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Identification and Remediation of Student's Learning Difficulties in Geometry in Rivers State

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Abstract
The study identified and remediated learning difficulties on senior secondary school students' in geometry in Port Harcourt Local Government Area (PHALGA), Rivers State. The study was a quasi-experimental design, guided by three research questions and hypotheses. The population of the students comprises of (7,719) SS2 students in Port Harcourt Local Government Area, Rivers State. A sample size of 314 was drawn from four schools out of the sixteen public schools in PHALGA using purposive sampling technique. Two instruments were used, Learning Difficulties Identification Test on Geometry (LDITOG) and Remediation Test on Geometry (REMTOG). The instruments were validated and their reliability was determined using test retest and a reliability coefficient of 0.80 for (LDITOG) and 0.89 for (REMTOG) were obtained using Pearson Product Moment Correlation. Percentage, frequency count, mean and standard deviation were used to answer the research questions while the hypotheses were tested using Chi Square and ANCOVA at 0.05 significant level. The findings of the study revealed the presence of adaptive reasoning, procedural formulation, strategic competence and conceptual understanding learning difficulties among students. The study revealed that students' performance, and Mathematics ability levels improved after remediation. Based on the findings it was recommended that educational stakeholders should organize workshops, seminars where in-service Mathematics teachers could be trained on how to identify and remediate learning difficulties experienced by students.

Keywords: identified, experienced, Mathematics, trained

Introduction

The word civilization existed today and continued because of the practice of Mathematics. Mathematics is the bed rock of all technological inventions, its place in technology cannot be compared to any, this is because technological invention makes use of analysis, critical thinking, creativity skills and abstract reasoning that are applied in solving problems of real-life situation and the above-mentioned features are mental tools on which Mathematics is practiced. Mathematics is an essential aspect of national development and sustainability, from the technological development to economic advancement of which socio-economic and geo-political development of a nation includes. According to Mbanefo, (2018) [11] Science, Technology and Mathematics education is not only glowing in its use for technological innovations and inventions but has been proved to be the determinant factor for measuring any nations socio economic standard of living and geopolitical development. The vision of Nigerian educational system is to produce individuals that will apply their Mathematical knowledge and skills in technological development of which its achievement starts with the elimination of obstacles to effective Mathematics practice.

Mathematics is an indispensable part of human nature. Mathematics education is aimed at producing productive individuals that will work in the industries, effectively and efficiently using their Mathematical skills, ideas and knowledge. It's also aimed at equipping individuals with Mathematical intellectual tools that will help them function effectively in their citizenship duties. Mathematics education builds individual characters by inculcating in them the spirit of braveness, self-confidence, self-esteem and courage in solving life problems and indulging into new situations. The teaching and learning of Mathematics do not exist without challenges that tend to affect negatively the achievement of its stated goals irrespective of all the efforts of government and educational stakeholders. The major challenge in the practice of Mathematics is poor performance which set to bring to nothing all the efforts of concerned stakeholders towards success in the practice of the subject. According to Okoafor, (2016) [14] poor performance and achievement of students' in Mathematics in external and internal examination have its cause traced to learning difficulties experienced by students. A student who fails to perform or achieve as expected at the end of any program is an indication that he/she experiences learning difficulties. Learning difficulties are indication of deficiency which tend to restrict a student from achieving set educational goals on a particular subject domain or general; clearly observed in their performance both internal and external exams. (Obigwe, 2016) [12]. According to Uka, (2017); Learning difficulties are learning deficiency or mental malfunction that occurs among students which limits their educational progress geared towards attainment of set goals. It can be expressed as unexpected occurrence of continues learning problems experienced by students that cut short their expected achievement and performance in a particular domain of a subject.

According to Uma, (2016) [20] he, described remediation of learning difficulties as a planned action employed in correcting academic defects by nullifying negative learning behaviours for a positive one. It is an act of providing the students with their academic needs in order to make progress. Remediation involves the designing of an

instructional package that will assist students in attainment of expected proficiency in particular subject. Remediation of learning difficulties is a common practice in the educational world but the process seems not to give a desirable outcome because teachers remediate without identification of type of learning difficulties experienced by students, which is likely to a doctor treating a patient without knowledge of the type of sickness and the extent of damage caused by the sickness.

