

Effects of Computer Based Simulation on the Academic Performance and Retention of Social Studies Students in Rivers State

Dr. Birabil, Saturday, Tete,¹ Worlu, Shedrack Onwukwe²

¹Department Of Curriculum Studies and Educational Technology,
Faculty of Education,
University of Port Harcourt,
Rivers State.

Email: saturdaybirabil2@gmail.com

²Department of Social Studies Education.
Faculty of Social Science,
Federal College of Education (Technical) Omoku, Rivers State.
Email: worlushedrack@gmail.com



Abstract – The study examined the effects of computer based simulation on academic performance and retention of social studies students in Rivers State. Three objectives, three research questions and three hypotheses were formulated to X guide the study. A quasi-experimental design was adopted. The population of the study consisted of three thousand six hundred and one (3,601) Junior secondary school students, drawn through purposive sampling techniques from three schools. Social Studies Performance Test (SOSPT) was used for data collection and the reliability coefficient of 0.80 was determined using Cronbach alpha reliability estimate. Face and content validity were determined by two experts. Mean and standard deviation were used to answer the research questions while analysis of covariance (ANCOVA) was used in testing the hypothesis at 0.05 level of significance. The findings revealed that computer based simulation improved social studies students' academic performance and their retention ability were also enhanced to a greater extent. Based on the above findings, it was recommended among others that social studies teachers be encourage and trained on the use of computer base simulation while computer services and facilities be provided to schools.

Keywords – computer-based simulation, academic performance, retention, social studies.

I. INTRODUCTION

Ever since the introduction of social studies into the Nigerian school curriculum, the subject continues to serve as an embodiment of knowledge, skills, attitude and values needed to make individuals a functional and useful citizen in the society. To buttress this, Osakwe cited in Ukadike (2010), opined that the objective of social studies education in Nigeria may be categorized into three broad area; information learning's, skill and attitude and value learning's. In a related development, Oyekale cited in Mezieobi and Briabil (2016) stated that the discipline does not only deal with, the acquisition of facts, knowledge and concepts (cognitive domain) but also deals with changes in values, interest and attitude (affective domain) couple with the development of skills but intellectual and manipulative (psychomotor domain) in order to enable the learner take rational decision in problems that affect them in the society.

In view of the above importance attached to the subject, the need arises to enhance proper understanding and academic

performances of students with the use of some innovative teaching methods rather than the conventional teaching method. Again, a careful observation and research conducted reveals that computer simulation had some advantages over the conventional method in social studies instruction. For instance, Jane, Wachange & Anditi (2017) conducted a study and concluded that computer-based simulation has a positive and significant contribution to the principles as reflected by the higher performance of students taught than their counterpart that received instruction with the regular teaching

II. COMPUTER SIMULATION AS A CONCEPT

Computer simulation as a concept could be referred to a tool that can be manipulated in order to effect some changes in a model before invoking a particular change in the real world. According to Guy and Lownes-Jackson (2015), computer simulations have been used to support a variations of cognitive learning styles, to facilitate higher order thinking and problem-solving skills and to augment differential, collaborative and mastery learning. Perhaps, it was on this note that Williams (2016) noted that visual classroom is a digital technology driven classroom that support self-directed and regulated learning. This means that social studies teachers and regulated learning. This means that social studies teachers should be well rooted in the use of technological strategy alongside the conventional method of effective teaching and learning process to be actualized.

As reported by McCaren, Adams, Mayer & Forlizzi (2017), a lot of claims have been unveiled on the benefits of learning with educational game versus traditional method in addition to teachers' belief that computer-based games can be effective. Therefore, in a social studies instruction, the teacher can employ simulation with the use of video game, role play, mini enterprise, graphic images to mention but fear to make social studies students' feel confidence and assist them discover new knowledge, skills and talents.

Although, review of research literature indicates that there are many empirical studies carried out in the utilization of computer-based simulation, teaching strategy. For instance, Njoku (2015) conducted a study on the effects of computer simulation and application in electrical wiring instruction. He shows that there was a significant difference in the student's mastery of cognitive learning as the students who studied through the computer simulation approach showed evidence of acquiring better cognitive knowledge in Okwudubam Offiah and Medichic (2018) that investigated the effect on computer simulation on secondary school and find out that computer simulation was effective. In a related development, Ayuba (2017) studied the effects of computer-Based instruction on retention and performance in Algebraic also found a significant difference in performance in favour of students taught with computer-based simulation Teaching Approach on students Achievement also found it to be effective. Nduudee and Arokoyu (2021) findings on the effect of simulation model on secondary school chemistry students' performance and gender, in favour of the male students. There were so many other findings on computer-based simulation but most of them were scientific based. But most empirical work has not been carried out in social studies, especially in Rivers State. Therefore, the present study was designed to bridge the gap.

III. STATEMENT OF THE PROBLEM

Social studies as a discipline, is seen as a veritable instrument for national development because it serves as a spring board for the social sciences and humanities. The persistent poor performances of students in the subject in Rivers State in particular and Nigeria at large in both internal and external examination is a matter of serious concern to the entire society, administrators, educationist and stakeholders. Again, a lot of social studies teachers prefer to use conventional method of teaching instead of some innovating teaching strategies that can offer practical experience and engage the learner with personal construction of knowledge. The study is therefore, undertaken to fill the gaps. The problem of this study is that, will the use of computer-based simulation method of study enhance students' performance in social studies?

