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EFFECTS OF COMPUTER SIMULATION MODEL ON SECONDARY SCHOOL STUDENTS' COMPREHENSION OF THE COARSE NATURE OF MATTER

[1]Imoniwe O. Thompson
imoniwethompson@gmail.com
&
[2]Abamba E. Ikechuku
abamba@yahoo.com

[1&2]Department of Science Education, Faculty of Education. Delta State University, Abraka

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ABSTRACT

This study looked into the effects of computer simulation model on secondary school students' comprehension of the coarse nature of matter. The study was led by five research questions and five hypotheses. The study used a quasi-experimental pre-test, post-test control group design. For this study, the population consisted of forty-two thousand, eight hundred and eight students. The sample for this study consisted of 236 students from SS II. Using a straightforward random sampling procedure, the sampled schools were chosen. The instruments used for data collection were the Chemistry Achievement Test (CAT) and the Scholastic Ability Test in Chemistry (SATIC). Using Kuder Richardson formula 21, CAT has a dependability coefficient value of 0.77. Mean, standard deviation, t-test, and analysis of variance were used to analyze the data (ANOVA). The study's findings revealed that: male and female students who were taught chemistry using computer simulation models performed similarly; there was no significant difference in their performance; and there was a significant difference between the mean retention scores of students who were taught chemistry using computer simulation models and those who were taught using lecture method, in their favor. The study also discovered that technique, sex, and aptitude interactions had no discernible impact on students' memory of chemistry. The study suggests that secondary school chemistry teachers adopt the usage of computer simulation models to encourage students' active participation and interaction with chemical concepts..

Key words: Computer simulation model, secondary school students' comprehension, coarse nature of matter

INTRODUCTION

A physical science, chemistry is concerned with the characteristics and interactions of matter and energy and aids in the description and explanation of our universe. The study of matter's qualities, features, and physical and chemical transformations is possible thanks to chemistry. The study of matter's composition, characteristics, and applications is at the heart of chemistry, according to Ababio (2016). Investigates how matter undergoes transformations, looking for fundamental rules that control this process. To say something is matter is to say that it has mass and takes up space. Particulate matter simply refers to the fact that all stuff is made up of tiny particles. This essentially indicates that there are empty gaps in between individual pieces of stuff. Matter's microscopic nature is important to almost every aspect of chemistry. Many aspects of solution chemistry are explained by the particle theory (also known as the kinetic molecular theory), which is the foundation for these concepts (Harrison and Treagust, 2000).

Chemists play a vital part in the development of human resources needed by the economy. It boosts a person's employability, productivity, and income by enhancing his or her human capital. In order to modernize and innovate throughout the whole economy, we need workers at all levels of the workforce, from entry-level to C-suite.

Income Allocation: Equity, quick national development, social and political stability all depend on a fair and efficient distribution of income. These can only be realized if chemistry plays a role in redistribution of wealth, not in bridging the gap between the affluent and the poor. Chemistry's contribution to national progress cannot be overstated.

Developing fundamental knowledge and abilities in science, technology, and mathematics (STM). Acquiring a fair degree of proficiency in ICT applications that foster entrepreneurialism producing money and jobs by using one's abilities to suit society demands; the ability to take advantage of the multiple employment options available in the field of chemistry. .Being well-equipped to pursue post-secondary chemistry education.

The Nigerian National Policy on Science and Technology Education (FRN, 2018) supports these aims and objectives. Promoting Science and technology education for scientific and technological excellence to be facilitated to build frameworks for inter-institutional cooperation in the development of science and technology education programs in all areas of the economy; creating the circumstances for the strengthening of the scientific and technical infrastructure for research, development and innovation in our educational industries; and, the Nigerian economy's efforts for global competitiveness must be supported by science and technology education program goods

In order to meet these goals to the fullest extent possible, the Chemistry curriculum is structured to demonstrate the connections between Chemistry and other science subjects (such as Biology and Physics) and to meet the requirements of the National Policy on Education for senior secondary school programs. Formal operational stage pupils are expected to have a thorough

knowledge of logical thinking in order to study chemistry (Igwe,2015). In spite of the significance of chemistry and its role in national development, the West Africa Senior School Certificate Examination (WASSCE) results in Chemistry have not been promising (See Appendix B). Since chemistry is the prerequisite for most science-based courses at colleges and universities, this is a cause for worry (Bello and Oke, 2010).