Statement of Problem

The expected academic success in Mathematics has turned into a mirage. It is obvious that there are obstacles that prevent the actualization of its success. The achievement of the desired success requires the elimination of the obstacles. The inability of learners to achieve as expected in Mathematics showed that they are experiencing difficulties. The cause of poor performance can be attributed to factors like; nature of the subject, curriculum design, teaching method, quality of teachers, lack of learning resources and student characteristics. (Ifamuyi & Ajilogun, (2012)) [9].

Wonu and Zalmon, (2017) [21] attributed learning difficulties experienced by students as the major causes of massive failure in Mathematics. Therefore, the major focus should be how to identify the learning difficulties and ways of remediation for improved performance. The researcher of this study in her years of experience as a teacher, observed that many teachers remediate learning difficulties without identification of types and nature experienced by students. The situation is likely to a medical doctor guessing the type/causes of a sickness suffered by a patient without confirmation from test thereby administering the wrong treatment that will result into no cure. The difficult question on this, is how long will this continue to exist as it is now a reoccurring decimal and need to be approximated to a whole number in order to move forward the educational system of this nation.

Objectives of the study

The study specifically intends to;

1. Identify the presence and proportion of learning difficulties exhibited by students in geometry before and after remediation.
2. Determine the performance of students exposed to remediation and those not exposed to remediation.
3. Find out Mathematics ability level of students on geometry before and after remediation.

Research Questions

The following research questions guided the study.

1. What are the proportions and types of learning difficulties exhibited by students on geometry before and after remediation?
2. What are the mean performance score of students exposed to remediation and those not exposed to remediation?
3. What is the Mathematics ability level of students on geometry before and after remediation?

Hypotheses

The following hypotheses were tested at 0.05 alpha level.

Ho_1: There is no significant difference in the types and proportions of learning difficulties exhibited by students on geometry before and after remediation.

Ho_2: There is no significant difference between the performance of students exposed to remediation and those not exposed to remediation.

Ho_3: There is no significant difference in the Mathematics ability level of students before and after remediation on geometry.

Methodology

The design of the study was quasi experimental. The population of the study was (7,719) consists of all public senior secondary schools two in Port Harcourt Local Government Area of Rivers state. The sample size for the study consists of 314 students. The instrument used were Learning Difficulties Identification Test on Geometry (LDITOG) and Remediation Test on Geometry (REMTOG). The instruments were validated for content and face validity. The Reliability coefficient of the instruments was determined using test retest; Pearson Product Moment Correlation was used to calculate reliability coefficient of 0.80 for learning difficulties identification instrument while a reliability coefficient of 0.89 was calculated for remediation instrument. A pre-test was administered to the students for identification of presence and types of learning difficulties experienced. A post-test was given after treatment to determine the effect of remediation. Data collected were analysed; percentage, frequency count, mean and standard deviation were used to answer the research questions while the hypotheses were tested at 0.05 significant level using Chi square and Analysis of Covariance (ANCOVA).

Analysis of learning difficulties

The questions of the instruments were designed based on standardised examination question. The marking scheme had each question subdivided into; Method (PF) students' ability to use the correct method at any stage of the solution; Accuracy (SC) accurate answer following a correct method/procedure; and independent accuracy marks not proceeded by M (AR). PF represents procedural formulation; AR represents adaptive reasoning; PF that leads to SC represents strategic competence. Total score (CU) for each question is made up of scores on AR+PF+SC=CU. The West African Senior Secondary Certificate Examination (WASSCE) grading method has $A1, B_2, B_3, C_4, C_5$, and C_6 as good acceptable grades ranging from (50%-100%) while D_7, E_8 and F_9 as below pass mark ranging from (0%-49%). A good pass mark is from 50% and above. Therefore, students with scores below 50% experiences learning difficulties in conceptual understanding, procedural formulation, strategic competency and adaptive reasoning. The students with scores above 50% but below 100% experiences one or two or three learning difficulties in circle geometry. Mathematics ability level of students was obtained using the overall performance scores for categorization into grade levels. Based on WASSCE grading scheme students that scores from (65%-100%) that is A_1, B_2, B_3 are classified to possess Above Average Mathematics Ability (AAMA) level; students with (50%-64%) scores that is C_4, C_5, C_6 are classified to possess Average Mathematics Ability (AMA) level, while students with (0%-49%) scores that is $D_7, E_8 F_9$ are classified to possess Below Average Mathematics Ability (BAMA) level. Scores were recorded, based on that

appropriate remediation was offered. Ability level is the assessment summary, it defines students' capability of applying acquired Mathematical knowledge and skills in solving/performing tasks in the subject at the end of learning which are categorized into three levels.

