

EFFECTS OF ROLE PLAY AND ADVENTURE DIGITAL GAME-BASED INSTRUCTION ON SECONDARY SCHOOL GEOGRAPHY STUDENTS' ACHIEVEMENT IN NORTH- CENRAL, NIGERIA

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ABSTRACT

This study investigated effects of Role Play and Adventure Digital Game-Based Instruction on Secondary School Geography Students Achievement in North-Central, Nigeria. The study had four objectives. In line with the objectives, four research questions and hypotheses were raised. This study employed a quasiexperimental design. The population consisted of 698,480 secondary school geography students, from which a sample of 245 students was selected using purposive sampling, focusing on intact classes. Two experimental groups were created while a control group received conventional teaching. The instruments used for data collection were the Geography Achievement Test (GAT) and the Geography Retention Test (GRT) were validated by experts from the Department of Educational Technology at FUT Minna. Reliability analysis using Cronbach's alpha yielded a coefficient of 0.75 and 0.82. After the six-week intervention, the GAT was administered to assess students' academic achievement, followed by the GRT two weeks later to measure retention. Data were analyzed using mean and standard deviation to answer the research questions, while ANOVA and ANCOVA were employed to test the hypotheses. Findings revealed a significant difference in the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method, $F_{(2,243)} = 10.304$, *P*-value = 0.000 at P<0.05 with calculated effect size of $\eta_p^2 = .08$, which signified a "high" effect. Based on the findings, it was recommended that Adventure Digital GameBased Instruction and Role Play Digital Game-Based Instruction should be used for teaching Geography in secondary schools.

Keywords: Role-Play Game, Adventure Game, Digital Game-Based Instruction, and Academic Achievement.

Introduction

The world is becoming increasingly characterized by technology-driven communication, which has transformed the world into a global connected community with ever-increasing outreach of information and communication technology. It is obvious that the impact of ICT has also brought transformation in Nigeria educational system as a developing nation. It's therefore evident that technology is the application of discoveries of science to proffer solutions to human and societal problems (Ayodele and Jackson, 2019). Teaching and learning in contemporary schools have greatly been influenced by information and communication technology following a trend in contemporary societies which base their progress on the knowledge of information media like Digital Games Based Instruction. Digital games based instruction are broadly defined as a form of learning that elicits experiential engagement of players in a learning activity using technological tools, such as computers, tablets, smart phones, net books among others (Mei *et al.* 2018).

Role play and adventure games are examples of digital games. Role play digital game is a storylines game in which students assume the role of character in a fictional setting in relation to Geography embedded content to realize a "role game" for a whole class playing together Jantke and Hume (2021) while Adventure game is a form of gameplay which is focused on puzzle solving in the classroom. Players navigate through until they reach the final goal thereby making learning more enjoyable in different subject areas like Geography.

Geography is the study of places and relationships between people and their environment and its teaching has undergone a series of transformations from teachers-oriented teaching to learners' centered teaching through innovative teaching strategies like digital games (Iwena, 2018). Digital games instruction allows learners to visualize, interact, and identify certain visual effects in geography, it enhance students' learning context which helps to shape a higher level of achievement.

Achievement is the outcome of students' evaluation results in a particular teaching contents. Also, the outcomes of the students learning achievement are strongly positively linked to the effective use of educational digital game-based instruction (Alkhalifah *et al.*, 2021). In other words, learners would change the knowledge, skills

and behaviors, and learning achievement after the instruction (Lederer and Battaglia, 2019). Geography students' achievement test is an instrument administered to an individual as stimuli to elicit certain desired and expected responses, as demanded in the instrument; performance on which the individual is assigned a score representing his achievement either through role play digital game based learning or adventure digital game based learning instruction

Statement of the Research Problem

Geography is seen as a subject that develop learners' critical thinking ability and to comprehend spatial relationship among various features on the surface of the earth, most importantly in problem solving and further prediction of the environmental phenomenon. As important as the subject is, the poor academic performance of students at West African Examinations Council, (WAEC) and National Examination Council (NECO) Chief Examiners Report (2018), (2019); and (2020). (2021) referencing students' outcomes in Geography have indicated unsatisfactory, poor and discouraging performance among Nigerian secondary school geography students. Following this assertion, the researcher projected that among other factors responsible for the trend of students' unsatisfactory performance in Geography in recent years include teaching methodology, inadequate explanation of points, inadequate preparation and poor presentation of geographical features and concepts.