Teaching situations where the student is immersed into a "world" designed by an instructor are called simulations. Students are immersed in a virtual world when they participate in a simulation. It is up to the instructor to set the parameters of this "world" in order to get the desired outcomes in the classroom. The situation is brought to life for the students, who get a firsthand look at how it really works. Therefore, simulation is a novel teaching style that is centered on the needs of the student.

The result of creating the looks or effects of another item is called a simulation (Akinsola and Animasahun,2007; Ishaq, latunde, Ogwumu, Mustapha and Ajinuhi,2019). Using simulation allows students to put theory into practice, sharpen their critical thinking and problem-solving abilities, and offer a pleasant break from the daily grind of reading and preparing for class. The addition of realism to students' learning experiences is one of the many advantages of simulation. Students learn by putting theory and decision-making into practice in a computer-generated version of a real-world business situation. A simulation approach, according to Watson (1986), allows students to project themselves into new classroom roles, which improves classroom discussion, active involvement, and the transfer of information in the classroom.

It is possible to see events and processes that would otherwise be unavailable to students using computer simulations (Chen, Pen, Sung, and Chang, 2013). That's why researchers at Delta State are looking into how computer simulation models affect students' comprehension of particulate matter.

After a period of time, a fact or a concept may be recalled with ease (Ndem and Ubana, 2013). If the learner is able to recall and apply the material he or she was taught after a period of time, then meaningful learning has occurred. According to Agbeyanku (2011), the ability to recall and apply previously learned ideas is essential for students' ability to think critically and creatively about problems they encounter on a daily basis. According to Iji (2010), retention refers to one's ability to continue to act in a certain manner after learning it. Individuals that are able to retain knowledge, resources, or experiences gained over time are called retainers by Ezenwabucili and Okoli (2021). This is why students of chemistry need to be taught or taught the material in a way that makes it easy for them to remember. Students' ability to acquire and retain information is directly influenced by the teacher's ability to engage them in active involvement throughout class time. Ability is another aspect that may have an impact on students' chemistry performance.

Hornby defines ability as a degree of intellect (2010). The degree of a student's ability is a significant determinant of how well they do in school. The ability of pupils is determined at the

conclusion of a teaching and learning technique used by a teacher. It was found that Jimoyiannis and Komis (2001) found that including simulation into the teaching and learning process might assist students dispel misunderstandings and increase their proficiency with various chemical subjects. When it comes to teaching low-ability kids, this study will determine whether strategy is more effective: simulation or lecture.

Research in Delta State will focus on how computer simulations may help pupils better comprehend the particle nature of matter in secondary school. For the purposes of this research, students' academic performance, ability, gender, and persistence in Chemistry will be especially examined.

