; $P=0.00<0.05$). The fourth finding of the study shows that there exist a significant difference between the performance of SSN in Procedural Knowledge and Underlining Reasoning in favour of Procedural Knowledge ($t=13.70$; $P=0.00<0.05$). It is therefore recommended that, workshops, seminars and conferences should be organized to upscale, and strengthen the capacities of teachers in Special Schools, in the teaching of Conceptual and Procedural Knowledge skills in Algebra and Mathematics in general.*

KEY WORDS: assessment, conceptual knowledge, procedural knowledge, students with special needs and mathematics**.**

INTRODUCTION

Mathematics is a branch of science which deals with the concept of numbers, shapes, size, quantity and order whose knowledge and skills is applied in solving problems in physical and economic situations (Ayeni, 2012). It could be used as a means of solving any mental and physical problem which creates a fertile environment for mathematical reasoning. Mathematics could be considered

as a subject that equips the learner with critical, reflective and creative thinking skills for solving life problems. It includes the study of arithmetic, algebra, geometry, statistics, numerical analysis and its application globally.

Algebra is the branch of Mathematics that deals with symbolizing general numerical relationships and mathematical structure and with operations on these structures. Arithmetic uses four fundamental operations namely addition (+), subtraction (-), division (÷), and multiplication (x). Algebra is taught because it gives compact formulae or generalization to be used in all cases and it gives a new, good approach to the study of a new language and new symbols. In Mathematics, the letters of alphabet used in Algebra are called variables.

All fields of studies depend on Mathematics for problem solving. It is in recognition of this and other usefulness of Mathematics that the Federal Government of Nigeria has made Mathematics a core subject in primary and secondary curriculum in Nigeria. It is a compulsory requirement to gain admission into higher institution. Secondary school students must pass Mathematics at a credit level in order to gain admission into institution of higher learning. This is applicable to students with special needs.

The West African Examination Council Chief Examiners' Report (WAEC, 2018) reported that the performance of candidates in Mathematics declined by 20% as compared to that of 2017.The report listed some of the students' weaknesses as follows: translating word problems into mathematical Statements; related problems; solving equations simultaneously and solving problems involving indices. All these are Algebraic topics. Considering this report, the difficulty students have in Algebra is that the students are unable to translate the symbols to numerals which are a word problem. Artique, Grugeon and Lefant (2019) asserted that mathematical processes is problem solving and all problems are resolved into Algebraic expressions and equations for possible solutions. This implies that students who master and retain the knowledge and skills of Algebra are likely to apply them successfully in real life situations.

The aim of teaching and learning Mathematics is to have students become competent problem solvers. Competence in Mathematics requires the knowledge of concepts and procedures (Zuya, Matawai & Kwalat, 2017). Mathematical competence rests on children development and connecting their knowledge of concepts and procedures. That is, students must learn both fundamental concepts of Mathematics and the procedures for solving the problem. In every teaching and learning situation in Mathematics in general and Algebra in particular, conceptual and procedural knowledge are very important for skills acquisition (Aligba & Abur, 2018). That is, the combination of conceptual and procedural knowledge enables the learner to acquire useful and relevant skills of life.

According to Capraro and Joffrion (2016), conceptual knowledge is referred to as the comprehension of ideas or generalization that governs a particular domain and connects mathematical constructs. It is the ability to identify and apply principles, knowledge and facts. Conceptual knowledge is the knowledge that provides understanding of the principles and relations

among bits of knowledge in a certain domain (Schneider & Stern, 2012). This is the knowledge of understanding abstract concepts that has to do with abstraction and generalization of particular instances. Zuya (2017) defines procedural knowledge as the ability to commit into memory the rules, procedures, principles and definition of Mathematics and to recall them when solving problems without necessarily having an understanding of them. Procedural knowledge is the ability for one to resolve a given problem without knowing the reason behind applying a certain theory process or law during solving mathematical problems.

Zakaria, Yaakkob, Maat, and Adnan (2010) pointed out that knowing Mathematics has to do with the understanding of concepts and procedures. Therefore, there has to be a link between conceptual and procedural knowledge. That is, conceptual knowledge and procedural knowledge rely on each other to give meaning to the teaching and learning of Mathematics. The difference between the two is that procedural knowledge often relies on unconscious steps, while conceptual knowledge requires conscious thinking. Therefore, for conceptual knowledge and procedural knowledge to be complete students must develop good underlining reasoning skills.