This has become a source of concern to all stakeholders in Nigerian education system, as most teachers in Nigeria that teach Geography, particularly Physical aspect of Geography across secondary school stages, (SS I to SS III) have decried the effectiveness of methods used in the teaching and learning of the subject. Those who teach subjects like urban and regional planning and environmental studies that require the application of Geography also complained of the challenges they face. One of such challenges as stated in the NECO Chief Examiner's Report of 2021 was the method and little knowledge of the content of the Geography syllabus and general phobia for questions that require diagrams, sketches and charts in the physical aspect of Geography.

In spite of the widespread application of various effective interactive strategies like the use of actors, symbol's, graphics, animation, simulations, gamification packages at various times to improve classroom instruction in Nigeria, the trend persisted. Following these, Literature appeared to prove that there has been insufficient research that specifically examines effect of Role Play and Adventure Digital Game Based Instruction on learning outcomes in Geography among senior secondary school students in North Central Nigeria. Consequently, to the researcher's knowledge, from the reviewed work, none of the studies seek to address the issue of convectional sign and symbols, use and functions in map interpretation of features in a topography map in physical Geography. Therefore, as a step towards addressing these problems, a more interactive strategy that will actively involve the students in Geography lesson becomes imperative. Hence, the strategy that might salvage the problem may be the use of digital role pay and adventure games based instruction. As a result, the researcher sought to investigate the effectiveness of role play and adventure digital game-based instruction on secondary school geography student's achievement in North-Central, Nigeria.

Aim and Objectives of the Study

The study intends to achieve the following objectives;

- 1. Determine the effects of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method on the achievement of secondary school Geography students in North-Central, Nigeria.
- 2. Determine the influence of gender on the academic achievement of secondary school Geography students when taught using Role Play Digital Game-based Instruction in North-Central, Nigeria .
- 3. Examine the influence of gender on the academic achievement of secondary school Geography students when taught using Adventure Digital Game-based Instruction in North-Central, Nigeria.
- 4. Determine the influence of gender on the academic achievement of secondary school Geography students when taught using Conventional Teaching Method in North-Central, Nigeria.

Research Questions

The following research questions were raised for the study:

- 1. What are the effects of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method on the achievement of secondary school Geography students in North-Central, Nigeria?
- 2. What is the influence of gender on the academic achievement of secondary school Geography students when taught using Role Play Digital Game-based Instruction in North-Central, Nigeria?
- 3. What is the influence of gender on the academic achievement of secondary school Geography students when taught using Adventure Digital Game-based Instruction in North-Central, Nigeria?

4. What is the influence of gender on the academic achievement of secondary school Geography students when taught using Conventional Teaching Method in North-Central, Nigeria?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.5 alpha level of Significance:

- HO₁: There is no significant difference in the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method in North-Central, Nigeria.
- **HO**₂: There is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI) in North-Central, Nigeria.
- HO₃: There is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Adventure Digital Game-Based Instruction (ADGBI) in North-Central, Nigeria.
- HO₄: There is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Conventional Teaching Method in North-Central, Nigeria.

MATERIALS AND METHODS

This study employed a quasi-experimental design to investigate the effects of roleplay and adventure digital game-based instructional methods on the academic achievement and retention of geography students in North Central Nigeria. The population consisted of 698,480 senior secondary school geography students, from which a sample of 245 students was selected using purposive sampling, focusing on intact classes. Two experimental groups were created: one group was taught using role-play digital game-based instructions, and the other using adventure digital gamebased instructions, while a control group received conventional teaching. The instruments used for data collection were the Geography Achievement Test (GAT) and the Geography Retention Test (GRT), both of which were validated by two experts from the Department of Educational Technology at FUT Minna. Reliability analysis using Cronbach's alpha yielded a coefficient of 0.75 and 0.82 respectively which indicate that instrument was reliable for the study. After the six-week intervention, the GAT was administered to assess students' academic achievement, followed by the GRT two weeks later to measure retention. Data were analyzed using mean and standard deviation to answer the research questions, while ANOVA and ANCOVA were employed to test the hypotheses, identifying statistically significant differences among the groups.

RESULTS

Research Question One: In answering research question one, on the effect of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method on academic achievement of Senior Secondary School Geography students in North-Central, Nigeria, Mean and Standard Deviation was used to answer research question one. This is shown in Table 1.

