Effect Of Personalized Instruction Strategy On Pupils' Academic Achievement In Numeracy In Ilorin West Local Government Area Of Kwara State

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Abstract.

This study focused on effect of personalized instructional strategy on pupils academic achievement in Ilorin West Local Government Area of Kwara State. The study adopted pre-test post-test control group quasi-experimental research design. A factorial design of 2X2 was adopted for the study. The population comprises of all public and private primary schools pupils. The sample size were four primary three classes. First, all the schools were divided into two strata (Private and Public), and Purposive sampling technique was used to select (2) public and (2) private schools using intact class. Three research instruments were used titled: Pupils' Numeracy Achievement Test (PNAT) with two treatment packages, Instructional Guide for Personalized Instruction (IGPI) and Instructional Guide for Conventional Method (IGCM). Instruments were subjected to face and content validity by some selected numeracy. Test re-test method of reliability was used. Thereafter, Pearson Product Moment Correlation (PPMC) was used to determine the reliability index of (r=.71). Three research hypotheses were formulated and tested at 0.05 level of significance. The demographic data of the participants, were analyzed using frequency counts, mean, and percentage while the research hypotheses were tested, using analysis of co-variance (ANCOVA) at 0.05 level of significance. The finding revealed among others that there was a significant main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1; 129)} = 10.175$, $P< 0.05$). Those exposed to Personalized Instruction (15.726) performed significantly higher than those exposed to conventional method (14.667). Based on the findings of this study, it can be explicitly stated that personalized instructional strategy can enhance better performance in Numeracy than the traditional method of teaching and learning. Recommendation were made among others, Numeracy teachers should be enlightened on the effectiveness of personalized instructional strategy on pupils' academic performance in Numeracy.

Keywords: *Personalized Instructional Strategy, Academic Achievement and Numeracy.*

I. INTRODUCTION

The rationale behind the teaching and learning activities in a classroom is to bring about a desirable change in learners' behaviour. The change is possibly determined through the extent of pupils' achievement on a learning task or subject. Achievement is something that has been done or attained through effort a result of hard work. Numeracy is the ability to understand and work with numbers. It includes basic arithmetic skills such as Addition, Subtraction, Multiplication and Division, as well as more advanced skill such as problem solving, data analysis, and mathematical reasoning. Numeracy a fundamental aspect of education as it provides the foundation of many other subjects, including science, technology, engineering and mathematics (STEM). In the primary school curriculum, numeracy is a required topic that is unavoidable and holds a prominent place among the several subjects taught in every educational setting. It is the foundation of all scientific courses in schools and has a significant impact on the revival of people and nations as well as the advancement, expansion, and wealth of past civilizations as well as the modern day. The majority of students consistently do poorly academically in numeracy, and this is frequently linked to teachers' inefficient methods of imparting knowledge (Adunola, 2011). Additional factors contributing to students' low performance in numeracy classes include fear and anxiety as well as the assumption that numeracy is a difficult subject. According to Attwood (2014), dyscalculia, interrupted instruction, and parental attitudes are the main causes of low numeracy success.

Karue and Amukowa (2013) identified the primary causes of low numeracy achievement as lacking in a significant library and laboratory, qualified teachers, home environmental conditions, family backgrounds, and parental involvement in their children's education. Numeracy, science, and technology are crucial for developing a country that can stand tall among other developed nations (Akudo, Olaoye, Alabi & Otun, 2017). Obaid (2004) reported that there is discontent with the way that numeracy education is taught and received, with problems arising in the areas of content, teaching and learning strategies, educational activities, and learning outcomes across all educational levels. Numeracy actually necessitates structured learning that would enable students to actively participate in the classroom, such as individualised numeracy training. Personalisation is an instructional design feature that enables students to translate textual content into familiar referents in order to promote student participation.A personalised system of instruction leverages each student's needs, interests, abilities, and goals in connection to the curriculum to tailor learning for each individual student. In science and numeracy in particular, it tackles values and develops logical thinking abilities (De Freitas & Yapp, 2005). It depends on accurately identifying students' answers to a particular problem, making the required corrections, and outlining any discrepancies or misunderstandings between the responses and the anticipated feedback.

