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Improving Students' Achievement And Retention In Computer Studies Through The Use Of Computer-Assisted Tutorial Instructions

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Abstract: ***This study focused on improving students' achievement and retention in computer studies through the use of computer-assisted tutorial instruction.. The design adopted for the study was quasi-experimental. The population of the study consisted 4,873 SS2 students in Nnewi Education Zone of Anambra state. 90 SS2 computer studies students comprised the sample for the study. Computer Studies Achievement Test (CSAT) validated by two experts from Nnamdi Azikiwe University, Awka was used as instrument for the study. The reliability of the instrument was established using Kudder-Richardson Formula 20 which yielded coefficient of internal consistency of 0.82. CSAT was administered as pretest before treatment, posttest after treatment and retention test after three weeks of the posttest. Data obtained from the test administration were collated and analyzed using mean, standard deviation and Analysis of Covariance (ANCOVA). Results from the study showed that computer-assisted tutorial instruction significantly improved students' achievement and retention in computer studies more than the conventional method of instruction. The study recommended that the government should make provision for computer technology accessories needed for the effective integration and use of computer-assisted tutorial in the classroom for lesson delivery.***

Keyword: Computer-assisted instruction, tutorial, retention, file organization, achievement

I. INTRODUCTION

Lack of adequate computer laboratory equipment and power constitute a major problem in the teaching and learning of computer studies at the secondary level of education. The use of alternative power supplies such as generator sets is also not easy to handle. In recent times, the cost of fuel, gas or other such chemicals that can be used to operate generator sets are alarming and leaves school administrators no ways of adopting the option of alternative power supplies. These challenges have been an issue of concern to computer studies teaching and learning. It is at this point that computer assisted instruction (CAI) in the form of tutorials and animated media instructional strategies come to mind.

CAI refers to the use of computer in teaching and learning. It is one mode through which computers can be used in teaching and learning process (Ahiatrogh, Madjoub & Bervell, 2013). In this teaching approach, the teachers use computer to instruct a group of students. This can be done by projecting the lesson contents, showing a video of practices exercise or how what is learnt can be applied in operating the computer. Also, tutorials or step wise images of the steps to carry out different computer operations can be done using CAI. Another effective and useful approach is the use of animated media instruction strategy in the course of instruction.

The introduction of animation in teaching may facilitate learning by engaging more senses of the learners, which in

turn may enhance their achievement and retention of learning. Achievement is the outcome of learning. According to Othman and Leng (2011), it is the extent to which a learner profited from an instruction. Retention is the ability of a student to retain and remember as well as reproduce what he/she has learnt in the past. Students tend to retain what was learnt only when they are actively involved in the lesson and if enough and rich learning experiences are provided (Zeynep, 2015). Thus, the use of tutorial CAI instructional strategies is thought to be one of the means through which retention can be facilitated by providing multiple learning experiences for the learners as noted in the Dual coding theory of Alvan Paivo.

Dual Coding Theory states that there are two separate information processing systems: a visual system which processes visual knowledge and a verbal system for processing verbal knowledge. Thus, Computer images and animations because of their unique dynamic functions are more likely to be coded as both visual and verbal knowledge stored in the long-term memory, facilitating encoding and retrieval process. This theory suggests that subject concepts can be coded through three distinctive level of processing that can occur between verbal and visual systems: representative, associative and referential. Representational processing connects the incoming stimuli from the environment to either the verbal or visual system. Associative processing constructs connections within either of the verbal or visual systems, and referential processing builds connections between the verbal and visual systems.

The Dual Coding theory advocates for learning methods that enrich students' learning experience by engaging the visual and auditory senses. The various means of processing information engage learners' cognitive processes through multiple learning experiences including verbal and visual presentations which can be achieved by using computer assisted instruction and animation. Thus, information are better understood and retained. This cognitive processes induced by using CAI and animation underscored the need to investigate whether their application in Computer studies can improve achievement for students.

The greatest contribution of cyber age technology is the development of computer and its use in teaching learning process (Vinta, 2015). Instruction materials are among the assistant materials which teachers use them to make instruction more effective, lasting and retentive. Computers that are used as both a material and method and instructional materials are effective for making students concentrate on, understanding of, synthesizing and improving positive attitude towards the subject. The course an instructional material especially when it involves animation and other computer assisted instruction packages makes the topic clearer and more retentive making the topics that are abstract for students more concrete (Cepni et al., 2004; Demirel, 2004).

