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Effects of Computer-Assisted Instruction in Teaching Economics in Senior Secondary Schools in Nasarawa State, Nigeria

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Abstract

The study investigated the effects of Computer-Assisted Instruction (CAI) in teaching Economics achievement in Senior Secondary Schools in Nasarawa State, Nigeria. Two schools were purposively sampled and quasi-experimental design was adopted. The population of the study consisted of 33,267 SSS II student and 100 senior secondary II students were used as a sample from two schools (GSS Galle & GSS NasarawaEggon), Nasarawa State, Nigeria. A 25 items Economics Achievement Test (EAT) and Interest Computer Instruction Questionnaire (ICIQ) contained 15 items. EAT and ICIQ were validated which yielded 0.78 and 0.79 and the reliability index for EAT and ICIQ using Kuder-Richardson method (KR-21) are 0.81 and 0.82, respectively. Three research questions were answered using mean and three null hypotheses were tested using t-test at 0.05 level of significance. The result showed that students taught Economics with computer-assisted instructions showed more interest on the concepts for a long period of time as compared to students taught using traditional teaching method. Further result shows that there was a significant location difference on gender and the interest of students. The researcher recommended that, teachers should use CAI method in teaching and learning of Economics and train teachers on how to use it. This will bring sustainable development in Nigerian secondary schools and the Africa at large.

Keywords: *Computer-assisted instructions, Economics, Achievement, Interest*

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Background to the Study

In recent years, advancement in science and technology and their application in the educational system have yielded wealthy dividends in almost all disciplines related to the management and organization of education which make teaching and learning more enjoyable through Information and Communication Technology (ICT) tools. Today, such tools provide both students and teachers with more opportunities in adapting learning and teaching to individual needs and the society at large (Mikre, 2011). This applied aspect of technology in the educational discipline has tremendous capability to provide the best possible output for both the teachers and students. It is now not a matter of secrecy that there has been a continuous shift in the nature and use of technology for improving the processes and products of education depending upon the type of excellence attained by the members of the society and community all over the globe in terms of scientific, philosophical, psychological and technological progress especially in tertiary and secondary education.

According to Lucas and Olaniyan (2008), secondary school is that level of education where children receive the basic education that enhances their advancement to higher professional and academic pursuit. The Federal Republic of Nigeria (FRN, 2014) in her national policy on education described the secondary school as education children receive after primary education and before the tertiary stage. Economics is one of the senior secondary school subjects that require a systematic assessment to ascertain students' basic knowledge, skills, and understanding of the concepts and the nature of economic problems in any society. According to Robison in Salihu, Agatha, and Kawang (2016) defined Economics as a science which studies human behaviours as the relationship between ends and scarce means which have alternative uses. The objectives of studying Economics according to Asadu (2001) are:

a. To enable students to acquire knowledge for the practical solution of the Economic problem of Nigerian societies, developing countries and the world at large.
b. To prepare and encourage students to be cautious and effective in the management of scarce resources.
c. To equip students with the basic principle of Economics necessary for useful living.
d. To increase students respect for the dignity of labour and their appreciation to Economic, cultural and social values of the society.

However, for this objectives should manifest learners interest must be captured during the instructions and the methods instructors used. In line with the statement above, Abrami, Poulsenand Chambers (2014) view interest as personal preferences with regard to learning, which sometimes means what an individual chooses one thing rather than other things and sometimes a positive psychological state occurs during his/her interaction with the circumstances that engenders further learning motives. In teaching and learning of Economics, interest is required to meet students' intellectual as well as emotional needs; interest can never be imposed on an individual by external forces, but a teacher can help increase the learners' interest through an innovative instructional strategy such as Computer-assisted instruction. Lim (2013) defined interest in learning as personal preferences with regard to learning, which sometimes means what an individual chooses one thing rather than other things and sometimes a positive psychological state occurs during his/her interaction with the circumstances that engenders further learning achievement.

Anekwe cited in Adejoh (2015) described achievement as something which has been accomplished successfully by means of exertion, skills, practice and perseverance. Achievement is the ability to function effectively, respond quickly or perfectly to a given task. The results of achievement test provide information on the extent to which a student has attained the criterion performance. It also enables the researcher to compare a student's performance with respect to other students' performance, which is norm reference achievement (Uwalaka, 2013). Okoro (2011) opined that achievement could be enhanced when students have a chance to interact and partner with one another on a given task, under assessment. Assessment it is the practical application of measurement and just as all testing could be subsumed under assessment, so could all assessment be subsumed under measurement (Chauhan, as cited in Anikweze, 2013). Assessment is the process of investigating the status or standard of a learner's achievement/attainment or the achievement of a group of learners, where group instructions prevail, with reference to expected outcomes which must have been specified as objectives (Anikweze, 2013). This study focused on assessment of computer-assisted instruction (CAI).

