

Effect of Ludo Game on Senior Secondary School Students' Academic Performance in Mathematics in Ogbomosho North, Oyo State, Nigeria

By:

Issau K. A., Hassan M. O., & Zakariyau A. A.

**EFFECT OF LUDO GAME ON SENIOR SECONDARY SCHOOL STUDENTS'
ACADEMIC PERFORMANCE IN MATHEMATICS IN OGBOMOSO NORTH, OYO
STATE, NIGERIA**

By

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Abstract

Games is one of the promising approach to enhanced teaching and learning of mathematics concepts in secondary schools. The study examined the effects of instructional game on senior secondary school students' performance in probability. Two objectives and two research questions were raised to guide the study. The researchers employed a quasi-experimental design of the pretest, posttest, non-randomized, and non-equivalent control group design. Purposive sampling technique was used to select one hundred and twenty (120) senior secondary school students in Ogbomoso North, Oyo State, Nigeria. The experimental group was exposed to Ludo game while the control group was taught probability using conventional method. The instrument used for data collection was Probability Performance Test (PPT) with reliability coefficient of 0.78. The data collected were analyzed using mean, standard deviation and t-test statistics. The result of the findings revealed that there was a significant difference in the performance of students taught probability using Ludo game than the control group, $t_{(117)}=7.34$, $p < 0.05$. Also, gender has no influence on students' academic performance in probability, $t_{(66)}=0.69$, $p > 0.05$. The study recommended among others that mathematics teachers should adopt the use of games in their teaching to enhance students' performance in mathematics and also Federal Ministry of Education and Professional bodies should train teachers on how to use instructional games such as Ludo for teaching and learning of mathematics

Keywords: Instructional games, Ludo game, student performance

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Introduction

The relevance of mathematics in the area of logical thinking, reasoning, problem-solving, and human and national development cannot be over-stressed, hence its inclusion as a core subject in the school system. The success of intellectual development to propel scientific and technological development to foster national development rests heavily on sound mathematics education policies. As a result, mathematics education is now a crucial part of academic curricula all around the world (Ojose, 2018). Iji (2008) agreed that there could be no real technological development without a corresponding development in mathematics for both as conceived and as practiced. That is why mathematics is a compulsory subject both in senior and junior secondary schools. Mathematics is seen as the foundation for any meaningful scientific endeavour and any nation that needs development in science and technology. Thus, mathematics is an essential tool for the advancement of science and technology in the present era, and neglecting it would affect national development (Odili, 2006).

Mathematics remains a service provider for all disciplines and it contributes immensely in deciding direction of activities in all areas of human activities such as economy, market transactions, industrial functions, research, leadership, engineering and others too many to mention (Salman, 2005; Odili, 2006; Ugwuanyi & Agwagah, 2014). The development of any nation is dependent on its improved mathematics education which establishes bases for technological advancement. The present national ambition is to pursue education using modern mathematics techniques in which students are actively involved. One of the activity-oriented method that make mathematics teaching and learning interesting and attractive is the

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use of mathematical games. Mathematics game can facilitate the mathematical environment as they release tension, boredom and establish a friendly atmosphere which allows for growth of skills and knowledge.

Despite the indispensability of mathematics in the development of humanity, it has experienced a persistent failure in both internal and external examinations (Sam-kayode & Salman, 2015). This failure is attributed to perceived difficulties in mathematics by the students and poor teaching methods by mathematics teachers (Okereke, 2006 & Azuka, 2003). Several researchers and mathematics educators have also agreed that there is a prevalence of poor achievement in mathematics among school students. Many studies have shown significant improvement in students' academic performance in mathematics when exposed to innovative learning approaches in the teaching and learning of mathematics. The use of games was found to have a strong impact on the learning strategies adopted and on their confidence towards mathematics. A game is a situation in which two or more persons confront one another in order to achieve a winning situation (Agwagah, 2001). Ludo games are games which are interactive hardware or software played for entertainment, challenge or educational purpose. It combines physical, mental and cognitive agreement in a group situation to achieve the learning content embedded in the game (Alio & Okafor).