Personalised learning, according to Pane, Steiner, Baird, Hamilton, and Pane (2015), is defined by students studying in various stations and environments with minimal assistance from the teacher. After they have mastered the current task or, more accurately, the unit in question, learners are permitted to switch between stations (Deakin, 2007).Researchers underlined the potential for personalised learning frameworks to improve student results in a paper created under a grant from the US Department of Education. The report also pointed out that, according to data from assessments of high school reform models, establishing a structured and customised learning environment was one area where effective interventions led to better high school student outcomes, especially in large high schools (Herlihy & Quint, 2006). Strong improvements in reading, math, and other academic areas were found in a study that examined accomplishment data from 36,000 American students who utilised personalised learning in the 2016–2017 academic year.On the NWEA MAP exam, students' average development was 130% in reading and 122% in maths. Six% of those students attained or surpassed the maths growth objective, and 57% of those students met or exceeded the reading growth target. Furthermore, according to Osadebe & Nwabeze (2018), 71% of teachers were certain that personalised learning had a beneficial impact on teaching and learning, and 92% of district leaders stated that instructors were more effective when utilising the personalised learning strategy.A range of initiatives are included in personalised learning, with the goal of catering to the various interests and learning requirements of students from various backgrounds. Students' quest for knowledge also inspires them to learn more effectively.

According to McLeskey, Rosenberg, and Westling (2017), the following elements of personalised learning were investigated: student choice, student involvement, flexible learning environment, and personal learning routes. While there are still issues with implementing personalised learning, such as time constraints, resource constraints, and evaluation protocols, there has been a noticeable improvement, according to a survey report on the strategy's introduction in Australian secondary schools (Prain et al., 2013). The study's variable of interest is gender.Okoye (1987) contended that people assume that one sex may be more intelligent than the other due to biological distinctions in human makeup, such as those between men and women. Gender differences do not intrinsically account for any substantial differences in IQ between males and females. He maintained that male are not more creative than female just because they are viewed as the dominant and even superior sex. There is a widespread perception or stigma that mathematics is a field best left to men. A meta-analysis reveals that there is no discernible gender difference in the comprehension of mathematical concepts, however men often do better on tests involving problem-solving while girls tend to do better on computation-based assessments (Hyde & Mertzb, 2009). The influence of personalised learning on students' academic progress in Numeracy in the Ilorin West Local Government Area of Kwara State generates a researchable knowledge vacuum that this study aims to solve.

Statement of the Problem

Pupils numeracy academic achievement is considered an important factors in child's development, especially considering the importance of personalized instructional strategy however, it is observed that lack of support from teachers perharps slow down the pace of pupils numeracy achievements in schools. The situation has become of great worrisome to researchers and scholars in the field of education. Throughout the curriculum of the elementary three grades, numeracy is a subject that is developed. It has to do with using logic and reason to solve problems, as well as having the assurance and proficiency to use measurements and numbers in a variety of contexts. One of the main subjects taught in elementary schools is this one. At this stage of education, low numeracy achievement may be the consequence of teacher deficiencies and incorrect use of classroom procedures.

Theoretical and empirical evidences on the learner-centered method of teaching have been documented in Numeracy across the globe, empirical evidence on some of these innovative strategies (personalized) in this study is not many. To the best of researcher's knowledge, there seems to be no documented empirical evidence on the effect of personalized instructional strategy on pupils' academic achievement in Numeracy in Ilorin West Local Government Area of Kwara State, Nigeria. Although some researchers have worked on other strategies such as guided discovery and problem-solving strategy, relationship between children's constructive play activities, spatial ability, mathematical word and problem-solving performance. In spite of these efforts, the problem of pupils' poor academic achievement in numeracy skills persists. This creates a researchable gap in knowledge, the gap which research intends to fill by examining the effects of personalized instructional strategy on pupils' academic achievement in Ilorin West Local Government Area of Kwara State, Nigeria.

II. RESEARCH HYPOTHESES

The following research hypotheses are formulated and tested at 0.05 level of significance for the study;

$H_0$1: There is no significant main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government Area of Kwara State.

$H_0$2: There is no significant effect of gender on pupils' academic achievement in Numeracy in Ilorin West Local Government Area of Kwara State.

$H_0$3: There is no significant interaction effect of personalized instructional strategy and gender on pupils' academic achievement in Numeracy in Ilorin West Local Government Area of Kwara State.