Gana (2013) described computer-assisted instruction (CAI) as virtually any kind of computer use for teaching in educational settings which include drill and practice, tutorials, simulations and instructional management. Computer-assisted instruction (CAI) is learner-centered and activity oriented. CAI has been ended up being successful and beneficial instructional approach for boosting interest, uplifting mentality, building up students' retention capacity and boosting the students' performance (Osemmwinyen, 2009, Gana, 2013). Computers provide exciting, stimulating and energizing approaches to instructional process that were not even imagined for two decades back, yet the degree to which the instructive capability of computer technology will be accepted remains to be seen (Amara, 2006, Salahudeen, 2012). Computer-assisted instruction generates and creates enabling the environment that permits interest and retention for both learners and instructors during classroom instructions (Salihu and Aminu, 2017). In line with the above statement, Owusu, Monney, Appiah, and Wilmot (2010), the use of computer-assisted instruction especially in tutorial mode is supported mostly by the behaviourist's view of learning, largely due to the principles of objective, practice, and reinforcement. It uses a blend of graphs, texts, sounds and videos for learning process (Onasanya, Daramola, & Asuquo, cited in Qaiser, Ishtiaq, Naseer and Khalid, 2017).

Computer-assisted instruction stimulates students performance and encourages teamwork among gender. Gender has been identified as one of the factors influencing students' achievement (Anagbogu and Ezeliora, 2007). According to Uwameike and Osunde (2005), gender refers to all the characteristics of male and female which describes behaviours or attributes expected of individuals on the basis of being either a male or female in a given society. Ogedengbe (2009) stated that gender is a socially constructed term depicting the system of relations between males and females, and designates behaviours, attitudes, roles, status and other processes that govern relationship among sexes in a given educational, socio-economic and political context. Ifedili (2012) maintained that gender discriminations which are highly peculiar to girl-child could only be eliminated through education and empowerment; this is because some girls have proved that they could be the best if given a chance academically. These

mediators might have played on the students‟ sense of competence and their interest in subjects (Udoukpong, Emah, and Umoren, 2012). Kangethe, Lyria and Nyamanga (2014) stated that in order to conform to the socially constructed gender labels, individuals are compelled to feel obliged to fit into a pre-determined stereotypical model of masculinity and femininity especially in the environment or location that would permit conducive teaching and learning that will harvest valid students' academic achievement which depends mostly on the location of school.

Location of schools could also be a factor that affects the achievement of students in science and social science subjects. Bosede (2010) in his study on: "classroom environment as a correlate of students' cognitive achievement in senior secondary school geography" stated that urban students performed significantly better than rural students in academic achievement. Similarly, Josiah (2012) indicated that schools in urban areas characterized by electricity, water supply, more teachers, more learning facilities, and infrastructure harvest good academic achievement over the rural schools. In the same way, Salihu and Aminu (2017) further assert that students in the urban setting could have more access to libraries, laboratories; etc harvested richly results than those in a rural setting. It is against this background that this study is necessitated to determine the effects of computer-assisted instruction (CAI) on Economics achievement and interest among senior secondary school students in Nasarawa state, Nigeria.

Statement of the Problem

Teaching in secondary schools generally appears to be through conventional or traditional teaching method, notes giving and taking, chalkboard illustrations, demonstrations and other teacher-center methods which enable students to only form mental models of concepts presented to them. This method of presentation of concepts may lead to loss of interest in learning as students tend to forget what they learn easily. Also, since it is the same monotonous order of only the teacher doing the talking and/or teaching, the enthusiasm to learn is absent. Social science subjects, especially Economics, tend to be the most affected since most of the graphical concepts taught are abstract and also requires the student to put in a lot of effort in forming mental models to aid understanding. This might have led to lack of interest and negative attitudes towards the study of Economics. Therefore, the researcher would find out if comparing computer-assisted instruction (CAI) and conventional method (CM) in teaching and learning of Economics in would encourage the interest of students and change their negative attitudes towards the study of Economics in Nasarawa State secondary schools.

Research Questions

The following research questions guided the study:

Research Question1: What is the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions?

Research Question2: What is the mean interest scores of rural and urban students taught Economics using computer-assisted instructions?