Underlining reasoning skills require students to answer a given question or concept and then justify the reasons in form of proof (s) to support the answer (Clarima, 2014). This simply refers to justifications inform of proofs or reasons to demonstrate that one has knowledge of concept or phenomena. Conceptual knowledge, procedural knowledge and underlining reasoning all increase students' performance in Algebra and Mathematics in general.

Special education is a formal education training given to the people (children and adults) with special needs who fall into two categories: the disabled and the gifted and talented (G&T). The disabled include children and adult with hearing impairment, visual impairment, physical and health impairment, intellectual disabilities, learning disabilities, multiple handicap and emotional disturbance. The National Policy on Education (FRN, 2014), defined special needs education (SNE) as a customized educational programme, designed to meet the unique needs of persons with special needs that the general education programme cannot cater for. Oyundoyin (2013) Stated that it is the education given to children and youths that entails modification, adaptation, adjustments, innovations and management of curriculum, methods and materials in addition to other resources and parties of regular schools of fit and the special learning needs of those who present different forms of disabilities and learning difficulties.

The focus of special education is to educate Students with Special Needs (SSN) in a way that addresses their individual differences and needs towards helping them actualize their respective destinies and contribute to the development of the society (Dantata, 2015). These groups of learners are assisted to achieve a higher level of personal self-fulfillment, sufficiency and success through school to be useful to themselves and the society at large which can be achieved through effective teaching and learning.

One of the ways a teacher can find out the effectiveness of his/her teaching is by assessing pupils' learning processes. Assessment is a way of monitoring learners' progress as well as obtaining

information about performance of each individual learner based on his/her performance. Gurel, Eryilmaz and McDermott (2015) maintain that two-tier tests are assessment tools which are concerned with the persistent or recurring learning difficulties like the one mentioned by the West African Examination Council, Chief Examiners' Report (2015, 2016, 2017, 2018, & 2019), that are left unresolved and are the causes of learning difficulties. Two-tier test has first and second cycles. The first cycle of the two-tier test examines content knowledge, while the second cycle examines the reasons or supporting conception underlying such knowledge. A two-tier test provides the examiner with an understanding of students' reasoning behind their answers. Several studies were carried out as related to the variable in different areas of disciplines among which are Mathematics (Aligba&Abur, 2018; Ashmore, 2017; Zuya, Matawal & Kwalat, 2017; Hong, 2012; Nor & Effandi, 2011;)and Physics(Kanli,2015). But all the studies were not carried out on students with special needs except Ashmore (2017) whose study was only on the Deaf and Hard of Hearing students but not in Nigeria and did not use two-tier test. Due to the importance and recommendation of a two-tier diagnostic test and the scanty available empirical studies on conceptual and procedural knowledge of Students with Special Needs (SSN) in Benue State, the present study therefore, adapted a two-tier diagnostic test to assess the conceptual and procedural knowledge of SSN in Benue State to close this identified research gap.

The researchers also observed that, despite the enormous benefits derived from Mathematics and the great value placed on education, the government and some parents have not seen the need to educate children who have special needs. They still believe that the disabled children are unproductive and inevitable liabilities. Based on the statistics collected from the Deans of Studies obtained from the various special schools in Benue State, the number of students offered admission into special education school keep on reducing year in year out. Most times one finds the children roaming the streets or sometimes engaging in begging and other unwholesome activities including but not limited to crime. Worse still, the performance of the students including those with special needs in Mathematics is not encouraging. The students' low performance might be traced to students' inability to understand the concepts and to use the correct procedures for solving mathematical problems. The researchers therefore set out to investigate why the performance of SSN in Mathematics is not encouraging.

Research Questions

The following research questions were raised to guide the study:

i. To what level do SSN possess conceptual knowledge, use procedural knowledge and underlining skills reasoning in Algebra?

ii. What is the Mean difference between the performance of SSN requiring conceptual knowledge and procedural knowledge in Algebra?

iii. What is the Mean difference in the level of SSN conceptual knowledge and underlining reasoning skills in Algebra?

iv. To what level do SSN differ in their performance requiring procedural knowledge and underlining reasoning skills in Algebra?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

H_{01}: There is no significant difference in the mean score of SSN conceptual knowledge and Procedural knowledge in Algebra.

