Computer Assisted Instruction (CAI) and Students Interest as Determinant Of SSII Chemistry Students' Achievement in Chemical Equilibrium in Rivers State

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Abstract: *This study investigated the effort of computer assisted instruction (CAI) and interest as determinant of senior secondary II chemistry's achievement in chemistry equilibrium in Port Harcourt, Nigeria. Pre-test-post-test, control group quasi-experimental design study involving a 2x2x2 factorial matrix was adopted. Purposive sampling technique was use to select 40 senior secondary two private schools in Port Harcourt Two valid and reliable instruments of twenty-five 25 items, chemical equilibrium students (p= 0.83) and interest scale towards. Chemistry achievement test computer and assisted instruction package (p=.724) were used for data collection. Three null hypotheses were generated and tested at 0.05 level of significance. Data were analyzed using Analysis for Co Variance (ANCOVA). While Sidak post hoc test was used to explain the direction of significance between the groups. There was a significant difference in the performance of experimental and control group after treatment on secondary students school's achievement in chemical equilibrium (F(l,39)=11.015, p<0.5, there was a significant main effect of treatment on student's interest in chemical equilibrium participants groups (F (1. 39) =15.898; p< (0.5); There was a significant interaction effect of treatment, interest and gender on students in chemistry (F (1,39) = .462, p< 0.5). Further there was a significant main effect of gender on chemistry participants ((F(1,39) = .462, p< 0.5. finding revealed that majority of boys has positive interest towards chemistry when they use computers then the girls in school. students should be motivated to use of computer assisted instruction to pursue careers in science by designing attractive models of instruction in schools at all times. Stockholders and NGO's should be encourage and equip schools with new technology and computers for easy learning,*
Keywords: Computer. Assisted Instruction (CAI) Interest, Achievement in chemistry

I. Introduction

A strong positive link should exist between the quantity and quality of instructional materials improvised by the teacher for teaching of chemistry concept. The major function of the school is teaching (Popoola and Olarewaju 2010). Effective teaching and good performance is possible if the necessary instructional teaching facilities are made available. Research works in the field of learning psychology reveal that the use of instructional materials in chemistry has several advantage mainly because of two senses (seeing and hearing) involved. All learning is based on perception. Instructional materials are the medium by which the senses gain information from environment. According to Ibrahim (2010), more learning occurs when information is received simultaneously through the two senses rather than in a single medium. Esu and Ntukiden (2003) added that instructional materials are teaching – learning aided that supplement teaching strategies and perfect learning experiences. To them, instructional aides keep the learners busy and active, thus increasing their participation in the lesson especially in a situation where audio visual materials are utilized.

Further, Adegbilr (1999) opine that teaching becomes more effective and meaningful if the teaching method is complimented with good and relevant instructional materials. The use of instructional materials cannot be limited to a particular field of study, so the use instructional materials require careful planning as to meet the learner characteristics. Moallen (2007) emphasized that learners individual differences are very important to consider learners needs when organizing instructional delivery activities such that a reasonable number of learner would attain the envisaged mastery of the objectives (Zheng and Smaldino 2003) Instructional objectives are those skills, behaviour and knowledge that the learners are expected to develop, upon completion of the instructional unit.

Mayer (2001) has it that, instructions are effective when verbal information is presented visually (with pictures) of the real thing rather than aurally (use of words only) the modality principle. Thus, it stands to reason that, replacing speech with pictures in the class may improve pupil's performance. Fletdur (1990) suggest that pupils remember 20% of what they hear, 40% of what they see and hear and 75% of what they see, hear and do. Further, kucukahmet (2001) supported that 75% of learning archievement is resulted from seeing, hearing 13%, smelling 6%, touching 3% and tasting 3%. This shows that, the more senses are considered during the

