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PERCEPTION OF STUDENTS ON THE USE OF COMPUTER SIMULATION AND COLLABORATIVE LEARNING IN BIOLOGY IN OBIO/AKPOR, RIVERS STATE

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ABSTRACT

This study investigated the effect of computer simulation and collaborative learning strategies on senior secondary school students' perception in Biology. A descriptive design was adopted for the study. The population of the study comprised all the public secondary schools in Obio-Akpor Local Government Area of Rivers State. A sample size of one hundred and eighty-two (182) students was selected using the purposive sampling technique. Two research questions and corresponding hypotheses were formulated to guide the study at 0.05 level of significance. The instrument for data collection was a Biology Perception Questionnaire Scale (BPQS) designed by the researcher and Cronbach Alpha Analysis test was used to test the instruments. A reliability coefficient of 0.88 was derived for the questionnaire. Research Questions were answered using mean and standard deviation while Analysis of covariance was used to test the hypotheses. The study established among others that the use of computer simulation and collaborative learning strategies enhanced students' perception towards the learning of Biology in secondary school. It was recommended among others that government, through the state ministry of Education should commission Biology textbooks writers to integrate the computer simulation strategy as a recommended teaching strategy for teaching abstract concepts in Biology.

KEYWORDS: ***Technology, computer simulation, collaborative strategy, perception, secondary education.***

INTRODUCTION

Education is crucial to the growth of a united and modern Nigeria. In every nation, it is an essential tool for national development and a natural force for change. The Merriam-Webster dictionary defines education as "the knowledge and development that result from learning." Education is a process that takes a long time and has a positive impact on people's lives and actions. According to FRN (2014), the general goal of secondary education is to prepare students for successful social lives and higher education. As a result, senior secondary schools ought to be comprehensive and provide a core curriculum designed to broaden students' perspectives and knowledge. As a result, education has seen advancements in learning and teaching in the digital age.

The development of technology has an impact on how we live, work, play, and learns. It can be found almost everywhere in our culture (Serhat, 2015). It has become increasingly important for education to incorporate this technology into the teaching-learning process because of the proliferation of mobile and wireless devices and global technological advancement. Students' performance can be enhanced and learning made simpler for them by teachers who use digital tools appropriately (William, 2016).

In simulation environments, teachers can manipulate system components. Students are able to alter and track variables over time through the use of simulation, which imitates the operation of a real-world process or system. Students are able to use simulations to understand concepts that would be difficult or impossible to notice in real life as a result of this. In the meantime, the procedure encourages active participation.

Biology is a separate field of natural science that focuses on the study of living things. It involves investigating both inanimate and living things. Biologists investigate the structure, growth, origin, functions, evolution, and distribution of living things. The goals of the senior secondary biology curriculum, as stated by the Federal Ministry of Education (F.M.E., 2019), are to assist students in acquiring the following skills:

i. Essential and significant biology knowledge; daily apply scientific knowledge to problems affecting personal, agricultural, and community health.
ii. Adequate laboratory biology skills and a rational and practical scientific mindset Biology has been made an essential science in senior secondary school to produce competent and creative individuals who can keep up with the system's technological advancements. As a result, biology students should improve their interest, problem-solving abilities, and critical and logical thinking skills. If these objectives are to be achieved, biology instruction needs to be goal-oriented and student-centered, particularly in secondary

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schools. Teachers who are dedicated to creating an innovative and engaging learning environment that fosters maximum biology achievement, such as the collaborative learning strategy, can accomplish this.