The use of computer assisted instruction has been shown to bear beneficial boost on students' achievement (Orjika, 2012). CAI ensures the application of proven teaching methods to all students at all times. The use of CAI arouses and sustains interest and engages them actively in the learning process. Thus, students benefit homogenously from CAI thereby making for a uniform positive achievement. CAI therefore offers equal educational opportunities for all by using the same programme for all schools where application and educational softwares are developed for such purpose (Bromberg & Theokas, 2013).

CAI changes the role of the teacher from teaching capacity to that of a guide (Cheung & Slavin, 2012). This enables the teachers to introduce new ideas and concepts which can then be explored by the students and the teacher. When CAI is connected with internet, students are exposed to the information community from where they could understand the learning material in various ways.

CAI removes fright and embarrassment for the students (Falth, Gustafson, Tjus, Heimann & Svensson, 2013). According to Faith et al. (2013), the reduction of fright in the learning process of students allows them the opportunity to learn with ease and at their own pace. CAI therefore brings about meaningful learning. The pace of instruction concerns everyone involved in the development of educational activities. Parents often worry about their children being either left behind or held back by the performance of the other students in the classroom. Teachers using traditional learning activities have trouble progressing with some of the students in a classroom if all of them are not ready (Orjika, 2012). Computer-based educational activities assist here by allowing each student to learn at his or her own pace. One student can move onto more demanding educational activities before the rest of the class without disrupting anyone else's learning. Simultaneously, another student can repeat certain learning activities as often as advisable.

PURPOSE OF THE STUDY

The main purpose of the study was to investigate improvement in students' achievement and retention in computer studies through the use of computer-assisted tutorial instructions**.** The study sought specifically, to find out the:

- ✓ Difference between the mean achievement scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method.
- ✓ Difference between the mean retention scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method.

RESEARCH QUESTIONS

- ✓ What is the difference between the mean achievement of scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method?
- ✓ Difference between the mean retention scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method?

HYPOTHESES

- ✓ There is no significant difference between the mean achievement of scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method.

- ✓ There is no significant between the mean retention scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method.

II. METHOD

RESEARCH DESIGN

The design of the study was quasi-experimental. Specifically, the pretest-posttest non-equivalent control group design was used. In this kind of study, independent variables are manipulated in order to examine their effects on the independent variables (Nworgu, 2015). The design of the study is shown below:

E	0_1	X	0_2	0_3
C	0_1	~X	0_2	0_3

Figure 1: Design of the Experiment

Where,
E = Experimental Group I
C = Control Group
0_1 = Pre-test
0_2 = Post-test
0_3 = Delayed Post-test (Retention test)
X = Treatment I – CAI tutorial instruction
~X = Control group - Conventional method

AREA OF THE STUDY

The area for the study was Nnewi Education Zone which was made up of four local government areas namely: Nnewi North, Nnewi South, Ekwusigo and Ihala local government areas. The area is known for its commercial activities and serves as a host community to a number of institutions. Also, residents of this area are known for their business acumen. There are primary and secondary schools in Nnewi Education Zone. The choice of this area is because Nnewi Zone is known for its technological adventures. It is hoped that such study as this will inform teachers and educators of the present situation of learning geared towards computer studies. The outcome of the study may provide a guide for improvement in computer studies teaching and learning in order to further improve the existing technological advances in the area.

POPULATION FOR THE STUDY

The population of the study consisted of 4, 873 senior secondary school two (SS2) computer studies students. There are 52 secondary schools in Nnewi Education Zone of Anambra state.

SAMPLE AND SAMPLING TECHNIQUES

The sample for the study comprised of 90 senior secondary school two (SSII) students. The sample was obtained using multi-stage procedure. First, purposive sampling was used to obtain two co-educational schools. The reason for selecting the two schools was because they are among the schools that have the facilities to enable the experimentation with CAI and animated media instruction and the schools are also coeducational. The two schools selected were categorized into experimental group and control group using random sampling (balloting without replacement). The names of the two schools were labelled on pieces of papers and folded. These were picked at random. The first school picked was coded B and that became the experimental group, the second school that was picked was coded A and it became the control group. The experimental group in their intact classes had 41 students (24 females, and 17 males) and the control group had 49 students (29 females and 20 males).