information dissemination; the easier it is to retain knowledge and enhance learning. To him therefore, instructional material make instruction more beneficial, lasting and pleasurable thereby creating conducive atmosphere for children by increasing their level of attention on the subject, understanding the lesson and developing interest on the subject. Demiral, (2004) has it that, instructional material makes the topic clearer and lasting by making the abstract real, especially in teaching abstract concept in science subject. It is very important to use visual material for people to understand the lesson better and improving positive attitude towards the lesson. Halis (2002) Izzet and Ozkan (2008) added that the use of good and appropriate materials in science application makes the lesson more interesting and encouraging. It makes the difficult science concepts to be learnt easily in more effective way. If it is taken into account that students especially at the age of primary school have difficulty in learning abstract concept, it is important to make these concepts physical and present them carefully. For this, educational technologies, especially computers can play an important role (Akpinar 2005).

The use of computers in schools seems to help people to be creative in problem solving thereby developing positive interest in their studies. In this respect, the whole purpose of education in a country like ours is to develop and enhance the potentials of human resources and progressively transform them, into knowledge society. Jones (2002) emphasis that professional development in the effective use of computers as a most fields of study, assumes that peoples will be able to return to a class room and use the skills, training, and knowledge acquired to earn a living and contribute meaningfully to the advancement of society.

Computers could play powerful roles in the child learning in school. That is because it helps to develop learners' potentials in different areas of learning and may also constitute powerful delivery system that may be bring about great changes in learners behaviours that are desirable to the society at large. It is noted that, most learning occurs by doing (experimental learning) including getting things wrong as well as getting them right determined by immediate feedback in other words computers appears to be capable of giving almost instant feedback, tirelessly no matter how often learners get it wrong during the process. Recently computer education was introduced into Nigeria secondary School Curriculum. Thus, many schools if not all in Nigeria are trying to integrate the use of computer in their teaching and learning processes. Also, base on the experience in ICT training for pre-service and in-service teachers is an integrated curriculum that is proposes within the frame work of educational system, teachers are undergoing in-service training on how to use computer as part of instructional material to improve the quality of their teaching activities.

Nature of computer assisted instruction
Computer assisted instruction (CAI) refer to instruction or remediation presented on a computer. It is the use computers as an interactive instructional technique whereby a computer is used to present the instructional materials and monitor the learning that take place. It is assisted learning because it allows the learner to interact with instructional techniques whereby a computer is used to present the instruction and monitor the learning that takes place. It uses a combination of text, graphics (animation), sound and video in the learning process. Forrie (1999) added that CAI as an educational computer programs that is available online and from computer stores and textbook companies. They enhance teacher instruction in several ways.

The integration of computers into education system has a relative brief history. However, the first use of com puters in educational area started with the use of mark and ENIAC in 1940s. First computers were used as a problem solving machine especially for science and engineering (Carter, 2004). More specially, computer programs are interactive and can illustrate a concept through attractive animation, sound and demonstration. They allow students to progress at their own pace and work individually or problem solving in a group. Computer aided instruction has been found to enhance students' performance then the conventional instructional methods in counsellor education (Karper, Robinson, Casado-Kehoe 2005).

Computer as instructional material has made a significant contribution to a wide range of group-learning activities. They can, for example, be used to manage or structure a group-learning process, by guiding the group through a simulation exercise of some sort. This can provide a vehicle through or with which a group of learners interact, and gain access to information, investigate simulated situation, which can lead to creativity indeed, virtual all these are ways in which computers can be used to determine pupils interest in learning. It can also be used in group-learning situations. Learners in groups thus, do not only benefit from feedback they receive from the computer, but also from the feedback they receive from one another. Considering the views of Izzet and Ozkan (2008) many research studies abound that, investigated the efficacy of computer assisted instruction (CAI) using different variables difference group of students, difference ability levels, gender among others.

Adeleke (2003) sees computer as a machine for executing precisely stated rules with accuracy, repeatedly with great reliability. However in his argument, shortly after the development of computers in 1940, educators perceived their potentials as one of the educational tools that aid learning process. Nevertheless, the perception only got more recognition recently by the government and policy makers in the Country. In this

regard, computer therefore acts as a substitute tutor with which the pupils can participate in an ongoing dialogue via an interactive terminal of some sort.