III. METHODS

The study adopted a pre-test post-test control group quasi-experimental design due to the suitability in establishing possible effect relationship. It is a non-equivalent, control group design that requires non-random assignment of pupils into groups. Quasi-experimental research design is considered appropriate because, intact classes was used to avoid disruption of normal class lesson. The topic, which was taught during the treatment, a table of specification was prepared for evaluation of the pupils in numeracy in areas of knowledge, comprehension and application. The factorial design of 2x2 was adopted to test the null hypotheses for this study. The first two factorial levels were the experiment and control groups, the second factorial design level is gender occurring in either male (M) or female (F). A purposive sampling technique was used to select the school that were used for the experimental and control group respectively because of some of the characteristics needed by the researcher. One school was picked for the experimental group and another one school was picked for control group. Purposely, intact classes of primary three pupils were sampled from the two primary schools selected for the study.

Table 1. Showing the Research Design of the Study

Groups	Pretest	Treatment	Post test
Experimental Group	01	X1	03
Control Group.	02	-	04

Where: O1- Pre-test of the experimental group, X1-Treatment for the experimental group, O3- Post test of experimental group, O2- Pretest of the control group, O4- Post test of control group. The factorial matrix that was employed in this study is 2x2.

Variable of the Study

Independent variables

Personalized instructional strategy

Conventional method

Moderator variable

Pupils' Gender was manipulated at two levels

Male

Female

Dependent Variable

Pupils' academic achievement in numeracy

The population of this study comprised of all primary schools pupils in Ilorin West Local Government Area of Kwara State while the target population of this study were all primary three pupils in both 61 public primary schools with a total of 6,696 and 266 private schools with total of 13,443 primary schools children in Ilorin West Local Government Area, Kwara state, (Kwara State School Census Report,2019-2020). Sample size for the study were four primary three classes. The multistage sampling techniques was used. The purposive sampling technique was used to select four mixed primary schools (Boys and Girls schools) because of certain characteristics they possessed that relevant to the conduct of this study. From which four schools are randomly selected. Two public schools as well as two private schools were selected randomly as the experimental groups and control group. Thereafter, primary three pupils of these schools were selected for the experimental group as well as the control group. Three research instruments were used for the study one achievement test title: Pupils' Numeracy Achievement Test (PNAT), and two Treatment Package title**:** Instructional Guide for Personalized Instruction (IGPI), Instructional Guide for Conventional Method (IGCM). Instrument was subjected to face and content validity by some selected Numeracy teachers in primary schools. Pearson Product-Moment Correlation (PPMC) coefficient was used to determine the reliability index of 0.78. data were analyzed using frequency counts, mean and percentage, while the research hypotheses were tested, using analysis of covariance (ANCOVA) all at 0.05 level of significance.

IV. RESULT AND DISCUSSION

Section A: Demographic Characteristics

Table 2. Gender Distribution

Gender	**Frequency**	**Percentage**
Male	67	51.5
Female	63	48.5
Total	130	100.0

Table 2 shows the distribution of participants based on gender. 67 of the participants representing 51.5% were male while 63 of the participants representing 48.5% were female. From the analysis above, it was obvious that male participants were found to be more in number than female participants.

SECTION B: Testing of the Hypotheses

Ho1: There is no significant main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State.

Table 3. Summary of Analysis of Covariance (ANCOVA) showing the main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	82.249[a]	8	10.281	3.795	.001

Intercept	1305.617	1	1305.617	481.966	.000
Pre_Test	29.305	1	29.305	10.818	.111
Treatment	27.564	1	27.564	10.175	.002
Treatment*Gender	.317	1	.317	.117	.733
Treatment*School Type	16.973	1	16.973	6.266	.014
Treatment * Gender*School Type	1.793	1	1.793	.662	.418
Error	327.782	121	2.709		
Total	30142.000	130			
Corrected Total	410.031	129			
a. R Squared = .271 (Adjusted R Squared = .234)					

Table 3 data shows the main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State. The finding revealed that there was a significant main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1; 129)} = 10.175$, $P< 0.05$). The hypothesis is therefore rejected in light of the result since the significant value (.002) is less than 0.05. This implies that there is a significant main effect of treatment on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State.