INSTRUMENT FOR DATA COLLECTION

The instrument for the study is a Computer Studies Achievement Test (CSAT) constructed by the researcher. CSAT items were constructed based on four topics in computer studies SS2 scheme of work namely: computer data conversion, file organization, basic file operations and file security. The topics were selected because they form part of the SS2 students' scheme of work. The CSAT items constructed according to the subject content with the use of a Table of Specifications. The was also used as retention. Two lesson packages were prepared with the concept of computer data conversion, file organization, basic file operations and file security.

VALIDATION OF THE INSTRUMENT

The content validity of the instrument was done using table of specification. The copies of the initial draft of the instrument and the lesson plans with the topic, purpose, research questions and hypotheses were given to one expert in Science Education and another in Educational Foundation Departments in Nnamdi Azikiwe University, Awka, and one experienced computer studies teacher for validation. These validators were requested to vet the items for clarity of words, plausibility of the distractors and appropriateness to the level of the students. Their corrections and recommendations were taken care of in order to standardize the instruments.

RELIABILITY OF THE INSTRUMENT

The reliability of the CSAT was established using the Kudder-Richardson Formula 20 (KR-20). The choice of KR-20 is because it is a suitable reliability estimate for dichotomously scored questions with different levels of difficulty. Consequently, the instrument was administered to 40 students outside the study area in Onitsha. The generated scores were computed for reliability index using the KR-20 Formula. The coefficient of internal consistency of the instrument obtained is 0.82.

EXPERIMENTAL PROCEDURE

The regular classroom teachers of the experimental group were used as research assistants in the study. They were brief for two weeks on the lesson packages. After the briefing, they were given time to do a mock presentation of the lesson to make sure they have mastered the approach. Before the

treatment commenced, the experimental and control groups were given pretest in the first week. For experimentation, the experimental group was taught the computer studies concepts using CAI tutorial instruction. In the CAI group, each subject content was taught via an automated computer system. The students in the CAI group were formed into groups of six to each system. The students interacted with the system and learnt directly from it. At the end of each lesson, the teacher attended to any confusing questions the students may have. On the desktop screen of each system, texts, graphic, videos and demonstrations describing each concept taught were displayed. The system introduced the students to the concept of computer files. On the screen, pictures of the different file storage means were displayed. The system at this time engaged the students in a discussion by asking them to list and explain other storage means known to them. The concepts of records and data filed items were introduced after the discussion. The system displayed on the screen the different types of data items and at that moment asked the students to give more examples of the data items already mentioned to them.

The concept of file organization was introduced with an illustration on the screen on how to arrange computer files. After the presentation displayed on the desktop screen, the students were asked to discuss among their groups the steps involved in the illustration displayed and repeat the steps in an attempt to create a file. Where a student could not finish up the steps accurately, another student was called up to complete it. The system further displayed on the screen while demonstrating on a desktop screen the different methods of accessing files. The steps demonstrated by the system involved:

- ✓ Serial method
- ✓ Sequential and
- ✓ Random methods

The system further demonstrated different ways of saving a file and show the students a saved file for them to see the file name extension. The system then asks them to try to list other file formats and their file name extensions. Other basic file operations were also be demonstrated as displayed on the screen. The operations to be demonstrated include:

- ✓ Copying a file
- ✓ Saving a file
- ✓ Opening a file
- ✓ Locating computer files and
- ✓ Restoring computer files

After each demonstration, students were called on to list the steps involved in carrying out each basic file operation. The system then introduced the concept of File security and Insecurity. The system asked students question to spur them into a discussion on some common cases of data loss. The system also demonstrated on the projected screen the following methods of file security: backing up, use of antivirus, pass-wording and labeling of storage file. After the treatment, the students were given pretest. The retention was administered after three weeks of the posttest.