IV. AIMS AND OBJECTIVE OF THE STUDY

The general purpose of this study is to determine the effects of computer-based simulation on students' academic performance in social studies? Specifically, the study seeks to:

1. Determined the effect of computer-based simulation on academic performance of social studies students.
2. Determined if gender influences the academic performances of social studies student exposed to computer-based simulation.
3. Find out the extent to which student, taught computer simulation and lecture method differs in terms of retention ability.

V. RESEARCH QUESTION

The study was guided by the following research questions:

1. What is the effect of computer-based simulation on the academic performances of social studies students?
2. What are the differences in the academic performances of male and female social studies students exposed to computer-based simulation method?
3. What are the difference in the retention ability of social studies students taught with computer simulation and those taught with lecture method?

VI. HYPOTHESES

The following hypothesis were formulated and tested at 0.05 level of significance.

1. There is no significant differences on the effect of computer-based simulation and lecture method on the academic performance of social studies students.
2. The academic performance of the male and female social studies students taught with computer-based simulation do not differ significantly.
3. There is no significant difference between the retention ability of social studies students taught with computer-based simulation and lecture method.

VII. METHODOLOGY

The study adopts a quasi-experimental research design. Quasi experimental design was considered adequate because it is applied to a situation which is not purely experimental as in some cases involving human beings especially when the threat to validity cannot be controlled (Nwankwo. 2016).

The population of the study consist of all the 3,601 junior secondary school students in Gokana Local Government Area of Rivers State. Preliminary investigations show that few of the government owned secondary schools have well equipped computers. Based on this, the researcher used three out of the twelve government owned functional model secondary schools. Ninety (90) JSS 3 student formed the sample size. Thirty (30) students that was made up of 51 males and 39 females were selected from the three schools through purposive sampling techniques were involved in the study. They were placed into experimental and control group respectively.

The instrument used to elicit opinion from the respondents was a questionnaire titled “Social Studies Performance Test (SOSPT) developed by the researcher. The instrument was subjected to face and content validity by two experts. The reliability of the instrument was tested using 30 respondents who were not part of the sample, but equivalent in all respect, using test-retest method. Cronbach’s Alpha reliability estimate was employed and a reliability coefficient of 0.80 was obtained which was considered adequate for the study. Two social studies teachers of the above schools were used as research assistants and were instructed on the treatment modalities. Mean and standard deviation were used to answer the research questions while analysis of covariance (ANCOVA) was used to test the hypothesis.

VIII. RESULTS

The results of the analysis are presented in tables according to the research question and hypothesis that guided the study.

Research Question One: What is the effect of computer-based simulation on the academic performances of social studies students?

Table 1: Mean and standard deviation of pre-test and post-test of the differences between the experimental and control group

Methods	n	Pre-test Mean	SD	Post-test Mean	SD
Computer based simulation method ⁴⁵		48.27	8.38	75.80	9.05
Lecture method	45	47.20	9.97	63.20	10.31

The result on table one shows that students taught using computer-based simulation method (experimental group) had a mean pre-test score and SD of 48.27 and 8.38 respectively. The mean and post-test score and SD were 75.80 and 9.05. The mean pre-test score and SD of students taught with lecture method (control group) were 47.20 and 9.97 respectively. The post-test score and SD were 63.20 and 10.31. This shows that students taught with computer-based simulation had a higher level of academic performance than their counterpart taught with lecture method.

Research Question Two: What are the differences in the academic performances of male and female social studies students exposed to computer-based simulation method?

Table 2: Mean and standard deviation of pre-test and post-test scores of academic performance based on gender

Methods	Sex	Test	Mean	SD
Computer based simulation method	Male	Pre-test	34.038	5.27
	Male	Post-test	52.906	6.40
	Female	Pre-test	23.937	4.90
	Female	Post-test	37.34	5.12

The result on table two shows that male students had a pre-test score of 34.038 and SD of 5.27 while their post-test scores were 52.906 and SD of 6.40. The female students had a pre-test score of 23.937 and SD of 4.90 while their post-test scores were 37.24 and with a SD of 5.12. This shows that the male students taught with computer base simulation performed better than their female counterparts.

Research Question Three: What is the differences in the retention ability of social studies students taught with computer based simulation and those taught with lecture method.

Table 3: Mean and standard deviation of post-test scores of retention ability of social studies students

Methods	n	Pre-test Mean	SD	Post-test Mean	SD
Computer based simulation method	45	50.80	9.05	50.67	12.97
Lecture method	45	51.20	10.31	38.53	10.16

Results on table three shows that the post-test retention mean score of students taught with computer-based simulation was 50.67 with a SD of 12.97 while those taught with lecture method has a mean score of 38.53 and the SD was 38.53. This shows that social studies students in the experimental group performed better than their counterparts in the control group.

Hypothesis One: There is no significant difference on the effects of computer-based simulation and lecture method on the academic performance of social studies students.