Further, Mwei (2011) has it in his finding that, CAI is more effective in some researches but it has fewer efficacies for others. For instance, the effect of computer – assisted Instruction on students Attitudes and Achievement in Matrices and Transformations in secondary schools in Kenya proves that CAI approach is more effective than conventional approach for producing achievement and attitude gains in such a population. However, Adel and Mounir (2008) Argued that ICT can distract learning according to him, this may be particularly salient at home, where internet access could be a source of distraction because of char room online games, reducing the time spent in doing homework or learning. Thus, the impact of the availability of IC'T on student learning will strongly depend on their specific uses

Considering the work of Nicole and Anderson (2000) CAI provides pupils with extended practice, which, in turn, can lead to acquisition of basic skills and encourage better learning of pupils in school. This may be due to the fact that a good amount or personal skills can be developed by the learners themselves when given the opportunity, unlike during the traditional classroom learning where the main source of feedback is the teacher. Therefore, to achieve this, activities should include intellectual challenging task that should motivate pupils to explore solution to a problem, and give them an opportunity to gain a sense of individual control and mastery over an environment (Becker, 2000).

Hypothesis
There is significant main effect of
➢ Treatment on secondary students' achievement in chemical equilibrium
➢ Interest on secondary student's achievement in chemical equilibrium
➢ Gender on secondary student's achievement in chemistry equilibrium

Methodology
This study adopted a quasi – experimental design, this is because the independent variables will be manipulated. The study sought to fine out the effect of using computer aided instruction as determinant of senior secondary school student' interest and achievement in basic science. In this research, two groups were used, (experimental and control group). The experimental groups were exposed to treatment, using CAI. Control group were exposed to treatment but to conventional teaching method only.

Population
The target population comprised of all private senior secondary school II (5) school students that offer Chemistry and all the schools that have computers in Port Harcourt local government of Rivers State. The choice of SS I was based on the fact that the classes were able to respond to the use computers, Also the group has been exposed to learning of chemistry at least for three years and therefore, they are expected to have attained certain level of intellectual .ability to be able answer question

Sample And Sampling Technique
Purposive sampling technique was used to select two (private) school thus participated the study, this was based. on the facts that, research, on computer Assisted instruction (CAI) should be conducted in schools were computers are available Thus, two schools, one with a computer laboratory (not less than 25 functional pieces in number) and another without computer laboratory were' selected, In these schools, computer education was part of' the curriculum students were exposed to the study.

Instrument
This test was developed by the researcher in order to determine whether or not differences existed between the achievement level of pupils in both experimental and control groups. The test consisted of 25 - items with four (4) multiple choice options A, B, C, and D ten (10) items tested pupils knowledge (memory level), seven (7) focused on comprehension while eight (8) items tested pupils ability to thinking. The content and construct validity were censured by using table of specification. The items were given to experts and two basic science teachers. Their critical review and comment help in ensuring that the items were appropriate for senior secondary school II. The final items selected after pilot study were administered to 40 pupils in two private schools which were not part of the study sample.

Data Collection Procedures

The consent for permission to conduct the research and use the computer laboratory for the experimental group was granted by the school administration. Prior to treatment in class, pre-test on basic science was administered to rest pupil's level of understanding on the selected topics as well as the questionnaire scale on interest in basic science and computer assisted instruction.

Analysis Of Data:

Data collected was analyzed using analysis of covariance (ANCOVA), with the pre-test scores as covariate to test for the main effect. ANCOVA was employed because it has the tendency to adjust for the initial mean differences that might exist among the groups. It was also used to determine the effect of the independent variable on the dependent or to compare if there are changes in terms of their achievement, as well as pupils interest to basic science.

II.   Result

The results were presented in line with the stated research question, the results were interpreted at the 0.05 level of significance.