STATEMENT OF THE PROBLEM

In order to produce competent and creative individuals who are capable of keeping up with the system's technological advancements, biology has been designated as an essential science subject in senior secondary school. Students' academic performance has recently been linked to some abstract concepts in biology, such as cell division, genetics, chromosomes, the matter cycle, and respiration, to name just a few. It's hard to get people excited about answering questions about such abstract concepts or topics. This could possibly be because of the conventional teaching methods that teachers use to teach biology. On the other hand, teachers communicate these abstract ideas without properly assessing students' perceptions which is essential for successful biology education. Consequently, parents of these students expressed dissatisfaction with their children's observed learning outcomes. These became a problem because teachers can gain insight into how to teach by knowing how students perceive learning a concept, and teachers can also gain insight into how to design lessons or learning experiences that are appropriate for each student's zone of proximal development by knowing how students prepare. as well as their perceptions of important topics, can be enhanced by implementing these strategies. So, the question is whether meaningful learning through computer simulation and discussion learning methods can improve students' perception. Based on students' perceptions, the researcher seeks to investigate the efficacy of computer simulation and collaborative learning strategies.

AIM AND OBJECTIVES OF THE STUDY

This study investigated the effects of computer simulation and collaborative learning strategy on biology students' perceptions. In particular, the study has two objectives which were:

1. Examined the impact of computer simulation and collaborative learning strategies on biology students' perception levels.
2. Determine how male and female biology students' perceptions of computer simulation and collaborative learning strategies differ.

RESEARCH QUESTIONS

1. How do computer simulations and collaborative learning affect biology students' perception levels?
2. How do male and female biology students' perceptions of computer simulations and collaborative learning strategies differ?

HYPOTHESES

H01: There is no significant difference in the effect of computer simulation and collaborative learning strategies on the perception level of biology students.

H02: There is no significant difference in the effect of computer simulation and collaborative learning strategies on the perception levels of male and female.

SIGNIFICANCE OF THE STUDY

The results of the study will help educators better understand how to teach biology through computer simulations and how well students are prepared to use them. Consequently, they will encourage them to purchase biology curriculum. Biology teachers will benefit from this study's findings because they will provide them with information about their students' readiness, enable them to group students according to their level of readiness, and educate them about the necessity of utilizing simulation systems and collaborative learning methods to enhance their instructional dexterity. Students will benefit greatly from the study's findings because they will be able to collaborate, which will allow them to share scientific ideas and actively participate in their own education. As a result, their academic performance on both internal and external assessments will improve as biology instruction becomes more concrete as opposed to abstract. The results of this study will also be used by the next researcher as an empirical review, exposing them to variables and interactive instructional strategies.

METHODOLOGY

This study adopted the use of descriptive design. The design is appropriate as it provided techniques that helped the researcher to investigate students' perceptions of the treatments used. The reason for using the design is that it will determine the quality of the research. Rick (2014) asserts that the information gathered will allow the researcher to measure the significance of results from the overall population understudy, as well as the challenges of your respondents' opinions, thus, it is an efficient way of gathering data to help address students' perceptions. This study included 28,062 students from 24 public secondary schools, two of which were located in the Obio/Akpor local government area. 12,065 male and 15,997 female students made up the population (Source: The board of Rivers State Senior Secondary Schools: 2021 and 2022 (Office of the Director of Planning Research and Statistics). The study's data were gathered with the help of the Biology Perception Questionnaire Scale (BPQS). Students who were not part of the study were given the Biology Perception Questionnaire (BPQ), for a pilot test to see how reliable they were. Cronbach Alpha Analysis was used to determine the internal consistency of the Biology Perception Questionnaire (BPQ). The result of the instrument reliability coefficient was 0.86. Because this reliability index was thought to be high enough, the instrument was thought to be reliable. Mean and standard deviation were used to answer the research questions. The t-test and Analysis of Covariance (ANCOVA) were used to test the hypothesis. Statistical Package for the Social Sciences (SPSS) was used for all of the statistical analyses.

RESULTS

Research Question One: What is the effect of computer simulation and collaborative learning strategies on the perception level of biology students?