Statement of the Problem

Although chemistry is crucial to the development of the nation, student performance in the subject is alarming. The WAEC Chief Examiner's Report of May/June (2019) found that candidates' performance was better than that in 2018 with a mean score of 40.0 and a standard deviation of 14.46 compared to a mean score of 29.0 and a standard deviation of 13.76 for WASSCE for school candidates in 2018. The Chief Examiner attributed this performance to a lack of understanding and comprehension of the themes in Chemistry. The decline in student performance in chemistry has disturbed stakeholders in scientific education. This poor performance has been attributed to teaching methods, however this is not the only cause. According to research by Onwe and Uwaleke from 2019, the lecture style is the most popular teaching method in Nigeria, where students only participate in the teaching and learning process passively. Professors frequently employ the lecture method to convey knowledge, which may help to explain why students find it difficult to understand basic concepts in chemistry. Their poor score on the chemistry exam may have been caused by their lack of active engagement in the lecture method. Chemistry instructors should use interactive computer simulations that let students interact and converse with one another as if they were in a real-world situation. The audio-visual presentation of the computer simulation may help students stay motivated and retain crucial concepts during instruction. Complete immersion improves student engagement in classroom simulations, which in turn improves students' capacity to remember and use what they have learned. Therefore, the problem of this study is: will the use of computer simulation instructional model improve students' achievement and retention in particulate nature of matter more than lecture method?

Purpose of the Study

The general purpose of this study was to investigate the effects of computer simulation model on secondary school students' comprehension of the coarse nature of matter. Specifically, the study sought to:

i. find out if there is an interaction between sex and ability of students achievement in Chemistry;

ii. compare the interaction between sex and teaching method on students' ability in Chemistry;
iii. find out if there is an interaction effect between teaching method and sex on students' mean retention score in Chemistry;
iv. find out if there is an interaction effect between sex and ability on students' achievement in Chemistry;

Research Questions

The following research questions guided the study.

i. What is the effect of interaction between sex and ability on students' achievement in Chemistry?
ii. What is the effect of interaction between sex and teaching method on students' retention in Chemistry?
iii. What is the effect of interaction between teaching method and ability on students' retention scores in Chemistry?
iv. What is the effect of interaction between sex and ability on students' retention in Chemistry?

Hypotheses

The following hypotheses were formulated and tested at .05 level of significance:

i. There is no significant effect of interaction between sex and ability on students' achievement in Chemistry.
ii. There is no significant effect of interaction between sex and teaching method on students' retention in Chemistry.
iii. There is no significant effect of interaction between teaching method and ability on students' retention score in Chemistry.
iv. There is no significant effect of interaction between sex and ability on students' achievement in Chemistry.

Methodology

A quasi-experimental research approach was used in this study. The population for the study comprised all Senior Secondary Two (SSII) Chemistry students of the four hundred and seventy – one (471) public secondary schools in Delta State. The total population of SSII students under study is forty two thousand, eight hundred and eight (42,808) (Ministry of Basic and Secondary Education Asaba, 2020). Six public high schools in Delta State participated in the research, as did six chemistry instructors, six students from Senior Secondary Class 11 (SS 11), or one class per school, and two hundred and thirty-six (236) students from Senior Secondary Class (SSII) of Chemistry. Each of the three senatorial districts had two schools chosen for this research. Simple

Random Sampling Technique was used to choose two schools from each senatorial district. Using a simple random selection method, one complete class was picked from each of the examined schools (balloting with replacement). In this investigation, two devices were employed to gather data. Accomplishment Tests for Chemistry (CAT) and a Scholastic Ability Test for Chemistry (SATIC). There were thirty (30) multiple-choice questions on the Delta State Government promotion examination's scholastic Ability Test in Chemistry (SATIC). SATIC was used to identify children with high and low levels of ability. 50 multiple choice questions derived from a six-week teaching unit in Chemistry covering matter, physical and chemical change, phase change of state, elements, compounds, and mixes, atomic structure, and isotopes were included in the Chemistry Achievement Test. To aid with distribution of Chemistry Achievement Test items, the researcher created Table 3, which displays this information. The specification table guarantees that all of the unit's content areas are represented. Blueprint depicts the cognitive exam of knowledge, understanding and application represented by the test items in instrument. Curriculum subjects from a high school senior English class were used to develop this lesson plan, which was written by the researcher. The Chemistry Achievement Test's grading methodology was devised by the researcher. Both the pre-test and post-test were administered using the Chemistry Achievement Test. Before and after therapy, the same instrument was used to deliver the Chemistry Achievement Test, which was then reshuffled and retested. The retention exam was performed two weeks after the post-test. The posttest was identical to the pretest in terms of retention. According to the Kuder-Richardson formula 21, the Chemistry Achievement Test (CAT) is reliable (KR21). Using this strategy for multiple-choice objective tests is an argument for its usage. Using a test-retest method, the instrument was administered to fifty (50) chemistry SSII students in Urhuoke Secondary School, Urhuoka Abraka in Ethiope East Local Government Area of Delta State who were not included in the study's scope. The data was then subjected to the Kuder – Richardson formula. An evaluation of the data yielded a reliability coefficient of 0.77.