Testing the Hypotheses:

There is no significant main effect of treatment (computer assisted instruction) on secondary school student's achievement in chemical equilibrium

The test hypothesis, analysis of covariance (ANCOVA) was employed to analyze the posted scores of the participants on treatment, using the pre-test scores as covariates to find out if post-test difference was significant.

Table 1: Descriptive Statistics of Treatment Score for Treatment Group and Control

Treatment	Mean	Std Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Computer Assisted Instruction	19.143	.464	18.197	20.088
Conventional method	16.708	.487	15.715	17.701

A covariance appearing in the model are evaluated at the following values: PRE-TEST = 15.00

Table 1: Shows the descriptive statistics on treatment. The result shows that the participants exposed to treatment had the highest post achievement mean score

(x = 19.143) in chemical equilibrium, while pupils in the conventional group has the least performance with the achievement mean score (x = 16.708) this implies that the treatment intervention of participants group is effective as seen in table 2.

Table 2: Summary of analysis of covariance (ANCOVA) showing the effect of treatment on experimental and control groups.

Dependent Variable: Achievement

Source of variation	Sum of squares	df	Mean square	F	Sig.	Eta Square
Corrected model	408.830	8	51.104	14.796	.000	.792
Intercept	70.343	1	70.343	20.366	.000	.396
Pre-test	109.711	1	109.711	31.765	.000	.506
Treatment	38.046	1	38.046	11.015	.002	.262
Interest	54.908	1	54.908	15.898	.000	.339
Gender	4.258	1	4.258	1.233	.275	.038
Treatment x interest	6.167	1	6.167	1.785	.191	.054
Treatment x Gender	1.595	1	1.595	.462	.502	.015
Treatment x Gender x Interest	41.099	1	41.099	11.899	.002	.277
Error	107.070	31	31	3.454		
Total	13548.000	40				
Corrected Total	515.900	39				

a R square = .792 (Adjusted R square = .739)

The result presented in table 2 shows that there is was a statistical significant main effect of treatment

(CAI and Conventional method) on pupils' achievement in basic science post-test scores of participants in the experimental and control groups ($F_{(1,39)} = 11.015$; P<0.5), partial eta square $n^2 = 262$. The effect size of 26.2% of treatment was fair and is accounted for the variance in pupils' achievement in basic science. Meaning there is a statistical mean difference in basic science achievement test scores of experimental and control group. This implies that, the treatment intervention seems to be significantly effective. Therefore, to provide information on the variation in post – test mean score of participants in treatment and control group, the pair-wise comparison was computed and presented as follows.

Table 3. Summary of pair – wise comparison analysis showing the effect of treatment on basic science achievement test scores of experimental and control group.

(I) Treatment	(J) Treatment	Mean Different (I-J)	SD	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Computer Assisted Instruction	Conventional Method	2.435*	.734	.002	.0938	3.931
Conventional method	Computer assisted Instruction	-2.435*	.734	.002	-3.931	-.938

Note*. The mean difference is significant at the .05 level

Table 3. Shows that the pair wise comparison post hoc test (Sidak) of pupils' in treatment and control group. The values obtained indicate that, treatment has significant effect on participants achievement in basic science as seen in table 3.
  ➤ There is no significant main effect of interest on senior secondary school chemistry's achievement in basic science.
  ➤ To test the hypothesis, analysis of covariance (ANCOVA) was used to analyze and they are presented in the table 5. To find out if test difference as significant.

Table 4: Descriptive Statistics of Interest on Pupils Achievement in Basic Science.