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Table 1: Mean score and standard deviation of the effect of computer simulation and collaborative learning strategies on the perception level of biology students

Group	n	Pretest		Posttest		Mean Diff.
		$\bar{x}$	SD	$\bar{x}$	SD	
Computer Simulation	56	18.63	3.56	27.57	4.21	8.94
Collaborative Learning	61	17.16	3.73	20.25	3.67	3.09

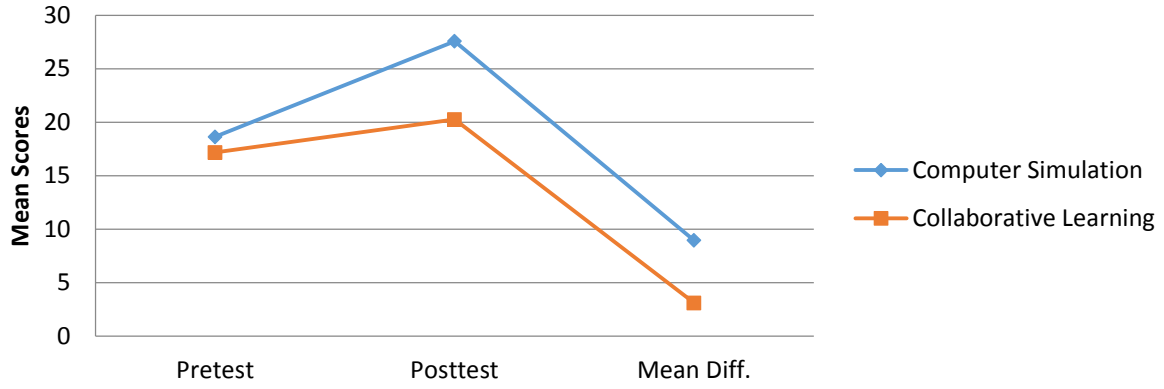

Figure 1: Chart showing the difference towards the use of computer simulation and collaborative learning strategies on Biology students' perception level.

Source: Researcher's Field Work, 2022.

Table 1 and figure 1 showed the difference towards the use of computer simulation and collaborative learning strategies on Biology students' perception level. The result indicated that before exposure to the computer simulation strategy students had pretest mean score = 18.63, and standard deviation = 3.56. After being taught Biology using the computer simulation strategy students' perception increased; as indicated in the posttest mean score = 27.57, and standard deviation = 4.21. Also, before exposure to the collaborative learning strategy students had pretest mean score = 17.16, and standard deviation = 3.73. After being taught Biology using the collaborative learning strategy students' perception increased; as indicated in the posttest mean score = 20.25, and standard deviation = 3.67. Consequent of the foregoing, the mean difference in the pretest and posttest perception of students towards the use of computer simulation and collaborative learning strategies differed. Students taught Biology using the computer simulation had high mean score ($\bar{x}$ = 8.94) as compared to the mean score of students taught with collaborative learning strategy ($\bar{x}$ = 3.09).

Research Question Two: What is the effect of computer simulation and collaborative learning strategies on the perception levels of male and female biology students?

Table 2: Mean score and standard deviation of the effect of computer simulation and collaborative learning strategies on the perception levels of male and female biology students

Group	Gender	n	Pretest		Posttest		Mean Diff.
			$\bar{x}$	SD	$\bar{x}$	SD	
Computer Simulation	Male	30	18.40	3.34	27.30	4.51	8.90
	Female	26	18.88	3.84	27.88	3.89	9.00
Collaborative Learning	Male	32	16.34	3.51	22.00	3.34	5.66
	Female	29	18.07	3.83	18.31	3.01	0.24