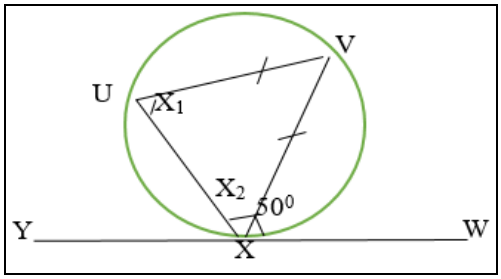

Fig 1

Typical example of learning difficulties identification test

Using the diagram find the value of <UXY

Solution.

$X_1 = 50^\circ$ (<s in alternate segment)

$X_1 = X_2$ (base <s of isos. triangle) AR=2

$X_2 = 50^\circ$

$<UXY + X_2 + 50^\circ = 180^\circ$ (sum of <s on St. line)

$<UXY + 50^\circ + 50^\circ = 180^\circ$

$<UXY = 180^\circ - 100^\circ$ PF=4

$<UXY = 80^\circ$ SC=4

CU=10

The learning difficulty identification Test on Circle Geometry (LDITOG) comprises of ten essay questions, each question carries ten marks making it 100%. The ten marks for each question consist of 2marks AR for adaptive reasoning, 4marks PF for procedural formulation, 4marks SC for strategic competence and the total 10marks CU for conceptual understanding, making it 20marks for AR, 40marks for PF, 40marks for SC and 100marks for CU. Therefore, students with less than 10marks on AR experiences adaptive reasoning difficulties; less than 20marks on PF and SC experiences procedural formulation difficulties and strategic competence difficulties while less than 50marks on CU experiences conceptual understanding difficulties.

Package for Remediation

Based on the identified learning difficulties, remediation package designed comprises of collaboration, laboratory and problem-solving strategies for the experimental group while the normal traditional teaching method was used for the control group.

Results and Discussions

Research Question one: What are the proportions and types of learning difficulties exhibited by students on geometry before and after remediation?

Table 1: Percentage and frequency count of types of learning difficulties exhibited by students before remediation.

Experimental group				**Control Group**		
Pretest (Before)				**Pretest (Before)**		
Learning Difficulties (LD)	n (167)	(%)	Remark	N (147)	(%)	Remark
Adaptive Reasoning (AR). Scores below 10	Freq. 123	74	Presence of LD	Freq. 116	79	Presence of LD
Scores up to 10	44	26		31	21	
Procedural Formulation (PF)Scores below 20	125	75	Presence of LD	118	80	Presence of LD
Scores up to 20	42	25		29	20	
Strategic Competence (SC) Scores below 20	125	75	Presence of LD	121	82	Presence of LD
Scores up to 20	42	25		26	18	
Conceptual Understanding (CU) Scores below 50	133	80	Presence of LD	121	82	Presence of LD
Scores up to 50	34	20		26	18	

If scores below cut off mean% >50 and scores up to cut off mean% <50 = Presence of Learning Difficulties (LD); of cut off mean (10) for AR, 20 for PF, 20 for SC and 50 for TS.

Table 1 experimental group pre-test result showed frequency count of scores below cut off mean and percentage of learning difficulties of adaptive reasoning difficulties AR as 123(74%), procedural formulation difficulties PF as 125(75%), strategic competence as 125(75%) SC and conceptual understanding CU as 133(80%) while for scores up to cut off mean frequency count and percentage for AR as 44(26%), PF as 42(25%), SC as 42(25%) and TS as 34(20%). The control group also showed frequency count of scores below cut off mean and percentage of learning difficulties of adaptive reasoning difficulties AR 116(79%), procedural formulation difficulties PF 118(80%), strategic competence SC 121(82%) and conceptual understanding CU 121(82%) while for scores up to cut off mean frequency count and percentage for AR as 31(21%), PF as 29(20%), SC as 26(18%) and TS as 26(18%). The result indicated presence of AR, PF, SC and CU learning difficulties for both groups since the percentage of scores below cut off mean are greater than 50% and up to cut off mean percentage scores are less than 50%.

Table 2: Percentage and frequency count of types of learning difficulties exhibited by students after remediation.