Table 1:Mean and Standard Deviation of Scores of Role Play DigitalGame-Based Instruction, Adventure Digital Game-Based Instructionand Conventional Teaching Method at Pretest and Posttest ofAchievement

Group		Ν	Pretest		Posttest		Mean	
							Gain	
			\overline{X}	SD	\overline{X}	SD		
RPDGBI		85	28.82	7.239	66.42	7.092	37.60	
ADGBI		81	28.32	7.345	70.00	7.463	41.68	
Conventional	Teaching	79	25.09	6.693	65.23	7.238	40.14	
Method								

Key: \overline{X} = Mean, SD= Standard Deviations, N= Number in samples

Table 1 reveals the Mean achievement scores and Standard Deviation of students who were taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method. The table showed that the Mean achievement score of the three groups at posttest differ statistically. Students taught with Adventure Digital Game-Based Instruction had the highest Mean achievement score of 70.00 with Standard Deviation of 7.463, followed by the mean score of students taught using Role Play Digital Game-Based Instruction which had Mean achievement score of66.42 with Standard Deviation of 7.092 while Conventional Teaching Method had Mean achievement score of 65.23 with Standard Deviation of 7.238. There were adjusted scores of 41.68, 40.14 and 37.60 respectively. This shows that Adventure Digital Game-Based Instruction enhanced better achievement of students more than Role Play Digital Game-Based Instruction and Conventional Teaching Method.

Research Question Two: In answering research question two, on the influence of gender on the academic achievement of secondary school Geography students when taught using Role Play Digital Game-based Instruction in North-Central, Nigeria, Mean and Standard Deviation was used to answer research question two. This is shown in Table 2.

Table 2:Mean and Standard Deviation of Mean AchievementScores of Role Play Digital Game-Based Instruction at Pretest andPosttest Based on Gender

Group	Ν	Pretest	Postest			Mean Gain
		\overline{X}	SD	\overline{X}	SD	
Male	53	29.66	6.572	66.23	7.418	36.57
Female	32	27.44	8.148	66.75	6.619	39.31

Key: \overline{X} = Mean, SD= Standard Deviations, N= Number in samples

Table 2 reveals the mean achievement scores and Standard Deviation of male and female students who were taught Geography using Role Play Digital Game-Based Instruction (RPDGBI). The table showed that the Mean achievement scores of the two groups at posttest differ statistically in the mean gain. Female students taught with Role Play Digital Game-Based Instruction had higher Mean achievement score of 66. 75 with Standard Deviation of 6.619, followed by the mean score of the male students taught using Role Play Digital Game-Based Instruction which had Mean achievement score of 66.23 with Standard Deviation of 7.418. There were adjusted scores of 39.31 and 36.57 respectively. This shows that female students who were taught Geography using Role Play Digital Game-Based Instruction performed slightly more than the male students.

Research Question Three: In answering research question three, on the influence of gender on the academic achievement of secondary school Geography students when taught using Adventure Digital Game-based Instruction in North-Central, Nigeria, Mean and Standard Deviation was used to answer research question three. This is shown in Table 3.

Table 3:Mean and Standard Deviation of Mean AchievementScores of Adventure Digital Game-Based Instruction at Pretest andPosttest Based on Gender

Group	Ν	Pretest	Postest			Mean Gain
		\overline{X}	SD	\overline{X}	SD	
Male	45	28.53	7.127	69.82	7.259	41.29
Female	36	28.06	7.701	70.22	7.809	42.16

Key: \overline{X} = Mean, SD= Standard Deviations, N= Number in samples

Table 3 reveals the mean achievement scores and Standard Deviation of male and female students who were taught Geography using Adventure Digital Game-Based Instruction (ADGBI). The table showed that the Mean achievement scores of the two groups at posttest differ statistically in the mean gain. Female students taught with Adventure Digital Game-Based Instruction had higher Mean achievement score of 70.22 with Standard Deviation of 7.809, followed by the mean score of the male students taught using Adventure Digital Game-Based Instruction which had Mean achievement score of 69.82 with Standard Deviation of 7.259. There were adjusted scores of 42.16 and 41.29 respectively. This shows that female students who were taught Geography using Adventure Digital Game-Based Instruction performed slightly more than the male students.