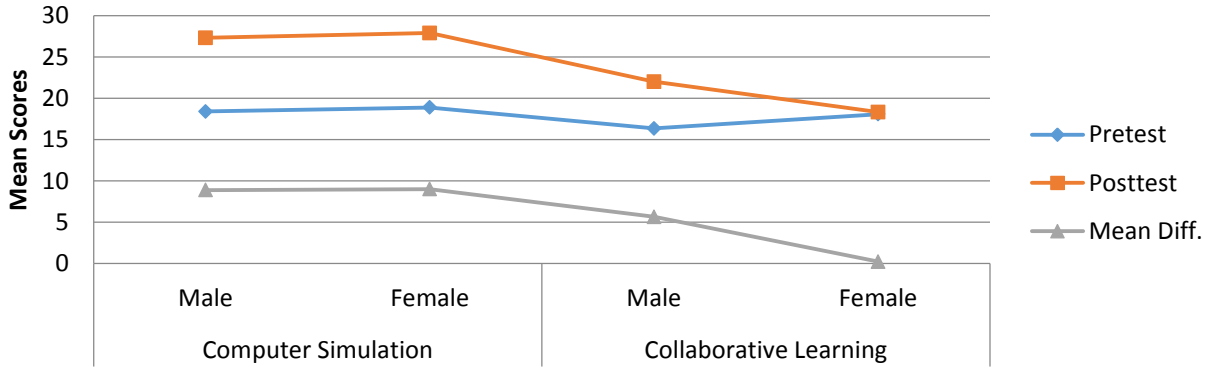

Figure 2: Chart showing the difference towards the use of computer simulation and collaborative learning strategies on male and female Biology students' perception level.

Source: Researcher's Field Work, 2022.

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Table 2 and Figure 2 showed the difference towards the use of computer simulation and collaborative learning strategies on male and female Biology students' perception level. The result indicated that before exposure to the computer simulation strategy male students had pretest mean score = 18.40, and standard deviation = 3.34. After being taught Biology using the computer simulation strategy students' perception increased; as indicated in the posttest mean score = 27.30, and standard deviation = 4.51. Furthermore, before exposure to the computer simulation strategy, female students had pretest mean score = 18.88, and standard deviation = 3.84. After being taught Biology using the computer simulation strategy female students' perception increased; as indicated in the posttest mean score = 27.88, and standard deviation = 3.89.

Also, before exposure to the collaborative learning strategy male students had pretest mean score = 16.34, and standard deviation = 3.51. After being taught Biology using the collaborative learning strategy male students' perception increased; as indicated in the posttest mean score = 22.00, and standard deviation = 3.34. Furthermore, before exposure to the collaborative learning strategy female students had pretest mean score = 18.07, and standard deviation = 3.83. After being taught Biology using the collaborative learning strategy female students' perception increased; as indicated in the posttest mean score = 18.31, and standard deviation = 3.01.

Consequent of the foregoing, the mean difference in the pretest and posttest perception of male and female students towards the use of computer simulation and collaborative learning strategies differed. Male ($\bar{x}$ = 8.90) and female ($\bar{x}$ = 9.00) students taught Biology using the computer simulation had high mean scores as compared to the mean scores of male ($\bar{x}$ = 5.66) and female ($\bar{x}$ = 0.24) students taught with collaborative learning strategy.

Hypothesis One: There is no significant difference in the effect of computer simulation and collaborative learning strategies on the perception level of biology students.

Table 3: Summary of Analysis of covariance (ANCOVA) on the difference in the effect of computer simulation and collaborative learning strategies on the perception level of biology students

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1577.74[a]	2	788.87	50.81	0.00
Intercept	2304.35	1	2304.35	148.41	0.00
Pretest	10.96	1	10.96	0.71	0.40
Group	**1455.15**	**1**	**1455.15**	**93.72**	**0.00**
Error	1770.07	114	15.53		
Total	69355.00	117			
Corrected Total	3347.81	116			

a. R Squared = .471 (Adjusted R Squared = .462)

Table 3 shows that there is significant difference in the effect of computer simulation and collaborative learning strategies on the perception level of biology students (F_1, = 93.72, df = 114, P = 0.00< 0.05). Thus, null hypothesis one is rejected at 0.05 alpha level.

Hypothesis Two: There is no significant difference in the effect of computer simulation and collaborative learning strategies on the perception levels of male and female biology students.