H_{02}: There is no significant difference in the mean score of SSN in their conceptual knowledge and underlining reasoning in Algebra.

H_{03}: There is no significant difference between the mean score of SSN in procedural knowledge and underlining reasoning in Algebra.

METHODOLOGY

The study adopted the descriptive survey design because it is a good design that can be used to assess individual characteristics such as views, opinions, knowledge on existing situation or events or phenomenon and report accordingly. The choice of a survey design for this study was to allow the researchers collect data by using a Two-Tier Algebra Diagnostic Test (TTADT) which has first and second cycles. Cycle I give room for students to provide their own reason while in Cycle II, the students are to choose the correct reason to support their answer.

In the first cycle, 40 items was developed by the researchers based on the content of Algebra for SS1 as required in the school Mathematics curriculum (NERDC, 2009). The contents include: simple equations and variations; quadratic equation and logical reasoning. It contains part I and part II. Part I contains 40 objective items with options A to D adopted from past questions of WAEC and NECO. While part II contains 40 open questions which require students to give reasons to support the answer in Part I. The items were administered to students and data were collected and used to develop the second part of the second cycle. The answers in form of justification provided by the students were used by the researchers to develop the second part of the second cycle in objective form with options from A to D (Underlining Reasoning). In the second cycle, the same questions that were used in the first cycle were used for the second cycle including the students' reasons and justification with options A to D.

The first tier is the conventional multiple choice content questions with four response mode (one correct and three distractors). The second tier question consisted of multiple choice set of reasons students had given that is associated with the answer they gave in the first tier in addition to the mathematically accepted reasons. Students' answers to each item were scored correct when both the correct choice (answer) and reasons are correct with 2 marks. The first part which measured the conceptual and procedural knowledge is assigned a score of one mark per item. The second part which measured the underlining reasoning skills also assigned the score of one mark. That is 20 items measured Conceptual Knowledge with Underlining Reasoning while the other 20 measured Procedural Knowledge with Underlining Reasoning. The most commonly identified answer and reasons for the answer (correct and incorrect) given by the students in each item of the open-ended questionnaire served as source of item options in the two-tier multiple-choice test cycle II.

The instrument, TTADT cycle I and II for the study were validated by two experts in Mathematics education, one expert in measurement and evaluation all from Benue State University,Makurdi one expert of Special Education from Federal University, Lafia and one SS1 Mathematics teacher. All the experts were requested to validate the 40 items developed by the researchers as Two-Tier Algebraic Diagnostic Test (TTADT) cycle I and cycle II which consist of part I requiring students to thick an appropriate option and part II requiring to supply reasons and justification for their answers in part I. The expert's advice was sought in terms of scope of coverage, content relevance, language level, ambiguity and vagueness of expression as well as suitability of items for SS 1 Algebraic topic specified. Their advice and comments led to the modification of the items numbers 2, 3, 7, 9, 20, 28, and 32, the replacement of the word "check" to "justify", the separation of questions that required conceptual knowledge from the ones that required procedural knowledge and the reduction of the number of items from 40 to 20 items because of the class and disability of the students.

A total of 20 items of the Two-Tier Diagnostic Instruments finally emerged after the modification.10 items measured Conceptual Knowledge and Underlining Reasoning while the other 10 measured Procedural Knowledge and Underlining Reasoning. Trial testing was carried out on 10 SS1 students from Dunama Special School Lafia and reliability of TTADT was calculated using Pearson Product Moment Correlation Coefficient and was found to be 0.96. For effective administration and collection of data, one experienced Mathematics teacher (at least 5 years teaching experience) and one interpreter; one from each school was used as research assistants for the study. The interpreter assists the researchers by explaining to students with hearing impaired using the American Sign Language on how to answer the test items. The researchers did explain to the students on how to answer the test items. The researchers advised and motivated the students not to be nervous in supplying the answers with the assurance that it would be used solely for the study and nothing else. This is to reduce the suspicion that they are being used for a special programme. The researchers also briefed the research assistants on how to administer the test. The test was administered, supervised and collected by the researchers and the research assistants.