Cooperative learning had a positive influence on the accomplishment of integrated science students in a research conducted by Ajaja and Eravwoke (2010). The simulation approach was taught to three instructors out of six in the chosen schools. All in all, it took six days. As soon as possible after arriving, the researcher went to the school heads (principals) and asked for permission to utilize their staff and pupils for the research. On the second day, the researcher with the support of two specialist instructors introduced the three teachers to the characteristics, origin, and principles of simulation teaching approach. Training manuals on simulation instructional methods of teaching prepared by the researcher were used to educate instructors throughout day three. As a research assistant, you were given the opportunity to practice and produce suggestions for using simulation instructional technique in teaching SS I1 chemistry's particulate nature of matter concept during the fourth and fifth days. Researchers and two other expert instructors constructively evaluated trained Chemistry teachers on the final day of training, and when they were completely convinced that the trained teachers can accurately use

simulation instructional method in teaching the particulate nature of matter, the training was over. The three lecturing instructors (the control group) had no formal training since they are used to lecturing as a technique of instruction. A lesson plan for the instructional units was provided to the three lecture technique instructors by the researcher in order to eliminate discrepancies in that group's treatment (See Appendix E).

Assignment of pupils to experimental and lecture groups was the initial phase of therapy (control). The experimental group consisted of three intact SSI1 classrooms from the six schools chosen for the research (Three schools for simulation method group). Groups of students were assigned to three remaining SSI1 courses from each institution (control group). Experimenters and control subjects were exposed to identical chemical topics. The simulation instructional approach was used to train the experimental groups, whereas the lecture instructional method was used to train the control groups. The six educators from the six schools that were chosen to participate in the study worked as research assistants. They received education in both the simulation and lecture methods of teaching.

Step by Step Treatment Procedure

The treatment groups consist of:

a. Experimental group (Simulation Instructional Method) and
b. Control group (lecture method group)

Six weeks of therapy were required. Within a week following the start of treatment, the researcher distributed the instructional units between the experimental and control groups, as well as to the six research assistants involved in the study. Students will learn about the elements, compounds, and mixes, as well as the atomic structure and isoptoes from Ababio's New School Chemistry in these chemistry-focused lessons (2005). As a means of familiarizing the instructor with the subject matter and ensuring that all educational presentations adhere to the required structure for the courses, the instructional units were sent.

The 50-item Chemistry Achievement Test was administered to both the experimental and control groups two days prior to the start of therapy (CAT). This was done in order to ensure that any changes seen after treatment were the result of the therapy and not the result of the groups' prior equality. Students in the control group were given a lecture-style presentation of all six weeks' worth of training material. The final versions of the subject materials were distributed equally among the three professors who instructed the students in the control groups. Simulated classrooms were used in the experimental classes.

Mean and standard deviation were used to answer the research questions in this study. As there was no significant difference in pre-test scores between the two groups when testing hypothesis I, II, III, and IV, a t-test statistic was employed to test these hypotheses while ANOVA was used to test hypotheses V, VI, VII, VIII, ix, and XI. Hypothesis testing was found to be significant at a level of.05.

Results and Discussion of Findings

The results of the pretest for both groups were analysed using t-test to determine whether both groups were equivalent before instruction. The result is presented below,

Table 1: Mean and standard deviation of pre-test achievement test scores of the groups.