Table 4: Summary of ANCOVA test Result Based on Academic Performances of the Experimental and Control Group

Source of Variation	Type III Sum of squares	df	Mean Square	F	Sig.
Corrected model	5295.633	3	1765.211	45.114	.000
Intercept	4923.946	1	4923.946	125.843	.000
Pre-test	4098.478	1	4098.478	104.746	.000
Method	<801.375	2	400.687	10.240	.000
Error	^3364.989	86	39.128		
Total	294496.000	90			
Corrected total	8660.622	99			

Table 4 reveals that there were significant differences between the academic performance of students taught with computer-based simulation and that of lecture method ($F(1, 86) = 10.240, p < .05$). Hence, the null hypothesis was rejected.

Hypotheses two: The academic performances of male and female social studies students taught with computer-based simulation do not differ significantly.

Table 5: Summary of ANCOVA Test Result Based on Gender Terms of Academic Performance

Source of Variation	of	Type III Sum of squares	df	Mean Square	F	Sig.
Corrected model		495.871	2	247.936	2.756	.072
Intercept		564.690	1	564.690	6.276	.015
Post-test		480.210	1	480.210	5.337	.025
Sex		.231	1	.231	.003	.960
Error		5128.712	57	89.977		
Total		519925.000	60			
Corrected total		5624.583	59			

Results on table 5 shows that there is no significant difference between the academic performance of male and female social studies students exposed to computer-based simulation, ($f(1, 57) = .003, p > .05$). The null hypothesis is therefore upheld.

Hypotheses three: There is no significance difference between the retention ability of social studies students taught with computer-based simulation and lecture method.

Table 6: Summary of ANCOVA Test Result Based on Retention Ability of Social Studies Students

Source of Variation	Type III Sum of squares	df	Mean Square	F	Sig.
Corrected model	3115.027	3	1038.342	6.599	.000
Intercept	5035.121	1	5035.121	31.998	.000
Pre-test	.005	1	.005	.000	.996
Method	2687.166	2	1343.583	8.538	.000
Error	13532.795	86	157.358		
Total	214144.000	90			
Corrected total	16647.522	89			

Results on table 6 reveals that there was significant difference between the retention abilities of students taught with computer-based simulation and that of lecture method ($f(1, 86) = 8.538, p < .05$) hence, the null hypothesis was rejected.

IX. DISCUSSION

The study investigated the effect of computer-based simulation on the academic performance and retention in social studies in Rivers State. The findings of the study as shown on table 1 and 4 revealed that there is significant difference in the academic performances of social studies students exposed to computer-based simulation than those of lecture method, through the pre-test post-test scores ($F(1, 86) = 10.240, p < .05$). This finding is in agreement with the work of Adeyemo and Sreelekha (2018) that investigated the effect of computer simulation strategies on students' achievement and acquisition of skills in physics in Kwara State. McLaren, Adams, Mayer and Forlizzi (2017) that undertook a study on computer-based game in mathematics also had similar result. So also, to Okudiba, Offiah and Medicine (2018) Guy and Lowness-Jackson (2015) and Njoku (2015) that conducted a study on effect of computer simulation on electrical wiring instruction.

Again, table 2 and 5 results show that there were no significance differences between the academic performance of male and female students exposed to computer-based simulation. Although the mean and standard deviation scores on table 2 shows some differences but the summary of ANCOVA test result on table 5 reveals no difference ($F(1, 57) = .003, p > .05$). The above study tallies with the findings of Kotoka (2013) that carried out a study on the effect of computer simulation on the teaching of chemistry to grade 11 physical science learners in South differences in gender achievements. So also, to the findings if Ayuba (2017), Although, the findings of Nduude and Arokoyu (2021) unveil some significant difference in favour of the male counter part

Finally, results on table 3 and 6 on retention ability of the experimental and control group shows that students in the experimental group (computer-based simulation) performed better than their counterpart in the control group (lecturer method) – $F_{1, 86} = 8.538, p < .05$. This finding is in parlance with the work of Jane, Wachange & Anditi (2017) that conducted their study on the effect of computer-based simulation on secondary school students' achievement in chemistry in Kenya.

X. CONCLUSION

Based on the findings of this study, the following conclusions were drawn:

1. Computer based simulation method enhances the academic performances of students.
2. The use of computer-based simulation did not indicate a significant difference in terms of gender performances.
3. Computer based simulation enhances the retention ability of students exposed to computer-based simulation.

Therefore, if proper use of computer-based simulation is given serious attention in the teaching of social studies at all levels of education, students' level of academic performance will be on an increase.

XI. RECOMMENDATIONS

Based on the above findings and conclusion of this paper, it is recommended that:

1. Social studies teachers should be encouraged to use computer-based simulation as a complement to other methods of teaching.
2. Policy makers and curriculum planners should see the result of this study as a way forward for teaching deficiencies among teachers.
3. Social studies teachers should be trained on the use of computer-based simulation usage.
4. Computers, internet facilities and services should be provided or made available to both students and teachers.
5. Computer based simulation usage should be made part of teacher education because of its innovative tendencies.

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