CONTROL OF EXTRANEOUS VARIABLES

- ✓ *TEACHER VARIABLE:* The researcher prepared the lesson plans and briefed the regular class teachers of the experimental groups on how to use the instructional packages. The researcher also made sure they master the plan by having them do a mock presentation using the method contained in the packages.
- ✓ *HAWTHORNE EFFECT:* The researcher used the regular classroom teachers to reduce hawthorne effect which tends to affect the outcome of a study when students become aware that they are being used in an experiment.
- ✓ *CLASS INTERACTION:* The schools to be used in the study are situated some distance apart from each other to check class interaction.
- ✓ *INITIAL GROUP DIFFERENCE:* There was no randomization of subjects (students) into the different groups. This resulted in non-equivalent classes which has difference. Since the students cannot be removed in their classes due to administrative set up and to avoid disruption of school activities, analysis of covariance (ANCOVA) was used to take care of the initial group differences among the students.
- ✓ *EFFECT OF PRE-TEST ON POST-TEST AND RETENTION TEST:* The questions in the instrument was reshuffled to reduce the effect of pretest on post-test and retention test.

METHOD OF DATA COLLECTION

The CAT was administered to the subjects before the treatment as pretest. Immediately after the four week teaching period, the same instrument was administered to the same students in their classrooms under the same classroom conditions but this time, the test items were re-arranged at random in the serial numbering of the questions and the answer options to reduce test knowledge. After 3 weeks, the instrument was rearranged again, and re-administered as retention test. Each correctly answered question earned the students 5 marks making a total of 100 marks.

METHOD OF DATA ANALYSIS

Data relating to the research questions were analyzed using mean. Analysis of covariance (ANCOVA) was used to test the hypotheses. The ANCOVA procedure helped eliminate any further imbalances in the entry abilities of the participants that extraneous-variable control measures could not properly address. The decision rule for the hypotheses is to reject the null hypothesis if Pvalue is less than 0.05, otherwise, the null hypothesis was not rejected.

III. RESULTS

RESEARCH QUESTIONS 1: What is the difference between the mean achievement of scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method?

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Source of variation	N	Pretest Mean	Posttest Mean	Gain in Mean	Pretest SD	Posttest SD
Tutorial CAI	41	31.46	60.61	29.15	13.10	10.38
Conventional	49	27.14	38.98	11.84	9.63	6.85

Table 1: Mean Pretest and Posttest Achievement Scores of Students taught Computer studies using Animated-media Instructional Strategy and Conventional Method

Table 1 shows that the group taught computer studies with tutorial CAI had gain in mean achievement score of 29.15 while the conventional method had gain in mean achievement score of 11.84.

RESEARCH QUESTIONS 2: Difference between the mean retention scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method?

Source of variation	N	Posttest Mean	Retention Mean	Loss in Mean	Posttest SD	Retention SD
Tutorial CAI	41	60.61	49.51	11.10	10.38	6.78
Conventional	49	38.98	34.49	4.49	6.85	5.60

Table 2: Mean Posttest and Retention Scores of Students taught Computer studies using Animated-media Instructional Strategy and Conventional Method

Table 2 shows that the group taught using tutorial CAI had loss in mean score of 11.10 and those taught using the conventional group had loss in mean scores of 4.49.

HYPOTHESIS 1: There is no significant difference between the mean achievement of scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method.

Source of variation	**SS**	**Df**	**MS**	**F**	**P-value**	**Decision**
Corrected Model	10615.931[a]	2	5307.965			
Intercept	24482.179	1	24482.179			
Pretest	172.166	1	172.166			
Method	9582.414	1	9582.414	130.535	.000	S
Error	6386.569	87	73.409			
Total	231625.000	90				
Corrected Total	17002.500	89				

Table 3: ANCOVA on Significant difference in Mean Achievement Scores Students' Achievement in Computer Studies taught using Computer-Assisted Tutorial Instructions and Conventional Method

Table 3 shows that there was significant main effect of the treatment on the achievement scores of the students, F (1, 89) = 130.535**,** P (0.000) <0.05. Thus, the null hypothesis one was rejected. Therefore, there is significant difference in the mean achievement score of students in computer studies taught with tutorial CAI those taught using conventional method.

HYPOTHESIS 2: There is no significant between the mean retention scores of students taught computer studies using computer-assisted tutorial instructions and those taught using conventional method.