The data collected was analyzed with a view to answering the research questions and testing the hypotheses formulated for the study. The students received a score of 2 marks if they responded correctly to the first part (content and procedure choice) and correctly to the second part (reasoning part). Correct answer in the first part and wrong reason in the second part attracted a score of 1 mark, while wrong answer in the first part and correct reason or wrong answer in the first part and wrong reason earned zero mark. This method of scoring was used as recommended by Peterson and Treaqust, (1987) and cited by Uyulgan, Akkuzu and Alpat (2014). The test was marked over 100. The population of this study includes all the SS1 students in the 3 selected secondary schools in Benue State (Special School for Exceptional Children,Aliade, Saint Francis School for the Deaf and Blind,Vandeikya, and Mbapuun Grammar School,Zaki-Biam) with the exception to the visually impaired. The total number of SS 1 students within this category was 36 from all the 3 schools. The figure was obtained from the Office of the Head of Departments admission list of

2019/2020 academic session from the various schools by the researchers. Since the entire population was small, the sample was the same with the population.

The descriptive statistics of mean and standard deviation used to answer the research questions, while the hypotheses were tested at 0.05 level of significance using t-test statistic. The reason for using t-test statistics for hypotheses testing is based on the fact that the hypotheses are aimed at comparing mean scores of two different groups.

RESULT

Research Question 1: To what level do SSN possess conceptual knowledge, use procedural knowledge and underlining reasoning in Algebra?

Table 1: Mean Scores and Standard Deviation of SSN Level of Conceptual Knowledge in Algebra

Variable	N	Mean	Std. Deviation
Conceptual Knowledge	36	31.25	8.67
Procedural Knowledge	36	40.69	5.89
Underlining Reasoning Skills	36	21.08	6.24

Table 1 reveals that the mean score of SSN in conceptual knowledge is 31.25 and the standard deviation is 8.67. the mean score of SSN in procedural knowledge is 40.69 and the standard deviation is 5.89 the mean score of SSN in underlining reasoning skills is 21.08 and the standard deviation is 6.24, implying that underlining reasoning skills of SSN is low. This means that SSN possess a low underlining reasoning skills.

Research Question 2: What is the Mean difference between the performance of SSN requiring conceptual knowledge and procedural knowledge in Algebra?

Table 2: Mean scores and Standard Deviation of SSN Performance of Conceptual Knowledge and Procedural Knowledge in Algebra

Variable	N	Mean	Std. Deviation
Conceptual Knowledge	36	31.25	8.67
Procedural Knowledge	36	40.69	5.89
Mean Difference		9.44	

Table 2 reveals that the mean score of SSN in conceptual knowledge is 31.25 and the standard deviation is 8.67 while the mean score of SSN in procedural knowledge is 40.67 and the standard deviation is 5.89. This shows that the conceptual knowledge of SSN in Algebra is low as compared to their procedural knowledge. The standard deviation of the SSN in conceptual knowledge in Algebra is higher than the procedural knowledge. This means that the performance of students in conceptual knowledge is less homogeneous than the procedural knowledge. That is, the data in conceptual knowledge is widely scattered around the mean while the scores in procedural knowledge is closely clustered around the mean. This further implies that the SSN performance is higher in procedural knowledge than conceptual knowledge in Algebra. Therefore, research

question two could be answered that the mean difference between the performance of SSN requiring conceptual knowledge and procedural knowledge in Algebra is 9.44 in favour of procedural knowledge.

Research Question 3
What is the Mean difference in the level of SSN conceptual knowledge and underlining reasoning skills in Algebra?

Table 3: Mean Scores and Standard Deviation of SSN Level of Conceptual Knowledge and Underlining Reasoning Skills in Algebra.