Expt. Group				Control Group		
	Posttest(after)			Posttest(after)		
Learning Difficulties (LD)	N (167)	(%)	Remark	N (147)	(%)	Remarks
Adaptive Reasoning (AR). Scores below 10	Freq. 15	9	Absence of LD	Freq. 52	35	Absence of LD
Scores up to 10	152	91		95	65	
Procedural Formulation (PF) Scores below 20	14	8	Absence of LD	54	37	Absence of LD
Scores up to 20	153	92		93	62	
Strategic Competence (SC) Scores below 20	14	8	Absence of LD	58	40	Absence of LD
Scores up to 20	153	92		89	60	
Conceptual Understanding (CU) Scores below 50	10	7	Absence of LD	42	29	Absence of LD
Scores up to 50	157	93		105	71	

Scores below cut off mean% <50% and scores up to cut off mean% >50 = Absence of Learning Difficulties (LD) of cut off mean (10) for AR, 20 for PF, 20 for SC and 50 for TS.

Table 1.2 post test result of experimental group showed frequency count and percentage of students that scored up to the cut off mean of adaptive reasoning difficulties AR 152(91%), procedural formulation difficulties PF 153(92%), strategic competence 153(92%) SC and conceptual understanding CU 157(93%) while for scores below cut off mean frequency count and percentage for AR as 15(9%), PF as 14(8%), SC as 14(8%) and CU as 10(7%). The control group also showed frequency count and percentage of students that scored up to the cut off mean of adaptive reasoning difficulties AR 95(65%), procedural formulation difficulties PF 93(62%), strategic competence SC 89(60%) and conceptual understanding TS 105(71%) while for scores below cut off mean frequency count and percentage for AR as 52(35%), PF as 54(37%), SC as 58(40%) and CU as 42(29%). The result indicated absence of AR, PF, SC and CU learning difficulties for both groups since the percentage of scores below cut off mean are less than 50% and scores up to cut off mean are greater than 50%.

The learning difficulties identification (before remediation) test result showed that greater number of students of both groups experiences learning difficulties of adaptive reasoning, procedural formulation, strategic competence and conceptual in geometry while the remediation result showed few number of students proving remediation appropriate and effective in reduction of learning difficulties experienced by students.

Research Question two: What are the mean performance score of students exposed to remediation and those not exposed to remediation?

Table 2: Mean and SD of pre-post scores of Experimental and Control groups.

		Pre-test		Post-test		
Group.	**N**	**Mean (X)**	**SD**	**Mean (X)**	**SD**	**Mean. Diff.**
Expt.	167	40.2	7.0	65.1	11.9	24.9
Control.	147	40.9	6.5	55.1	9.7	14.1
Total	314	-	-	-	-	-

The findings of table 2 showed that the pre-test mean score of the experimental group is (40.2) with SD of (7.0) while that of the control group was (40.9) with SD of (6.5). The post-test mean score of the experimental group is (65.1) with SD of (11.9) while that of the control group is (55.1) with SD of (8.0). The mean difference of experimental group is (24.9) which is higher than that of control group of (14.1).

Table 2 result showed that the pre-test mean scores of both groups are lower than 50 and with lower standard deviation. The result indicated low performance for both groups. The post-test mean score of both groups are above 50. The result proved that students exposed to remediation package (experimental group) scored higher than those not exposed to remediation package (control group) with an achievement mean gain (post-test mean difference experimental (65.1) and control group (55.1)) of 10. Therefore, ascertaining remediation package designed suitable for performance enhancement.

Research Question three: What is the Mathematics ability level of students on geometry before and after remediation?

Table 3: Mean and SD of pre-post scores of students of Below Average Mathematics ability (BAMA), Average Mathematics ability (AMA) and Above Average Mathematics ability (AAMA) of Experimental and Control groups.

		Pre-Test		Post-Test			
Group.	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**Mean. Diff.**
Expt. BAMA	133	17.6	5.1	10	47.0	1.9	29.4
AMA	34	50.7	1.3	60	55.9	3.1	5.2
AAMA	-	-	-	97	77.9	7.4	77.9
Control. BAMA	121	38.9	5.1	32	44.7	3.0	5.8
AMA	26	50.5	0.9	79	54.2	3.6	3.7
AAMA	-	-	-	36	66.3	1.2	66.3
Total	314	-	-	314	-	-	-

Below Average Mathematics ability (BAMA) are scores between 0%-49% (D7, E8, F9,) Average Mathematics ability (AMA) scores between 50%-64% (C4, C5, C6) and Above Average Mathematics ability (AAMA) are scores between 65%-100% (SC, B2, B3)

The result showed a positive change in students Mathematics abilities after remediation. The pre-test result showed that greater number of students scores are under 0-45% which is Below Average Mathematics Ability (BAMA) with mean value less than 50, also fewer number of students scores are under 50-64% which is Average