Research Question Four: In answering research question four, on the influence of gender on the academic achievement of secondary school Geography students when taught using Conventional Teaching Method in North-Central, Nigeria, Mean and Standard Deviation was used to answer research question four. This is shown in Table 4.

Table 4:Mean and Standard Deviation of Mean AchievementScores of Conventional Teaching Method at Pretest and Posttest Basedon Gender

Group	Ν	Pretest		Postest		Mean Gain
		\overline{X}	SD	\overline{X}	SD	
Male	44	23.73	5.748	67.11	5.461	43.38
Female	35	26.80	7.455	62.86	8.489	36.06

Key: \overline{X} = Mean, SD= Standard Deviations, N= Number in samples

Table 4 reveals the mean achievement scores and Standard Deviation of male and female students who were taught Geography using Conventional Teaching Method.

The table showed that the Mean achievement scores of the two groups at posttest differ statistically in the mean gain. Male students taught with Conventional Teaching Method had higher Mean achievement score of 67.11 with Standard Deviation of 5.461, followed by the mean score of the female students taught using Conventional Teaching Method which had Mean achievement score of 62.86 with Standard Deviation of 8.489. There were adjusted scores of 43.38 and 36.06 respectively. This shows that male students who were taught Geography using Conventional Teaching Method performed slightly more than the female students.

Testing of Hypotheses

The data collected from this study was analysed and reported that the three groups were used for this study, hence the need to use Analysis of Covariance (ANCOVA) to test the hypotheses since pretest was significant.

Hypothesis One (HO_1): In order to test hypothesis one, Analysis of Co-variance (ANCOVA) was used which is presented in Table 1.1

Table 5: ANCOVA Summary of Posttest Achievement Scores of the Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method

Source	Sum	of	df	Mean	F-value	P-	Partial Eta
	Squares			Square		value	Squared
Corrected Model	1133.805ª		3	377.935	7.214	0.000	0.082
Intercept	75016.182		1	75016.182	1431.845	0.000	0.856
Covariate	140.359		1	140.359	2.679	0.103	0.011
(Pretest)							
*Achievement	1079.720		2	539.860	10.304	0.000	0.079
Error	12626.293		241	52.391			
Total	1120813.000		245				
Corrected Total	13760.098		244				

P < 0.05

Table 5 ANCOVA statistics was computed to examine the significant difference in the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-

Based Instruction (ADGBI) and Conventional Teaching Method in North-Central, Nigeria at posttest. The table revealed that $F_{(2,243)} = 10.304$, *P*-value = 0.000 at *P* < 0.05, indicating a significant difference in the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method. Consequently, hypothesis one was rejected. The calculated effect size, determined through partial eta squared was ($\eta_p^2 = .08$), which signified a "high" effect. This indicates that approximately 8% of the variability in the observed outcomes can be attributed to the factor under investigation, which signified the utilization of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method. It is important to note that high variations hold meaningful implications, especially in educational contexts where multiple factors contribute to the learning process. The finding implies that students taught Geography using of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method differ significantly in their mean achievement scores. Sidak pairwise post-hoc analysis was carried out to locate where significant difference exists as presented in Table1. 2.

Table 6: Sidak Pairwise Post-hoc Analysis Significant Difference of Achievement of Students in RPDGBI, ADGBI and Conventional Teaching Method

Dependent	Treatment	Treatment	Mean	p-value	Lower	Upper
variable	(i)	(j)	Difference		Bound	Bound
			(i-j)			
	RPDGBI	ADGBI	-3.58*	.005	-6.29	86
		CTM	1.20	.647	-1.53	3.92
Posttest	ADGBI	RPDGBI	3.58*	.005	.86	6.29
		CTM	4.77*	.000	2.01	7.53
	CTM	RPDGBI	-1.20	.647	-3.92	1.53
		ADGBI	-4.77*	.000	-7.53	-2.01

Table 6 shows the Sidak post hoc analysis on effect of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and

Conventional Teaching Method on academic achievement of secondary school Geography students. From the Table, there was significant difference established between the mean achievement scores of RPDGBI and ADGBI because the mean difference of 0.005, p<0.05) with a lower bound of 6.29 and an upper bound of 0.86 was obtained. There was also statistically significant difference in the mean achievement scores of ADGBI with CTM with mean difference of 4.77 with upper bound of 7.53 in favor of ADGBI. There was no statistically significant difference between the mean achievement scores of RPDGBI and CTM with a lower bound of 3.92 and an upper bound of 1.53. This shows that students taught Geography using Adventure Digital Game-Based Instruction performed better than those taught with Role Play Digital Gamed-Based Instruction and Conventional Teaching Method.