Variable	N	Mean	Std. Deviation
Conceptual Knowledge	36	31.25	8.67
Underlining Reasoning Skills	36	21.08	6.24
Mean Difference		10.17	

Table 3 reveals that the mean score of SSN in conceptual knowledge is 31.25 while the standard deviation is 8.67. Also, the underlining reasoning skills is 21.08 and the standard deviation is 6.24. This implies that the underlining reasoning of SSN is lower than their conceptual knowledge, further accentuating that SSN has higher conceptual knowledge than underlining reasoning skills. The standard deviation in the conceptual knowledge is more heterogeneous than the standard deviation in underlining reasoning skills. This implies that the scores in conceptual knowledge is widely scattered around the mean while the scores in underlining reasoning skills is closely clustered around the mean. Therefore, the answer to research question three is that the mean difference in the level of SSN conceptual knowledge and underlining reasoning skills in Algebra is 10.17 in favour of conceptual knowledge.

Research Question 4
To what level do SSN differ in their performance requiring procedural knowledge and underlining reasoning skills in Algebra?

Table 4: Mean Score and Standard Deviation of SSN Level of Procedural Knowledge and Underlining Reasoning Skills in Algebra

Variable	N	Mean	Std. Deviation
Procedural Knowledge	36	40.69	5.89
Underlining Reasoning Skills	36	21.08	6.24
Mean Difference		19.61	

Table 4 reveals that the mean score of SSN in procedural knowledge is 40.67 and the standard deviation is 5.89. The mean score of SSN in underlining reasoning skills is 21.08 and the standard deviation is 6.24. This shows that SSN performed higher in procedural knowledge than underlining reasoning skills. The standard deviation in procedural knowledge is smaller which means homogeneous performance of the students than the underlining reasoning skills. Therefore, research question four could be answered that the mean difference between the performance of

SSN requiring procedural knowledge and underlining reasoning skills in Algebra is 19.61 in favour of procedural knowledge.

Hypothesis 1: There is no significant difference between the mean score of SSN conceptual knowledge and procedural knowledge in Algebra.

Table 5: Independent T-Test Analysis for SSN Conceptual Knowledge and Procedural Knowledge in Algebra.

	Group	N	Mean	Std. D	df	t	Sig (2 tailed)	Decision
SCORE	Con. Knowledge	36	31.25	8.67				
					70	-5.39	0.000	Significant
	Pro. Knowledge	36	40.69	5.89				
	Mean Diff.		9.44					

Table 5 reveals that t = -5.39; P=0.00<0.05. This shows that the probability value is less than 0.05. It therefore means that there is a significant difference between the means of SSN in conceptual knowledge and procedural knowledge in Algebra in favour of procedural knowledge. Consequently, the null hypothesis is rejected.

Hypothesis 2 : There is no significant difference between the mean score of SSN in their conceptual knowledge and underlining reasoning in Algebra.

Table 6: Independent t-test Analysis for SSN Conceptual Knowledge and Underlining Reasoning Skills in Algebra.

	Group	N	Mean	Std. D	df	t	Sig (2 tailed)	Decision
SCORE	Con. Knowledge	36	31.25	8.67				
					70	5.71	0.000	Significant
	Under. Reason	36	21.08	6.24				
	Mean Diff.		10.17					

Table 6 reveals that t = 5.71; P=0.00<0.05. This shows that the probability value is less than 0.05. It therefore means that there is a significant difference between the mean score of SSN on conceptual knowledge and underlining reasoning skills in Algebra in favour of conceptual knowledge. The null hypothesis is therefore rejected.

Hypothesis 3 : There is no significant different between the mean score of SSN in procedural knowledge and underlining reasoning skills in Algebra.

Table7: Independent t-test Analysis for SSN Procedural Knowledge and Underlining Reasoning Skills in Algebra.

	Group	N	Mean	Std. D	df	t	Sig (2 tailed)	Decision
SCORE	Pro. Knowledge	36	40.69	5.89				
					70	13.70	0.00	Significant
	Under. Reason	36	21.08	6.24				
	Mean Diff.		19.61					

Table 7 shows that t=13.70; P=0.00<0.05. This implies that the probability value is less than 0.05. It further accentuates that there is a significant difference between the mean score of SSN in procedural knowledge and underlining reasoning skills in Algebra in favour of procedural knowledge. Therefore, the null hypothesis is rejected.