Mathematics Ability (AMA) with mean value less than 50 and no student score was within 65-100% which is Above Average Mathematics Ability (AAMA) for both experimental and control groups. The result proves that students of both groups have low Mathematics ability before remediation. The post-test results of table 3 for both experimental and control showed that greater number of students scores are under 65-100% (AAMA) with the highest SD value, followed by scores within 50-64% (AMA) and with mean values above 50. The result also showed that fewer students scores are within 0-45% (BAMA) with mean value less than 50. The identification test result proves that students Mathematics abilities were low but improved after remediation with the highest mean difference under AAMA as (77.9) for the experimental group while for the control AAMA as (66.3). The result revealed a more significant improvement on the experimental group than the control group with a mean difference gain of 11.6 under AAMA. Therefore, remediation of learning difficulties experienced by students' using effective package designed has the potentials of increasing students' Mathematics abilities in geometry.

Hypothesis one: There is no significant difference in the types and proportions of learning difficulties exhibited by students on geometry before and after remediation.

Chi Square result of hypothesis one.

Table 4: Chi Square Result

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
31	147	-116	13456	91.54
105	147	-42	1764	12.00
44	167	-123	15129	90.59
152	167	-15	225	1.35
30	147	-117	13689	93.12
97	147	-50	2500	17.01
42	167	-125	15625	93.56
151	167	-16	256	1.53
29	147	-118	13924	94.72
99	147	-48	2304	15.67
42	167	-125	15625	93.56
151	167	-16	256	1.53
26	147	-121	14641	99.60
115	147	-32	1024	6.97
34	167	-133	17689	105.92
157	167	-10	100	0.60
				$\sum$=819.27

$\sum(O-E)^2/E = 819.27$

$X^2 = \sum(O-E)^2/E$

$X^2 = 819.27.$

Degree of freedom = (c-1) (r-1) where c = column, r = row; (16-1) (4-1) = (15) (3) = 45; the critical $X^2 = 61.66$ and the calculated $X^2 = 819.27$, since the calculated chi square value is greater than the critical chi square value at 0.05 significant level, thereby indicating that there is a significant difference in the types and proportions of learning difficulties (adaptive reasoning, procedural formulation, strategic competence and conceptual understanding) exhibited by students on circle geometry before and after remediation.

Hypothesis two: There is no significant difference between the performance of students exposed to remediation and those not exposed to remediation.

Table 5: ANCOVA result of Hypothesis two.

Tests of Between-Subjects Effects						
Dependent Variable: Performance.						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14688.678[a]	2	7344.339	103.379	.000	.399
Intercept	8501.988	1	8501.988	119.674	.000	.278
Pretest	6945.631	1	6945.631	97.767	.000	.239
Group	8562.679	1	8562.679	120.528	.000	.279
Error	22094.354	311	71.043			
Total	1182112.000	314				
Corrected Total	36783.032	313				

a. R Squared = .399 (Adjusted R Squared = .395)

The ANCOVA result of table 5 showed a calculated significant value of (.000) which is less than the 0.05 therefore, there is a significant difference between the performance of students exposed to remediation and those not exposed to remediation.

Hypothesis three: There is no significant difference in the Mathematics ability level of students before and after remediation on geometry.

Table 6: ANCOVA result of Hypothesis three.

Tests of Between-Subjects Effects						
Dependent Variable: Mathematics Ability level.						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	56942.963[a]	1	56942.963	3138.650	.000	.943
Intercept	56942.963	1	56942.963	3138.650	.000	.943
VAR00004	56942.963	1	56942.963	3138.650	.000	.943
Error	3428.932	189	18.142			
Total	190948.000	191				
Corrected Total	60371.895	190				

a. R Squared =.943 (Adjusted R Squared =.943**)**

Table 6 result revealed that the significant value (.000) is less than the 0.05 proving that there is a significant difference in the Mathematics ability level of students before and after remediation on geometry**.**

Discussion of Findings

The analyses result of the current study established the need for identification and remediation of students' learning difficulties for better achievement in the study of Mathematics. The result proved that students' poor performance in Mathematics are as a result of learning difficulties. It was identified in the study, types of learning difficulties experienced by students (adaptive reasoning, procedural formulation, strategic competence and conceptual understanding difficulties) on circle geometry and the effect of remediation. The study also confirmed the necessity of designing a remediation package based on the type of identified learning difficulties and the effectiveness of laboratory, problem solving base and collaboration strategies in the remediation of learning difficulties experienced by students on geometry. The study gives a clear picture of the major problem in the teaching/learning of Mathematics in our secondary schools were teachers adhere to traditional teaching method; remediating students without identification of learning difficulties and use of inappropriate teaching strategies.