New technologies have generated increased and applications of scientifically based materials in the world of work thereby increasingly the importance of science and mathematics knowledge and skill for workers (Solomon, Isa and Pius, 2010). Mathematics and Science are keys to innovation and power in today's world hence its improvement to enhance ability to succeed in the global economic development of the nation is highly imperative (Earls and

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Holbrook, 2007). Consequently, this study focused on the effects of instructional games (Ludo) on senior secondary school mathematics. This study may assist in improving the students' performance in mathematics which could enhance their abilities to improve their leadership qualities and service to humanity.

Statement of the Problem

The consistent poor performance in mathematics has been a concern to mathematics educator, mathematician and the general public. Despite the importance of mathematics and most especially to both national and individual development, students' performance in the subject has not been encouraging. This poor performance has been attributed to many factors which include: inadequate teachers' content knowledge, poor teaching methods, lack of instructional materials for teaching, students' misconception and misinterpretation of questions and non-adoption of limitless power of technology (Sam-kayode & Salman, 2015).

In order to proffer solutions to these problems, the present study focused on integration of instructional game to enhance students' academic performance in mathematics. Instructional games facilitate descriptive learning, reduce cognitive load and make procedural learning an active process to enhance performance. In order to enhance the not so good performance of students in mathematics by reducing theoretical presentation and exploiting, the current study aims to investigate the effects of Ludo game on senior secondary school students' academic performance in mathematics as a potential solution to the pressing issue of poor academic performance in Ogbomoso North Oyo State, Nigeria.

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Purpose of Study

The main purpose of this study was to determine the effect of Ludo game on senior secondary school students' academic performance in mathematics. Specifically, this study find out:

1. The effect of Ludo game on probability in senior secondary school students' academic performance in mathematics.
2. The influence of gender on senior secondary school students' academic performance in mathematics.

Research Questions

The following research questions were raised to guide the study;

1. What is the effect of Ludo game on probability in senior secondary school students' academic performance in mathematics?
2. Is there any difference in the academic performance of male and female students exposed to Ludo game?

Research Hypotheses

The following research hypotheses were tested in this study;

1. There is no significant difference in the academic performance of senior secondary school students' when taught using Ludo game and those taught using conventional method approach.
2. There is no significant difference in the academic performance of male and female students taught probability using Ludo game.

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Methodology

The study adopted quasi-experimental design which involved pretest non-equivalent groups and non-randomized control group design. All senior secondary schools' students in Ogbomosho North constituted the population. Purposive random sampling was used to select two schools for the study. A total of 120 senior secondary school students were involved in the study. The students were randomly assigned to experimental and control groups. The experimental group taught with the Ludo game was made up of 68 students (33 males and 35 females), while the control group taught with the conventional method was made up of 52 students (28 males and 24 females).

The research instrument used for the study was titled Probability Performance Test (PPT), which is the test instrument. PPT was made up of 30 multiple choice items constructed by the researcher. Each item was provided with four possible options A-D, out of which a student is expected to choose the correct answer. One mark was awarded for every correct question answered. The score obtained out of 30 was later converted to percentage. The face and content validation of Probability Performance Test (PPT) was done by two mathematics experts. Based on experts' suggestions and recommendations, the instrument were modified and restructured.

Trial testing and pilot study were carried out in a secondary school within the study area, but outside the schools selected for the main study, 50 SSII students were used. After a single administration of the test instrument, the split-half method was used, and a reliability coefficient of 0.78 was obtained. The data collection procedure lasted for six weeks; PPT was administered as a pre-test and post-test to both the experimental and control groups. Ludo

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game and conventional method were used to present the probability topic to the experimental group only while the control group was taught using chalk and talk method only. The data collected were analyzed with descriptive and inferential statistics. The hypotheses were tested using t-test statistics at a 0.05 alpha level of significance.

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Results

Research Question One: What is the effect of Ludo game on probability in senior secondary school students' academic performance in mathematics?

Table 1: Mean Gain Score of Students' Academic performance for both Experimental and Control Groups

Group	Number	Pretest		Posttest		Mean Gain Score
		Mean	SD	Mean	SD	
Experimental	68	24.56	8.90	38.18	8.36	13.62
Control	52	24.54	6.78	25.53	7.05	0.99

Table 1 shows the mean gain score of students who participated in the performance test on probability. The mean gain score of students exposed to LUDO was 13.62, while the mean gain core of students taught probability using the conventional method was 0.99. The mean gain score of the experimental group was 12.63 higher than the control group. Further analysis was conducted to test whether the difference in the means was statistically significant, and this led to research hypothesis one.