Method	N	$\overline{X}$	Mean Diff	SD	SD ERROR
Computer Simulation Model (CSM)	102	12.75	0.09	2.16	0.209
Lecture	134	12.84		2.94	0.254

From the table above, lecture method had a higher mean than the computer simulation model (CSM). To determine whether the difference is significant, t-test was employed and the result is presented in table 5

Table 2: t-test comparison for the equivalent of the groups

Method	N	$\overline{X}$	SD	df	P val	Decision
CSM	102	12.75	2.16			
Lecture method	134	12.84	2.94	234	0.774	Not Significant

P > .05

From the P-value in table 5, it shows that there is no significant difference between the two groups before treatment. Therefore, the equivalent of the groups was established.

Research Question 1

What is the effect of interaction between sex and ability on students' achievement in Chemistry?

Table 3: Mean and standard deviation showing the effect of interaction between sex and ability on students' achievement

Ability level	Sex	N	Mean	Mean Diff.	SD
High	M	20	30.70		7.73
	F	15	30.27	0.43	8.96
Low	M	95	24.94		6.13
	F	81	25.02	-0.08	7.10
Total		**211**			

A mean ability score for high- and low-achieving male students in Chemistry is shown in Table 3 as 30,70 and 24,94 with standard deviations of 7,72 and 6,13, while their female counterparts had a mean ability score of 30,27 and 25,02 with standard deviations of 7,72 and 6,02. Because the mean ability scores for males and females at the high level were greater for the two levels of high and low, the findings do not show an interaction between sex and ability on students' success in Chemistry.

Hypothesis 1

Ho1: There is no significant effect of interaction between sex and ability on students' achievement in Chemistry.

Table 4: Analysis of variance (ANOVA) showing the effect of interaction of sex and ability on students' Chemistry achievement

Dependent Variable Post test

Source	Type I Sum of squares	Df	Mean Square	F	Sig.
Corrected model	897.001*	3	299.000	6.306	.000
Intercept	88183.916	1	88183.916	1859.870	.000
Sex	.855	1	.855	0.018	.893
Ability	867.953	1	867.953	21.306	.000
Sex.*ability	1.947	1	1.947	.041	.840
Error	9814.705	207	47.414		
Total	152206.000	211			
Corrected Total	10711.706	210			

Table 4 shows that there is no significant effect of interaction between sex and ability on students' achievement in Chemistry, F(1,207) = .041, P = 0.840. Thus the null hypothesis is not rejected. Hence, there is no significant effect of interaction of sex and ability (High and Low) on students' achievement in Chemistry.

Research Question 2

What is the effect of interaction between sex and teaching method on students' retention in Chemistry?

Table 5: Mean and standard deviation showing the effect of interaction between sex and teaching method on students' retention

Method	Sex	N	Mean	Mean Diff.	SD
CSM	M	55	30.35		4.72
	F	47	27.72	2.63	5.06
Lecture Method	M	78	18.15		5.24
	F	56	18.07	0.08	5.05
Total		236			

Students who were taught Chemistry using a computer simulation model scored 30.35 and 27.72, respectively, on Table 5, while students who were taught the subject using a lecture technique had a mean retention score of 18.15 and 18.07. Students' recall of Chemistry was not affected by the combination of sex and teaching technique, according to the findings. This was due to the fact that the mean retention scores for students in the experimental group were higher at all levels of sex.

Hypothesis 2

Ho2: There is no significant effect of interaction between sex and teaching method on students' retention in Chemistry.