Table 4: Summary of ANCOVA on the difference in the effect of computer simulation and collaborative learning strategies on the perception levels of male and female biology students

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1812.02[a]	4	453.00	33.04	0.00
Intercept	1992.52	1	1992.52	145.31	0.00
Pretest	33.36	1	33.36	2.43	0.12
Group	1457.93	1	1457.93	106.32	0.00
Gender	83.86	1	83.86	6.12	0.02
Group * Gender	**143.58**	**1**	**143.58**	**10.47**	**0.00**
Error	1535.80	112	13.71		
Total	69355.00	117			
Corrected Total	3347.81	116			

a. R Squared = .541 (Adjusted R Squared = .525)

Table 4 shows that there is significant difference in the effect of computer simulation and collaborative learning strategies on the perception levels of male and female biology students (F_1, = 10.47, df = 112, P =0.00< 0.05). Thus, null hypothesis two is rejected at 0.05 alpha level.

SUMMARY OF FINDINGS

This study examined perception of students on the use of computer simulation in biology in Obio/Akpor. The findings include, among other things, that male and female students'

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pre- test and post-test perceptions of the use of collaborative learning strategies and computer simulations differed.
The following is a summary of the other findings that the researcher discovered:
1. Students' perception levels of biology differ significantly between collaborative learning strategies and computer simulations.
2. Male and female biology students' perception levels are significantly different when it comes to computer simulations and collaborative learning methods.

DISCUSSION OF FINDINGS

The study investigated the effect of computer simulation and collaborative learning strategies on perception of biology students in senior secondary schools in Obio/Akpor Local Government Area of Rivers State. From the data gathered, and analysis carried out, the findings of research question one showed that the mean difference in the pretest and posttest perception of students towards the use of computer simulation and collaborative learning strategies differed. . Students taught Biology using the computer simulation had high mean score as compared to the mean score of students taught with collaborative learning strategy. Furthermore, the result hypothesis one showed that there is significant difference in the effect of computer simulation and collaborative learning strategies on the perception level of biology students. These findings are corroborated by Mhamed Ben Ouahi, Abdesselam, Taoufik, and El Mehdi (2021), they found that students taught using Computer Simulation Strategy performed better than those taught using the conventional teaching methods

The findings of research question two showed that the mean difference in the pretest and posttest perception of male and female students towards the use of computer simulation and collaborative learning strategies differed, Male and female students taught Biology using the computer simulation had high mean scores as compared to the mean scores of Male and female students taught with collaborative learning strategy. Furthermore, the result hypothesis two showed that there is significant difference in the effect of computer simulation and collaborative learning strategies on the perception levels of male and female biology students. These findings are corroborated by Mhamed Ben Ouahi, Abdesselam, Taoufik, and El Mehdi (2021). They found that students taught using Computer Simulation Strategy performed better than those taught using the conventional teaching methods. Furthermore, the finding of this study was supported by the findings of Okolo and Oluwasegun, (2020), which revealed that computer simulation strategy was found to be better than the conventional method in teaching and learning of cell division,and gender was not a determinant factor in Biology students' interest ratings in teaching cell division.

CONCLUSIONS

.This study's discoveries lead us to the end that understudies' enthusiasm to play makes it simple for them to draw in with educational techniques like programmatic experiences that include game-like exercises. Students have a positive learning experience as a result. Therefore, in this day and age of computers, the use of games-like activities has a positive effect on students' perceptions levels, dispelling the notion that learning is monotonous. As a consequence of this, it is hoped that the findings of this study will compel additional research into the ways in which educational computer simulations influence students' perceptions towards learning.

RECOMMENDATIONS

Based on the findings and conclusion of this study, the following recommendations are made;
1. Curriculum planners ought to incorporate computer simulation as instructional resources that ought to be integrated into the teaching and learning of biology because the computer simulation-based approach to learning biology has been found to be effective in enhancing student perception.
2. It should be taught to teachers that students should take ownership of their education. Teachers should learn to actively involve students in the lessons rather than making them passive observers alone because computer simulation has been shown to increase male and female students' perceptions of biology and readiness to learn it.

CONTRIBUTIONS TO KNOWLEDGE

The findings of the study contributed to knowledge thus;
1. Senior secondary school teachers and school administrators now recognize the positive impact of computer simulation strategy on students' perception towards Biology.
2. This study provides evidence of the efficacy of computer simulation strategy over collaborative learning strategies in enhancing the perception of Biology students.

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