H₀₁: There is no significant difference in the academic performance of senior secondary school students taught using Ludo game and those taught using conventional method approach.

Table 2: t-test analysis of academic performance of students exposed to Ludo game and those taught probability using conventional method.

Group	N	Mean	SD	Df	t-value	P-value
Experimental	68	38.18	8.36			

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			117	7.34	.00**
Control	52	25.53	7.05		

P<0.05, **significant

Table 2 shows the t-test analysis of the student's performance. The table indicated that $t(117)=7.34$, $p = 0.00$. Since the p-value is less than the level of significance (0.05), the null hypothesis was rejected. Therefore, there seems to be a significant difference in the academic performance of students taught probability using the Ludo game compared to those taught using the conventional method approach.

Research Question Two: Is there any difference in the academic performance of male and female students exposed to Ludo game?

Table 3: Mean gain score of male and female students taught probability using Ludo game

Group	Number	Pretest		Posttest		Mean Score	Gain
		Mean	SD	Mean	SD		
Male	33	24.36	9.10	35.45	9.64	11.09	
Female	35	24.74	8.70	36.86	7.02	12.12	

Table 3 shows the mean gain score of male and female students in the group exposed to the instructional game (LUDO). The mean gain score of male students exposed to Ludo was 11.09, while the mean gain score of female students exposed to Ludo was 12.12. The mean gain score of the female students was higher than that of the male students. Further analysis was conducted to test whether the difference in the means was statistically significant, which led to research hypothesis two.

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Ho₂: There is no significant difference in the performance of male and female students taught mathematics using instructional game.

Table 4: T-test of male and female students taught probability using the Ludo game.

Group	N	Mean	SD	Df	t-value	P-value
Male	33	35.45	9.64			
				66	0.69	0.49
Female	35	36.86	7.02			

P<0.05, Not significant

Table 4 shows the t-test analysis of male and female students' academic performance. The table indicated that $t(66)=0.69$, $p = 0.493$. Since the p-value is greater than the level of significance (0.05), the null hypothesis was accepted. Therefore, there seems to be no significant difference in the academic performance of male and female students taught probability using an instructional game (Ludo).

Discussion

This study compared the effects of Ludo games with conventional method of teaching on senior secondary students' academic performance. It aimed at finding out whether students

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taught probability with Ludo game perform better than those taught with conventional method or chalk and talk method. The study revealed that there was a significant difference in the academic performance of students taught probability using the Ludo game and those taught probability using the conventional method approach. Those students who were taught probability using the Ludo game had significantly higher scores than those taught using the conventional method. This result is in agreement with Adeniyi and Salman (2016), who asserted that students' academic performance increased when taught using a computer animation package in geometry.

Also, this study found no significance difference in the academic performance of male and female students taught probability using the Ludo game, as revealed in Table 4, though the female students performed slightly better than the male students. The most recent study involving analysis of male and female academic performance in mathematics indicated no significant difference (Ajaegb & Ekwueme, 2019).

Conclusion

The study investigated the effect of Ludo game on senior secondary school students' academic performance on probability in mathematics. The findings from this study revealed that the Ludo game produced better achievement in students when supplemented with a discussion method of instruction. The results indicated a significant difference in the performance of students taught probability using the Ludo game than those taught probability using the conventional method. Also, gender has no influence on the academic performance of students taught probability using instructional games (Ludo). It can be concluded that Ludo game is effective in enhancing students' academic performance in mathematics.

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Recommendations

Based on the findings of this study, the following recommendations were made.

1. Ludo game has been found to be effective in enhancing students' academic performance on probability and therefore mathematics teachers are encouraged to adopt Ludo game to teach mathematics.
2. Professional bodies like the National Teacher's Institute (NTI), Mathematics Association of Nigeria (MAN), Teachers Registration Council of Nigeria (TRCN), and National Mathematics Centre (NMC) should organize workshops and seminars for teachers on how to use instructional games such as Ludo for the teaching and learning of mathematics.
3. Mathematics teachers should be sensitive to gender issues when using instructional games to teach mathematics.

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