

Problem-solving Strategy as a Determinant of Pupil's Academic Performance in Numeracy in Ekiti Local Government Area, Kwara State

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Abstract: *One may be aware that the numeracy performance of the pupils was no more encouraging. The researcher, therefore, examined problem-solving strategy as a determinant of a pupil's academic performance in numeracy. A quasi-experimental design was used, consisting of a series of pre and post-tests. Scores were collected using PNPT. Numeracy teachers validated the instrument. PPMC was used to obtain reliability at 0.81. The collected data were analysed using analysis of covariance (ANCOVA) at a significance level of 0.05. It was found that there was a significant effect of the problem-solving strategy on pupils' numeracy academic performance ($F_{1; 51} = 8.691, P 0.05$). It was concluded that using a problem-solving approach can help students become more successful in the classroom, acquire new knowledge, and broaden their horizons. It was suggested that the teachers should be provided with seminars and workshops on how to use problem-solving strategies in the classroom*

Keywords: Numeracy, Academic performance, Problem-solving strategy and gender

Introduction

The goal of any classroom activity should be to influence students' behaviour in a positive way. The extent to which students improve in their mastery of a subject or learning task may be one indicator of this trend. Academically speaking, a student's performance is their demonstrated level of intelligence on a prescribed exam. The educational standards of a nation have traditionally been evaluated based on its students' test scores in Numeracy (Yusuf, 2019)

Steen (1991) argued that the ability to understand, use, calculate, manipulate, and interpret results is an essential part of numeracy, and that it is as integral to Mathematics as literacy is to the English language. In recent years, numerous authors have advocated for various aspects of numeracy, with a common theme being that numeracy is the ability to understand and apply mathematical rules to resolve real-world challenges (Best, 2008). Adult numeracy refers to the ability to put mathematical concepts into practice (Awofala & Anyikwa, 2014)

When a child is in elementary school, he learns the fundamentals of reading, writing, and arithmetic. He can interact with others and conduct business in the world with confidence thanks to his newfound abilities (Anekwe, 2018). In the early years, children lay the groundwork for their future success in mathematics. Children's innate curiosity and enthusiasm are fostered by learning mathematics, and this happens through direct experience. If introduced at the right time and in the right context, early numeracy can do much more for a child than just get them ready for school or head-start them on elementary mathematics. Multiple studies have shown that how and where mathematical skills are measured has a significant impact on students' achievement. Students' mathematical abilities have been relatively weak for the past few years (Aremu, 2003).

Primary school pupils have been observed to have performed poorly in mathematics. This was due, in part, to pupils' inability to learn, unlearn, and re-learn, as well as to parents' ineffectiveness in encouraging their children to read at home so that their children can gain knowledge beyond what they have received in school. This is not to discount the fact that the teacher is a crucial factor in pupils' success in class by any means, since classroom instruction relies on the teachers' ability to instill knowledge through the application of strategy like the problem-solving (Yusuf, 2019)

The ability to think critically and develop effective solutions to problems is the bedrock of mathematical success. Therefore, teachers need to equip students with the skills necessary to identify and resolve problems using a variety of strategies, some of which have been discussed above. In addition to being useful in mathematics, this problem-solving skill is applicable to a wide range of real-world situations (Mehraj, 2014).

Problem-solving ability is the best predictor of performance in mathematics of advance school students as well. Danjuma and Aishatu, (2010) also found relationship between problem solving and achievement in mathematics. Therefore, teachers play most important role in developing pupils' problem-solving dispositions. They must choose problems that engage pupils. Bawa (2011) investigated the effects of using a problem-solving instructional strategy on secondary school students' achievement and retention in ecology. He argued that PSISS could be used to help students of all learning styles better understand and remember ecological concepts they are being taught. Because of this, it is crucial that secondary school biology teachers think about incorporating PSISS into their lessons. This style of instruction encourages students to participate actively in class, allowing them to learn new skills and expand their horizons. In addition, it helps and improves students' capacity for memory retention. This could be because of the rich

opportunities for student-to-student, student-to-teacher, and student-to-instructional resource information exchange that occurs in a classroom irrespective of gender of the students.

Most researchers have also recognised the issue of gender's impact on academic achievement. This is due to the fact that gender appears to have significant effects on education. There was no distinguishable difference in intelligence between sexes, found by Fauto and Friedman (2005). According to Okoye (2008), there was no significant difference in academic performance based on gender. He also emphasised the importance of the student's effort over gender in determining their final grade.

Statement of the Problem

Numeracy is the logical thinking, the ability to solve problems, and comfort to ease numerical and metric concepts. It is typically one of the core subjects. Poor performance in numeracy at this level of education might be as a result of inadequacies and inappropriate use of classroom practises by the teachers. This was evident during the inter-school's quiz competition where pupils found it difficult to answer some of the numeracy questions. Therefore, the researcher investigated problem-solving strategy as a determinant of pupil's academic performance in numeracy in Ekiti Local Government Area, Kwara state.