Interest	Mean	Sd	95% Confidence Interval	
			Lower Bound	Upper Bound
Lower interest	16.717	.440	15.819	17.615
High Interest	19.134	.416	18.286	19.982

a.   Covariate appearing in the model are evaluation at the following values: Pre-test. = 15.00

Table 4: shows that the descriptive statistics on interest. The result shows that highest interest group mean score (x = 19.134) in basic science, while in the low interest group had the least mean score (16.717). The mean difference between the high and low, interest group is 2.42. However, the difference is statistically significant ($F_{(1,39)} = 15.898$, P<0.5), partial eta square $n^2 = 339$ table 2. Therefore the effect size of 24.2% of interest on students' achievement chemical equilibrium was fair, and 24.2% of interest is accounted for the variation of pupil's achievement in basic science. The null hypothesis was rejected, meaning there is a statistical significant main effect of interest on pupil's achievement in basic science.
❖ There is no significant main effect of gender on secondary school students achievement in chemical equilibrium

To test the hypothesis, descriptive statistics, analysis of covariance (ANCOVA) is used to analyze and they are presented in the table 4 to find out if test difference was significant between gender and pupils achievement.

Table 4. Descriptive Statistics of Gender on Pupils Achievement in Basic Science

Gender	Mean	Std Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	18.270	.422	17.410	19.130
Female	17.581	.445	16.673	18.488

a.   Covariates appearing in the model are evaluated at the following Pre-test = 15.000

Table 5 shows that the descriptive statistics on gender, result of the analysis show that the males has higher mean score (x 18.270) than the females (x = 17.581). However, as table 2 shows, the mean difference of .689 is not statistically significant ($F_{(1,39)} = 1.233$, P< 0.5), partial eta square $n^2 = .038$ (Table 2). Therefore the effect size of 3.8% of gender on pupil's achievement in basic science was moderate, only 4% was accounted for variation of gender on pupil's achievement. The null hypothesis was not rejected, meaning there is no significant main effect of gender on pupil's achievement in basic science.

Implication Of The Finding

The finding of the study shows that CAI hard more positive effect in students' achievement in Chemistry than conventional method. Treatment strategy motivates and encourages pupils to interact with what they have learnt in terms of student students – teacher, students – students relationship, which have helped them to be creative in terms of thinking when compare with the conventional method that is teacher centred. The teacher dominates the class and sometimes the pupils are not given opportunity to make scientist discovery on their own but only depend on the ideas and fact given by the teacher, hence they end up memorizing.

The influence of interest has a vital implication on the pupil's achievement in Chemistry. This could in line with finding school administrative should make adequate provision of modern instructional materials that with motivate and arouse the interest of the pupils by given them adequate information.

Another implication of the study is the effect of gender on pupils' achievement. This implies that there is chance of learning irrespective of gender but the females should be encouraged in the use of computers. Also it seems Girls were lacking in confidence relative to boys because of the ways in which they were treated in school.

Furthermore, learning of basic should not only encourage by CAI but should be made available students' in schools both public and private secondary. The resultant effect will be serves as reorientation to the teachers on effective delivery of their lesson and improve of educational system.

As ICT continue to be more established in secondary school, there will be increasing need for research to identify pedagogical and integration issues in Nigeria, there will be a need to fully explore more teaching constructs of the place of ICT in secpondary school system education.

III. Recommendation

➢ Since this study showed that computer can enhance students' academic achievement, all the secondary schools in the state both private and public should be encouraged t have their own computer laboratories, to enable them attain a higher level of academic achievement
➢ Stock holders and NGO's should encourage and equip schools with new technology and computer for easy learning.
➢ That teachers can retain students' interest by designing lessens which appeal to them through use of computers
➢ There should be adequate provision for regular supply of electricity in the schools at all times
➢ Children should inspire with use of computer assisted instruction to pursue careers in science by providing attractive models of instruction.

IV. Conclusion

To conclude this study, the following were found.

There is need to us teaching aids during instruction, since this leads to effective learning. Identifying pupils' that are interested in science subjects at young ages is crucial because early identification can foster interest and developed achievement in the future. The need to develop a science interest measure was evidence when a review of existing science interest inventories indicated that they were theoretical in design, and did not have adequate evidence of psychometric properties. Therefore, the use of CAI in education contribute significantly to higher students performance in schools

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