Treatment	Mean Difference	Experimental	Control
Personalized Instruction	15.726a	*	
Conventional Method	14.667a		*

Table 4. Summary of Bonferroni's Poc Hoc Pairwise Comparison of the scores within the two groups

Table 4 data revealed that the significant main effect exposed by table 5 is as a result the significant difference between Personalized Instruction and conventional method. Personalized Instruction refers to the experimental group, while conventional method is known as the control group. This implies that those exposed to Personalized Instruction (15.726) performed significantly higher than those exposed to conventional method (14.667).

Research Hypothesis Two: There is no significant main effect of treatment and gender on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State.

Data in table 2 revealed the effect of treatment and gender on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State. The finding shows that there was no significant effect of treatment and gender on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1; 129)} = .117$; $P > 0.05$). The hypothesis is therefore not rejected in light of the result since the significant value (.733) is greater than 0.05. This implies that treatment and gender had no significant effect on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara state.

Research Hypothesis Three: There is no significant main effect of treatment and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State.

Data in table 3 revealed the effect of treatment and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State. The finding shows that there was significant effect of treatment and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1; 129)} = 6.266$; $P < 0.05$). The hypothesis is therefore rejected in light of the result since the significant value (.014) is less than 0.05. This implies that personalized instruction and school type had significant effect on pupils' academic performance in Basic Science in Ilorin South Local Government area of Kwara state.

Research Hypothesis Four: There is no significant main effect of treatment, gender and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State.

Data in table 3 revealed the effect of treatment, gender and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State. The finding shows that there was no significant effect of treatment, gender and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1; 129)} = .662$; $P > 0.05$). The hypothesis is therefore not rejected in light of the result since the significant value (.418) is more than 0.05. This implies that personalized instruction,

gender and school type had no significant effect on pupils' academic performance in Basic Science in Ilorin South Local Government area of Kwara state.

Discussion of Findings

Findings emanated from this study revealed that there was significant main effects of personalized instructional strategy on pupils' academic performance in Numeracy in Ilorin West Local Government Area of Kwara State. This findings supported the submissions of Romiro,(2021) investigated the effects of personalized instruction on the academic achievement of students in Physics. Personalization in instruction was introduced through a personalized modular instruction (in terms of content and procedure) followed by exercises/drills. It was found out that the students who were exposed to the constructive learning environment through personalized instruction performed better in their academic achievement in Physics: a highly significant effect on the academic performance of the students and a moderately high impact model of variability (72.7 %) in their academic achievement.

The finding is also in an agreement with Awofala (2014) revealed that personalized instruction pupils had higher levels of self -confidence, liking, usefulness, and motivation but recorded low level of anxiety regarding-numeracy word problems compared with the non-personalized group pupils. The result was in line with Akinsola and Awofala (2009), revealed that 320 senior secondary pupils in Nigeria, had shown significant different results due to the use of personalized print-based instruction and gender difference.Another finding also revealed that, there was no significant effect of treatment and gender on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1;\ 129)} = .117$; $P > 0.05$), there was significant effect of treatment and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1;\ 129)} = 6.266$; $P < 0.05$) and there was no significant effect of treatment, gender and school type on pupils' academic achievement in Numeracy in Ilorin West Local Government, Kwara State ($F_{(1;\ 129)} = .662$; $P > 0.05$).

V. CONCLUSION

Based on the findings of the study, it can be explicitly stated that personalized instructional strategy can enhance better performance in Numeracy than the traditional method of teaching and learning. By the result of this study, it can therefore be concluded that gender had no significant effect on pupils' academic performance in Numeracy in Ilorin West Local Government Area of Kwara State

VI. RECOMMENDATIONS

On the basis of the study's findings, the following recommendations are made:

1. Numeracy teachers should be enlightened on the effectiveness of personalized instructional strategy on pupils' academic performance in Numeracy.
2. Curriculum developer in Numeracy like, Federal and State Ministries of Education, school proprietors and Nigerian Educational Research and Development Council (NERDC) should incorporate personalized instructional strategy into the numeracy curriculum as one of the innovative strategies that would be used to teach Numeracy especially in primary schools.
3. Pupils' academic performance should not be determined by the teachers, head teachers and proprietors/proprietress based on their gender because, the factors have been discovered not to be strong factor that hinder pupil's academic performance.

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