The following hypotheses were formulated to guide the study

Research Hypothesis One: There is no significant main effect of problem-solving strategy on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Research Hypothesis Two: There is no significant main effect of gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Research Hypothesis Three: There is no significant interaction effect of problem-solving strategy and gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State

Methodology

A quasi-experimental design was used in this study, consisting of a series of pre and post-tests. Two public and two private schools were chosen at random using a stratified random sampling method. Scores were collected both before and after instruction using the Pupils' Numeracy Performance Test (PNPT). The tool served as a form of pre-exercise testing. Both the experimental and control groups received it based on their prior exposure to a predetermined set of curriculum topics. Numeracy teachers from the chosen schools helped verify the reliability and validity of the instrument. Within a span of two weeks, items were established through a test-retest procedure. Since this was an issue, the researcher and the research assistants employed the Pearson Product Moment Correlation (PPMC) to determine a coefficient of reliability for the instrument at 0.81. The experiment was conducted by the researcher and his assistants. The procedure adopted was to develop the pretest based on the topics chosen before the practise began. Then, the selected topics were taught to the experimental group using a problem-solving strategy, while the control group was prepared in the usual fashion. The test was given twice, once before and once after the instruction and practise sessions. An analysis of covariance (ANCOVA) was used to analyse the data at a 0.05 level of significance.

Results

Research Hypothesis One: There is no significant effect of problem-solving strategy on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Table 1: This table presents the findings of an ANCOVA study that examined the impact of problem-solving on students' proficiency in numeracys in the Ekiti Local Government Area of Kwara State.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2301.266 ^a	11	209.206	2.308	.022
Intercept	21925.671	1	21925.671	241.862	.000
Pretest	125.167	1	125.167	1.381	.245
Problem solving strategy	1575.781	1	787.891	8.691	.001
Gender	64.092	1	64.092	.707	.404
Problem solving strategy * Gender	205.875	2	102.937	1.136	.329
Error	4623.337	51	90.654		
Total	403750.000	63			
Corrected Total	6924.603	62			

Results in the area of numeracy are shown in Table 1 for pupils in the Ekiti Local Government Area of Kwara State who were exposed to Problem-solving strategy. Pupils' numeracy performance improved significantly after being exposed to problem-solving lessons in the Ekiti LGA of Kwara State. ($F_{(1, 51)} = 8.691, P < 0.05$). The hypothesis is therefore rejected in the light of the result since the significant value (.001) is less than 0.05. This implies that Problem solving strategy had significant effect on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Table 2: Summary of Bonferroni's Post Hoc pairwise Comparison of the scores within the two Groups

Treatment	Mean Score	Experimental	Control Group
Problem-solving Strategy	84.993	*	
Conventional Method	69.766		*

As can be seen in Table 2, the main effect revealed in Table 1 is due to the difference between Problem-Solving Strategy and the Conventional Method, which is statistically significant. This indicated that pupils who were taught using the problem-solving strategy outperformed their traditional-method counterparts by a large margin.

Research Hypothesis Two: There is no significant main effect of gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Table 1 also reveals the effect of gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State. There was no significant effect of gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State ($F_{(1, 51)} = .707; P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significant value (.404) is greater than 0.05. This implies that gender had no significant effect on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Research Hypothesis Three: There is no significant interaction effect of problem-solving strategy and gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State

Table 1 also shows the interaction effect of Problem-solving strategy and gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State. There was no significant interaction effect of Problem-solving strategy and gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State. ($F_{(2, 51)} = 1.136; P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significant value (.329) is greater than 0.05. This implies that Problem-solving strategy and gender had no significant effect on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State.

Discussion of Findings

One of the result emanated from this study stated that There was significant effect of Problem solving strategy on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State ($F_{(1, 51)} = 8.691, P < 0.05$). The findings corroborated those of Danjuma and Aishatu (2010), who had previously established a link between problem-solving and mathematical success. As another example, Bawa (2011) looked into the impact of a problem-solving approach on the learning and retention of ecology among secondary school students. Students' ability to remember information, as well as their willingness to try new things and broaden their horizons, both increase when they use problem-solving strategies. The strict application of the strategy's tenets in the classroom is a guarantee of this outcome.

Other results revealed that there was no significant effect of gender on pupils' numeracy academic performance in Ekiti Local Government Area of Kwara State ($F_{(1, 51)} = .707; P > 0.05$). This agreed with the findings of Fauto and Friedman (2005), who also found no significant difference in IQ between the sexes. In addition to the findings presented here, Okoye (2008) argued that there was no statistically significant difference in academic performance between the sexes. This suggests that achievement is not predicated on a person's gender, but rather on the competence and strategy of the instructor.

Conclusion

It was determined that using a problem-solving approach can help students become more successful in the classroom, acquire new knowledge, and broaden their horizons.

Suggestions

It was suggested based on the discussion of the findings that:

1. For the sake of efficient lesson delivery, teachers should be urged to employ the problem-solving strategy.
2. Teachers should be provided with seminars and workshops on how to use problem solving strategy in the classroom.
3. The gender of the pupils should not be a factor in how well they do in school or what skills they learn.

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