Source of variation	**SS**	**Df**	**MS**	**F**	**P-value**	**Decision**
Corrected Model	2961.137[a]	2	1480.568			
Intercept	29985.016	1	29985.016			
Posttest	52.336	1	52.336			
Method	2806.300	1	2806.300	39.196	.000	S
Error	5799.280	81	71.596			
Total	259025.000	84				
Corrected Total	8760.417	83				

Table 4: ANCOVA on Significant Difference in Mean Retention Scores Students' Achievement in Computer Studies taught with Computer-Assisted Tutorial Instructions and those taught using Conventional Method

Table 4 shows that there was significant main effect of the treatment on the achievement scores of the students, F (1, 83) = 39.196**,** P (0.000) <0.05. Thus, the null hypothesis three was rejected. Therefore, there is significant difference in the mean retention score of students in computer studies taught with tutorial CAI those taught using conventional method.

IV. DISCUSSION, CONCLUSION AND RECOMMENDATION

The findings of the study revealed that computer-assisted tutorial instruction significantly improved students' achievement and retention in computer studies. According to Cheung and Slavin (2012) CAI changes the role of the teacher from teaching authority to that of a guide. The students took responsibility for their own learning when Tutorial CAI is used. Since students were organized in small groups, there were greater interactions in the groups. Students interacted seriously over the contents of each lesson, arguing, answering questions after each lesson. Also, since the use of Tutorial CAI removes fright and embarrassment for the students (Falth, Gustafson, Tjus, Heimann, & Svensson, 2013), students participated in the lesson actively and continuously. Tutorial CAI therefore allowed them the opportunity to learn with ease and at their own pace. Tutorial CAI therefore brought about meaningful learning and not rote learning common when the students are trying to learn at the pace of the teacher or other students in the class. Thus, the effect of tutorial Computer Assisted Instruction (CAI) on the achievement of students in computer studies was significant when compared to that of those taught using conventional method using their pretest posttest mean scores. Also, tutorial Computer Assisted Instruction (CAI) was significantly more effective in enhancing students' achievement in computer studies when compared to that of those taught using animation method using their pretest posttest mean scores.

This finding of the study is in line with the findings of Adedamola (2015) who reported that there were significant differences in the mean achievements of the students taught in favour of CAI. The finding of the study is also in line with that of Dantani, Yusha'u and Hassan (2013) which revealed that there were significant differences in the mean achievements of pupils taught using CAI in Nupe language and English language and those taught using lecture in favour of those taught using CAI. The findings of the study is supported by Alhassan, Victoria and Danteni (2013) who investigated the effects of Computer Assisted Instructional Package on junior secondary school students' achievement and retention in geometry and reported a significant difference in achievement in favour of CAI group.

The findings of the study further supported those of Anyemene et al. (2012) who reported significant difference in the mean achievement scores of students taught using CAI and lecture in favour of CAI. The findings of Orjika (2012) also

supported the findings of this study when Orjika reported that CAI had significant effects on students' achievement in biology. The findings of Mudasiru and Adedeji (2010) further supported the findings of this study when the students taught using CAI achieved better than those taught with lecture method.

The findings of the study also revealed that while tutorial CAI was significantly effective in enhancing students' retention of computer studies. The students taught computer studies using tutorial CAI retained the learning material significantly better than those taught using lecture method. This observed result of the study may be because the use of tutorial CAI proved useful for elaboration, gaining and sustaining the students' attention. The students, because they interacted constantly with the learning materials, asked a lot of questions and on answering them, the lesson became clearer. Since the lesson was automated, the students had the opportunity of going through the lesson over and over again at their leisure periods.

The more they familiarized themselves with the contents of the lesson, the more the lesson content reached their long term memories. Also, because they interacted with the computer and the learning materials over repeated times for different lesson, they were able to recall their learning with ease. This is unlike those in the conventional method group. The students may not have properly conceptualized the concepts taught. This confusion may not have allowed them to properly store the information and therefore the poor retrieval of learning materials.

The findings of this study is supported by those of Alhassan, Victoria, and Danteni (2013) who reported a significant difference in the mean retention scores of the students in mathematics in favour of CAI. The findings of this study are also in line with that of Olga (2008) who examined the effects of Computer-Assisted Instruction on the achievement, attitudes and retention of fourth grade mathematics course. Olga reported significant difference in the mean retention scores of the students in mathematics in favour of CAI.