Hypothesis Two (**HO**₂): In order to test hypothesis two, Analysis of Variance (ANOVA) was used which is presented in Table 2.2.

Table 7:ANOVA on effect of gender on academic achievement ofSecondary School Male and Female Geography Students Taught UsingRole Play Digital Game-Based Instruction (RPDGBI)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.470	1	5.470	0.108	0.744
Within Groups	4219.283	83	50.835		
Total	4224.753	84			

From Table 7, it can be deduced that there was no significant difference in the effect of gender on academic achievement of Secondary School male and female Geography students taught using Role Play Digital Game-Based Instruction. This is reflected in the findings of the hypotheses tested $F_{(1, 83)}$, p = 0.744. Thus, the hypothesis which states that "there is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI) in North-Central, Nigeria" was accepted. Finding revealed that no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI) in North-Central, Nigeria" was accepted. Finding revealed that no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI) in North-Central, Nigeria.

Hypothesis Three (**HO**₃): In order to test hypothesis three, Analysis of Variance (ANOVA) was used which is presented in Table 3.3.

Table 8:ANOVA on effect of gender on academic achievement ofSecondary School Male and Female Geography Students Taught UsingAdventure Digital Game-Based Instruction (ADGBI)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.200	1	3.200	0.057	0.812
Within Groups	4452.800	79	56.365		
Total	4456.000	80			

From Table 8, it can be deduced that there was no significant difference in the effect of gender on academic achievement of Secondary School male and female Geography students taught using Adventure Digital Game-Based Instruction. This is reflected in the findings of the hypotheses tested $F_{(1, 79)}$, p = 0.812. Thus, the hypothesis which states that "there is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Adventure Digital Game-Based Instruction (ADGBI) in North-Central, Nigeria" was accepted. Finding revealed that no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Adventure Digital Game-Based Instruction (ADGBI) in North-Central, Nigeria" was accepted. Finding revealed that no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Adventure Digital Game-Based Instruction (ADGBI) in North-Central, Nigeria.

Hypothesis Four (HO_4): In order to test hypothesis four, Analysis of Variance (ANOVA) was used which is presented in Table 4.4.

Table 9:ANOVA on effect of gender on academic achievement ofSecondary School Male and Female Geography Students Taught UsingConventional Teaching Method

	Sum of Squares	df	Mean	F	Sig.
			Square		
Between	353.181	1	353.181	7.286	0.009
Groups					
Within Groups	3732.718	77	48.477		
Total	4085.899	78			

From Table 9, it can be deduced that there was significant difference in the effect of gender on academic achievement of Secondary School male and female Geography students taught using Conventional Teaching Method. This is reflected in the findings

of the hypotheses tested $F_{(1, 78)}$, p = 0.009. Thus, the hypothesis which states that "there is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Conventional Teaching Method in North-Central, Nigeria" was rejected. Finding revealed that significant difference in the mean achievement scores of secondary school male and female students taught Geography using Conventional Teaching Method. Finding revealed that significant difference in the mean achievement scores of secondary school male and female students taught Geography using Conventional Teaching Method in North-Central, Nigeria.

Summary of Findings

- 1. Finding a significant difference in the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method. The calculated effect size, determined through partial eta squared was ($\eta_p^2 = .08$), which signified a "high" effect. This indicates that approximately 8% of the variability in the observed outcomes can be attributed to the factor under investigation, which signified the utilization of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method. The finding implies that students taught Geography using of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (RPDGBI), and Conventional Teaching Method. The finding implies that students taught Geography using of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (RPDGBI), and Conventional Teaching Method. The finding implies that students taught Geography using of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (RPDGBI), inthe inter mean achievement scores.
- Finding revealed that there is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI) in North-Central, Nigeria.
- Finding revealed that there is no significant difference in the mean achievement scores of secondary school male and female students taught Geography using Adventure Digital Game-Based Instruction (ADGBI) in North-Central, Nigeria.
- 4. Finding revealed that there is significant difference in the mean achievement scores of secondary school male and female students taught Geography using Conventional Teaching Method in North-Central, Nigeria.