DISCUSSION OF FINDINGS

The first finding of this study shows that SSN performance in conceptual and procedural knowledge as well as underlining reasoning skills in Algebra was relatively very low in a test mark over 100%. Based on the grading system of WAEC, the mean performance of SSN on conceptual knowledge and underlining reasoning skills falls below pass mark(31.25% and 21.08% respectively) which is graded as "F9" while the mean score of SSN on procedural knowledge is 40.69% which is graded as "P8". This means that SSN performance in Algebra is poor. In fact, the performance of SSN in conceptual knowledge was very low as compared to their performance in procedural knowledge. This finding is in line with Aligba and Abur (2018) who revealed that students' conceptual knowledge was low and the level of students' procedural knowledge was high. The finding also agrees with the finding of Kanli (2015) who reported that students and teachers have misconception about the basic astronomic concepts. This result disagrees with Zuya, Matawal and Kwalat (2017) who reported that teachers perform higher in conceptual knowledge than procedural knowledge in geometry. They assert that, though some teachers can define certain concepts and rules in geometry, they are unable to transfer this knowledge into procedural skills to solve problems.

The second finding shows that there exist a significant difference between the performance of SSN in conceptual knowledge and procedural knowledge in Algebra in favour of procedural knowledge (t=-5.39; P=0.00<0.05). The finding of the current study is in agreement with Hong (2012), who found that students' level of conceptual understanding was low. The implication of this finding is that SSN were not able to define and explain concepts in Algebra. This may be due to the fact that the teachers did not focus on defining and explaining algebraic concepts to the students. The findings of the current research is similar to that of Nor and Effandi (2011) who revealed that the response given by the students in the procedural and conceptual understanding test showed a high level of procedural understanding but low level of conceptual understanding. They showed that

students could not interpret correlation that involved mathematical concepts in the sentence. This may be due to the fact that the teachers did not focus on defining linearity concepts to students. The implication of this finding is that most students learn Mathematics through methods and formulae process which are aimed at passing examinations only but not for the purpose of knowledge application. Ideally, knowledge of concept and knowledge of procedures should be related and therefore the performance on both knowledge is expected to show no significant difference.

The third finding of the Study shows that there is a significant difference between the mean score of SSN on conceptual knowledge and underlining reasoning skills in Algebra in favour of conceptual knowledge ($t=5.71$; $P=0.00<0.05$). The result of this current study disagreed with Ashmore (2017) who reported that the Deaf and Hard of Hearing (DHH) students performed significantly higher on underlining reasoning tasks in Mathematics. The findings submitted that the DHH students are more likely to complete mathematical problems by using critical thinking skills and reasoning. This implies that, the students had little reasoning skills to justify their Algebraic concepts.

The fourth finding of the study shows that there exist a significant difference between the performance of SSN in procedural knowledge and underlining reasoning skills in Algebra in favour of procedural knowledge ($t=13.70$; $P=0.00<0.05$). This could be as a result of the fact that most teachers focus on the teaching of formulas and methods of solving mathematical questions and concentrate less on proofs and justifications which gives rise to low underlining skills in Mathematics. Zuya (2017) study is in consonance with this submission where he affirmed that prospective Mathematics teachers performed above average on tasks requiring knowledge of procedures in Algebra. The implication of this finding indicates that the students had little reasoning skills to justify their steps and answers in solving Algebraic problems.

CONCLUSION

The assessment of conceptual knowledge and underlining reasoning of SSN in Mathematics in Benue State is very low, below the pass mark while their procedural knowledge is at the level of weak pass mark using WAEC grading system. However, this study has made contribution to knowledge as the research assistants used in the various schools of study became enthusiastic in using the Two-Tier test to assess the students' performance in Algebra and Mathematics in general which emphasized underlining reasoning of students on each question. That is, the study has exposed SSN and their teachers to knowledge and skills of using two-tier test (so as) to apply in solving problems (questions) in other topics in Mathematics.

Recommendations

Based on the findings of the study, it was recommended that:

1. The Benue State Ministry of Education in conjunction with proprietors of all special schools should organize workshops, seminars and conferences for teachers teaching in special

schools to strengthen their conceptual and procedural teaching skills in Algebra and Mathematics in general.

2. The enforcement of the usage of two-tier test by school in assessing SSN should be sustained to boost the students' underlining reasoning skills.

3. Reforms in teaching the SSN is needed to boost conceptual knowledge amongst students in order to minimize the use of algorithms and memorization in Algebra.

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