The study concludes that computer-assisted tutorial instructions is significantly effective in enhancing students' achievement and retention in computer studies. Based on the finding and conclusion of the study, the following recommendations are made:

- ✓ The government should organize seminars and workshops on how to effectively plan instructional lesson with CAI tutorial as well as how to use them effectively in teaching and learning. This will enable computer studies teachers to be competent in the use of tutorial CAI.
- ✓ The government should make provision for computer technology accessories needed for the effective integration and use of tutorial CAI instructions in the classroom for lesson delivery.

REFERENCES

[1] Adedamola, A. K. (2015). Effects of computer assisted instruction on students' academic achievement and attitude in biology in Osun State, Nigeria. Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS), 6(1), 69-73.

[2] Ahiatrogah, P.D., Madjoub, M.B., & Bervell, B. (2013). Effect of computer assisted instruction on the achievement of basic school students in pre-technical skills. Academic Journal of Interdisciplinary Studies, 2(1), 77-87.

[3] Alhassan, D.S., Victoria, I.E., & Danteni, I.W. (2013). Effects of computer assisted instructional package on junior secondary school students achievement and retention in geometry in Minna, Niger State, Nigeria. International Journal of Humanities and Social Science Invention, 2(5), 69-74.

[4] Anyamene, A., Nwokolo, C., Anyachebelu, F., & Anemelu, V.C. (2012). Effect of computer-assisted packages on the performance of senior secondary students in mathematics in Awka, Anambra State, Nigeria. American International Journal of Contemporary Research, 2(7), 61- 65.

[5] Bromberg, M., & Theokas, C. (2013). Breaking the glass ceiling of achievement for low-income students and students of color. Shattering Expectations Series. Washington, DC: Education Trust.

[6] Cepni, S., Ozsevec, T., Saydkan, F. & Emre, F.B. (2004). The Comparison of achievement levels of science teaching program students at two universities. International Science and Mathematics Education Congress Report, 2, 1241-1246.

[7] Cheung, A. C., & Slavin, R. E. (2012). How features of educational technology applications affect student reading outcomes: A meta-analysis. Educational Research Review, 7(3), 198-215.

[8] Dantani, I. W., Yusha'u, M.A., & Hassan, U. (2013). Effects of computer assisted instruction in nupe language on pupils' achievement in mathematics in Bida Local Government Area of Niger State, Nigeria. IOSR Journal of Research & Method in Education (IOSR-JRME), 1(5), 23-29.

[9] Demirel, O. (2004). Planning and Evaluation in Instruction; Art of Teaching. Pegem Publicaton.

[10] Falth, L., Gustafson, S., Tjus, T., Heimann, M., & Svensson, I. (2013). Computer-assisted interventions targeting reading skills of children with reading disabilities-a longitudinal study. Dyslexia, 19(1), 37-53.

[11] Mudasiru, O. Y., & Adedeji, O.A. (2010). Effects of Computer Assisted Instruction (CAI) on secondary school students' performance in biology. Turkish Online Journal of Educational Technology, 9(1), 62-70.

[12] Nworgu, B. G. (2015). Educational research: Basic issues and methodology. Ibadan: wisdom Publisher Limited.

[13] Orjika, M. O. (2012). Effect of Computer Assisted Instruction packages on secondary school students'achievement and interest in Biology. (unpublished master's thesis), Nnamdi Azikiwe University, Awka.

[14] Othman, N., Semarak, J., Leng K.B (2011). The relationship between self-concept, intrinsic motivation, self-determination and academic achievement among Chinese primary school students. International Journal of Psychological Studies, 3(1), 90-98.

ISSN: 2394-4404

[15] Vinta, S.B. (2015). The retention of effect of computer assisted instruction (CAI) on students' achievement for teaching the chemistry topics of class VIII students. International Journal of Science and Research Publications, 5(2), 485-488.

[16] Zeynep, Y., & Mine, A. (2015). The effect of computer assited instruction on achievement and attitude of primary school students. International Online Journal of Educational Sciences, 7(1), 97-109