Discussion of Findings

The findings of research question one on the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method. Students taught Geography using of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method differ significantly in their mean achievement scores with Adventure Digital Game-Based Instruction giving higher mean achievement scores. The finding of the null hypothesis one indicated a significant difference in the mean achievement scores of secondary school students taught Geography using Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method with a "medium" effect size accounting approximately 8% of the variability in the observed outcomes. The finding is in agreement with Seifi, (2015) who carried out a study on Investigate Adventure Digital game-based learning (ADGBL) and Gamification are emerging methodological strategies in education, aims to analyze the effects on academic performance and motivation after an experience combining ADGBL and Gamification in university students and found out that the results show significant differences in academic performance between the control and experimental groups. The finding also corroborates with the finding of

The finding was also support by Joonyoung, and Tao (2019) who conducted a systematic review on adventure education or adventure-based learning in physical education (PE) between 1976 and 2018 in order to examine the effects of adventure education on students' learning outcomes in PE such as physical and psychological outcomes and observed that adventure education benefits the developments of school-aged students' learning outcomes such as achievement retention and learning satisfaction. But disagrees with the finding of Chia-Li Debra (2015) who examined whether a Role Play Game (RPG) with embedded geological contents and students' anticipation of an upcoming posttest significantly affect high school students' achievements and attitudes toward geology and observed that: (a) there was no statistically significant interaction effect between RPG and anticipation of posttest on students' learning outcomes; (b) there was no statistically significant main effect for RPG on students' learning outcomes; however, (c) whether or not students had anticipated an upcoming posttest significantly affected their geological achievements

and attitudes. In conclusion, testing has positive effects as a reinforcement to help students both retain their content knowledge and have positive attitudes towards geology. This report presents findings from a meta-analysis of experimental and quasi-experimental studies investigating effects of instructional games on mathematics achievement of PreK—12thgrade students compared to traditional classroom methods. School setting (PreK-5th vs. 6th-12th) and type of assessment instrument (research-made vs. standardized) were explored as potential moderators of the relationship between game-based learning and mathematics achievement. Results showed heterogeneity among studies, both in magnitude and direction. Using a random effects model, a small but marginally significant overall effect (d * = 0.255) suggests that math video games might have contributed to higher learning gains as compared to traditional instructional methods. Furthermore, moderators analyses suggest that this effect does not significantly vary neither between instrument types nor between school settings.

Conclusion

Based on the comprehensive analysis of the study's findings, the following conclusions were drawn;

It was established that students taught Geography using of Role Play Digital Game-Based Instruction (RPDGBI), Adventure Digital Game-Based Instruction (ADGBI) and Conventional Teaching Method differ significantly in their mean achievement scores where Adventure Digital Game-Based Instruction enhanced better achievement than both Role Play Digital Game-Based Instruction and Conventional Method. In the case of gender, it can be concluded that Role Play Digital Game-Based Instruction, Adventure Digital Game-Based Instruction and Conventional Teaching Method are all gender friendly. The female students appear to engage more with the technologically based platforms where female performed better when taught using Role Play Digital Game-Based Instruction and Adventure Digital Gam-Based Instruction whereas the male performed better when taught using Conventional Teaching Method.

Recommendations

Based on the findings of this study, the following recommendations emerged to enhance the learning outcome of secondary school Geography students in North-Central, Nigeria:

- 1. The use of Adventure Digital Game-Based Instruction and Role Play Digital Game-Based Instruction enhanced higher achievement, retention and satisfaction of secondary school students in Geography, hence, they are recommended for usage in teaching secondary school students.
- 2. The use of Adventure Digital Game-Based Instruction and Role Play Digital Game-Based Instruction supported instruction in teaching and learning process on both male and female students as they are found to be gender friendly, therefore, it should be encouraged in the classroom to enhance male and female performance and retention in Geography. This will make learning interesting and also improve the male and female students' participation in Geography class.
- 3. Workshops and training programmes on the benefits and procedures of using Adventure Digital Game-Based Instruction and Role Play Digital Game-Based Instruction should be frequently carried out by policy makers.
- 4. Governments, non-governmental organizations, well-meaning individuals should help to subsidize in the cost of purchasing the systems. This will encourage all teachers and learners to utilize Adventure Digital Game-Based Instruction and Role Play Digital Game-Based Instruction.

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