Table 6: ANOVA showing the effect of interaction between sex and teaching method on students' Chemistry retention

Dependent Variable Post-test

Source	Type I Sum of squares	Df	Mean Square	F	Sig.
Corrected model	7204.969*	3	2401.656	94.507	.000
Intercept	126773.337	1	126773.337	4988.614	.000
Group	104.285	1	104.285	4.104	.044
Gender	6803.092	1	6803.092	267.706	.000
Group *Gender	91.960	1	91.960	3.619	.058
Error	5895.709	232	25.413		
Total	136660.000	236			
Corrected Total	13100.678	235			

Table 6 shows that there is no significant effect of interaction between sex and teaching method as measured by students' mean retention scores in Chemistry, F(1,232) = 3.619, P = 0.058. Therefore, Ho2 is not rejected. Thus, there is no significant effect of interaction of sex and teaching method on students' retention in Chemistry. This implies that the students' retention scores in Chemistry relative to teaching method are not influenced by students' sex.

Research Question 3

What is the effect of interaction between teaching method and ability on students' retention score in Chemistry?

Table 7: Mean and standard deviation showing the effect of interaction between teaching method and ability on Chemistry retention

Methods	Ability Level	N	Mean	Mean Diff.	SD
CSM	High	21	29.14		6.23
	Low	59	27.95	1.19	4.72
Lecture Method	High	14	18.07		5.33
	F	117	18.00	0.07	5.33
Total		211			

Table 7 shows a post-test mean retention score of 29.14 and 27.95, for High and Low ability students taught Chemistry using computer simulation strategy (experimental group). High and Low ability students taught with lecture method had a post test mean retention score of 18.07 and 18.00. The results do not suggest effect of interaction between teaching method and ability on students' retention scores in Chemistry. This was because at the levels of ability (High and Low), the mean retention scores were higher for students in the experimental group.

Hypothesis 3

Ho3: There is no significant effect of interaction between teaching method and ability on students' retention score in Chemistry.

Table 8: ANOVA showing the effect of interaction between teaching method and ability on students' retention

Dependent Variable: Retention

Source	Type I Sum of squares	Df	Mean Square	F	Sig.
Corrected model	5245.359*	3	1748.453	66.283	.000
Intercept	60047.041	1	60047.041	2276.364	.000
Method	3056.962	1	3056.962	115.888	.000
Ability	11.073	1	11.073	.420	.518
Method * Ability	8.714	1	8.714	.330	.566
Error	5460.347	207	26.378		
Total	111864.000	211			
Corrected Total	10705.706	210			

Table 8 shows that there is no significant effect of interaction between teaching method and ability as measured by students' mean retention score in Chemistry, $F(1,207) = .330$, $P = .566 > .05$. Therefore, Ho3 is not rejected. Thus, there is no significant effect of interaction of teaching method and ability on students' retention score in Chemistry. This implies that the students' retention scores in Chemistry relative to teaching method are not influenced by students' ability.

Research Question 4

What is the effect of interaction between sex and ability on students' achievement in Chemistry?

Table 9: Mean and standard deviation showing the effect of interaction between sex and ability on students' achievement in Chemistry

Sex	Ability Level	N	Mean	Mean Diff.	SD
Male	High	20	30.70		7.72
	Low	95	24.94	5.76	6.12
Lecture Method	High	15	30.27		8.96
	Low	81	25.02	5.25	7.10
Total		211			

Table 9 shows a post-test mean achievement score of 30.70 and 30.27, for male and female students with high ability level on Chemistry, while male and female students with low ability level had a post-test mean achievement score of 24.94 and 25.02. The results do not suggest effect of interaction of sex and ability on Chemistry achievement. This was because at all levels of sex, the mean achievement scores was higher for male and female students with high ability level.

Hypothesis 4

Ho4: There is no significant effect of interaction between sex and ability on students' achievement in Chemistry.