The result of table 1 and 1.2 proved the presence of learning difficulties of adaptive reasoning (AR), procedural formulation (PF), strategic competence (SC) and conceptual understanding (CU) among students. This was ascertained with the chi square result of hypothesis one proving that there is a significant difference in the proportion of learning difficulties exhibited by students' before and after remediation. This is supported by the study of Adindu, (2016) [1] that greater number of students' experiences learning difficulties on geometry before remediation which she attributed as the causal factor of poor performance among them. The findings were also supported by the study of Jaja, (2018) [10] that a higher proportion of senior secondary students' experiences learning difficulties on some topics of the senior secondary Mathematics curriculum which geometry was among. The findings agreed with the findings of Tall and Razali, (2014) [17], they identified thinking process as one of the difficulties experienced by students in Mathematics attributing it as the major cause of poor performance on the subject. They recommended the use of higher-level learning strategies in the teaching of Mathematics content and procedures. The study also agrees with the findings in the study of Syukriani, Juniati and Siswonu (2017) [16]; which identified adaptive reasoning difficulty as a learning difficulty experienced by students. The study is also in line with the study of Hlabane, (2017) [8] who identified higher order thinking skills as part of Mathematics learning difficulties experienced by students that requires remediation. This is in harmony with the study of Uja, (2017) [18] that students' experiences difficulty in procedural deduction and improved after remediation. The findings also agree with the work of George and Charles-Ogan (2015) [7]; they identified process difficult and conceptual understanding problem experienced by students as the casual factor of students Mathematics errors that leads to failure in problem solving. The findings are in accord with the findings of Adindu (2016) [1] and Syukriani, Juniati and Siswonu (2017) [16]; they identified strategic competence difficulty as a learning difficulty experienced by students with an improvement after remediation. This is in line with the study results of Opitz, Freesmann and Prediger (2016); Adindu, (2016) [1]; Halbane, (2017) and Okafor (2016) in their diagnosis of learning difficulties experienced by students identified conceptual understanding as one and its improvement after remediation confirmed with a positive change on students' performance.

Identification of Students learning difficulties, remediation and performance.

The findings are in congruence with the study results of Adindu, (2016) [1] and Uja, (2017) [18] that identification of learning difficulties experienced by students and remediation using effective strategies improves students' performance in Mathematics. It is also in pact with the study of Yusha'u (2013) [22] proving improvement in students' performance after remediation of identified learning difficulties (dyslexia and dyscalculia) using effective strategies. The study is in line with the work of Ajogbeje and Falorinso, (2012) [2] on improved performance in

Mathematics by remediation of students' using appropriate strategies based on feedbacks. The remediation package comprises of laboratory method, collaboration and problem base strategies which its application resulted into positive change in performance. The findings are in agreement with the study of Okigbo and Osuama, (2012) [13] and Fima, (2017) [6] that the teaching of trigonometry using laboratory and problem base strategies has a positive influence on students' performance. Also supported were the studies of Awaja, (2015) [3] and Chales-Ogan, (2014) [4], confirming improved performance on Mathematics using collaboration and problem base strategies.

Students Mathematics abilities and remediation

The findings of table 3 and 6 showed that there is significant difference in the Mathematics abilities (Below Ave, Ave and Above Ave.) of students' before and after remediation. This is in line with the finding result of Ejiofor-Chima, (2015) on improvement on students Mathematics abilities using creative game approach.

Conclusion

It was established from the findings of this study that students after remediation of identified learning difficulties (adaptive reasoning, procedural formulation, strategic competency and conceptual understanding) improved in their performance and Mathematics ability level.

Recommendations

1. Mathematics teachers should be encouraged and effectively trained on how to identify and remediate students with learning difficulties in Mathematics using appropriate teaching methods together with strategies. This will enhance better performance and retentiveness in Mathematics.
2. Curriculum planners should take cognizance of diagnosis and remediation of learning difficulties using innovative strategies and incorporate them when designing curriculum.
3. Educational stakeholders should organize workshops, seminars where in-service Mathematics teachers could be trained on how to identify and remediate learning difficulties experienced by students.
4. Mathematics teachers should join professional bodies like Mathematics Association of Nigeria (MAN) where they can be sensitized and enlightened on contemporary skills in lesson delivery to ensure students optimal achievement in Mathematics.

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