Table 10: ANOVA showing the effect of interaction between sex and ability on students' Chemistry achievement

Dependent Variable Post-test

Source	Type I Sum of squares	Df	Mean Square	F	Sig.
Corrected model	897.001*	3	299.000	6.306	.000
Intercept	88183.916	1	88183.916	1859.870	.000
Sex	.855	1	.855	.018	.893
Ability	867.953	1	867.953	18.306	.000
Sex *Ability	1.947	1	1.947	.041	.840
Error	9814.705	207	47.414		
Total	152206.000	211			
Corrected Total	10711.706	210			

Table 10 shows that there is no significant effect of interaction between sex and ability as measured by students' mean achievement scores in Chemistry, F(1,207) = 0.041, P=0.840. Therefore Ho4 is not rejected. Thus, there is no significant effect of interaction of sex and ability on students' achievement in Chemistry. This implies that the students' achievement scores in Chemistry relative to ability (High or Low) are not influenced by students' sex.

Discussion of the Findings

The findings of this study are discussed under the following sub-headings:

Effect of Interaction of Sex and Ability on Chemistry Achievement

Students' performance in Chemistry was not affected by the interplay of sex and ability, according to another conclusion of the research. According to Mohammad (2016), there were no statistically significant variations in sex and ability when it came to students' Chemistry success. Ellah (2016), who examined the cognitive styles and scientific attitudes of senior secondary science students of High cognitive ability level, supports this conclusion. Ellah (2016) Regardless of gender, he found that pupils with excellent mental abilities performed better in scientific classes. Based on the results of Chen et al. (2017) who found that technology-enhanced learning environments such as interactive simulation help students from low ability groups succeed, this conclusion is in agreement with theirs.

Effects of Interaction between Sex and Teaching Method on Chemistry Retention

Students' interest in Chemistry was not affected by the style of teaching or the sex of the instructor, according to the research. This implies that the use of a computer simulation model

and a lecture approach did not impact the retention of students in Chemistry. There was no significant relationship between teaching technique and gender location on pupils' success in physics, as reported by Abamba in 2021. Arokoyu and Nenalebari (2018) found no significant interaction between learning styles and gender on students' performance and retention in organic chemistry, which is in agreement with our findings.

Effect of Interaction between Teaching Method and Ability on Chemistry Retention

There is no substantial correlation between the technique of teaching and students' capacity to retain information in Chemistry. Suggesting that students' memory in Chemistry was not affected by the combination of sex and computer simulation model and lecture approach This suggests that the retention of students in Chemistry was not influenced by sex in conjunction with computer simulation models and lecture methods. There was a substantial interaction impact between teaching approach and gender on students' retention and accomplishment in Social Studies, according to Adeyemi and Ajibade (2011). That being said, this conclusion is in direct conflict with that of Alamrani et al. (2018), who examined the impact of simulation-based vs conventional teaching techniques on nursing students' critical thinking skills and self-esteem. Nursing students' competence and teaching approaches had a non-significant interaction impact.

Effect of Interaction between Sex and Ability on Achievement in Chemistry

Sexe and aptitude had no discernible impact on students' performance in Chemistry, according to the findings of this research. This suggests that students' success in Chemistry was not influenced by their skill level (High vs. Low). In Genetics, Akhigbe and Ogufere (2019) found that computer simulation teaching technique had a positive impact on students' attitudes and academic success. In Genetics, they found no significant correlation between sex and ability (High and Low) and students' success. According to Udousoro (2011), students' academic performance in Chemistry is not influenced by gender in any meaningful way.

Conclusions

The study's finding is as follows: Instead of lecturing, using a computer simulation model improves student retention and success in chemistry. It has been demonstrated that using a computer simulation model helps both male and female students' grades in chemistry. The employment of a computer simulation model and a lecture-based method had little impact on students' performance in Chemistry. The results of the study showed that students in both high and low grades who were taught through computer simulation models as opposed to lectures had greater advances in competencies. In terms of enhancing student performance and retention in Chemistry, computer simulation trumps the lecture method.

Recommendations

Based on the findings of this study, the study recommended that:

1. As a way to increase student accomplishment, the Ministry of Education could hold workshops that discuss using computer simulations in chemistry education. 3..
2. The government should provide electricity so that computer simulations may be implemented.

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