Research Question3: What is the mean interest scores of male and female students taught Economics using conventional instructions?

Research Hypotheses

Following research hypotheses were tested at 0.05 level of significance:

Hypothesis 1: There is no significant difference in the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions.

Hypothesis 2: There is no significant difference in the mean interest scores of rural and urban students taught Economics using computer-assisted instructions.

Hypothesis 3: There is no significant difference in the mean interest scores of male and female students taught Economics conventional instructions.

Literature Review

In a review of empirical studies on CAI, Salihu and Aminu (2017) conducted a study on the effects of multimedia instructional method in secondary schools students' academic achievement in Economics in Nasarawa State, Nigeria among others it was found that in conventional or traditional class male students mostly performed very well than their female counterparts. Oleabhiele and Mugu, (2015) conducted a study on enhancing effective teaching/learning of Economics in senior secondary schools through the use of computer-assisted instruction. He opinion that CAI has the power to provide the higher interactive potential for the users to develop their individual, intellectual and creative ability. There no doubt that CAI provides productive teaching and learning in order to increase learners' creative and resourceful abilities especially in today's information driving society. Ali and Akour (2006) the study revealed that students taught using traditional instruction combined with the use of computer performed significantly better than students taught using traditional instruction in a school setting.

Cotton cited in Oleabhiele and Mugu, (2015) concludes, among others, that the use of CAI as a supplement to conventional instruction produces higher achievement than the use of conventional instruction alone. In addition, students learn instructional contents faster with CAI than with conventional instruction alone, they retain what they have learned better with CAI than with conventional instruction alone. From the analyses of this study, it can be deduced that the teaching/learning of Economics through the use of CAI will greatly enhance students' performance in both internal and external examinations.

Furthermore, computer-assisted instruction has been found to enhance students' performance than the conventional instructional method in the teaching and learning of economics in schools (Karper, Robinson, and Casado-Kehoe, 2005). Similarly, students taught statistics using lecture-plus-CAI obtained higher averages on the midterm and final examinations than students taught using lecture method only (Basturk, 2005).

Research Methodology

The study adopted quasi-experimental design. This design involved two intact class groups: Experimental Group (EG) and Control Group (CG). It utilized non-randomized control group pre-test – post-test design. The population of the study consisted of 33,267 SSS II students offering Economics from the 107 public senior secondary schools in Nasarawa State. Two coeducational senior public secondary schools were randomly sampled from Nasarawa Eggon LGA of Nasarawa State for the study. That is, Government senior secondary school Nasarawa Eggon (GSSS Nasarawa Eggon) with 52 SSS II students of Economics (27 males and 25 females) and Government senior secondary school Galle (GSSS Galle) with 48 SSS II students of Economics (26 males and 22 females). Through lottery, GSSS Galle was assigned to Experimental Group (EG) while GSSS Nasarawa Eggon was assigned to Control Group (CG). This was to guarantee each of the two schools has equal probability of being assigned to either experimental or control group.

The instruments for data collection were a 25 items multiple choices Economics Achievement Test (EAT) and Interest Computer Instruction Questionnaire (ICIQ)contained 15 items were validated by experts from Measurement and Evaluation unit and Economics department Nasarawa State University, by checking for appropriateness and relevance of the items, adequacy and agreement with the blueprint, clarity of expression and size of print which yielded 0.78 and 0.79 and the reliability index for the instruments EAT and ICIQ were 0.81 and 0.82 obtained using Kuder-Richardson method (KR-21). Four topics were covered include the concept of the market, the theory of cost, the theory of demand and supply and concept of the multiplier from SSS II second term's scheme of works. The test had five questions from each of the four units making a total of 25 items.

Before the treatment, all students in experimental and control groups were subjected to a pre-test in order to obtain the pre-test achievement scores. The administration of the pre-test took place a week before the treatment began. The achievement scores obtained by the students from the two groups served as the pre-test scores of the study. Immediately after the pre-test, the actual treatment began in which SSS II students of Economics in GSSS Galle were taught Economics using computer-assisted instruction (CAI) while SSS II students of Economics in GSSS Nasarawa Eggon were taught Economics using conventional teaching method (CTM).

The treatment lasted for a period of six weeks. After the six weeks of the treatment, the post-test was administered to the students in their respective groups to obtain the post-test achievement scores. The post-test was administered a day after the completion of the experiment. The scripts of the students were collated and marked by the researcher and the students were scored over 25. This is because; any correct answer out of the 25 questions is 1 mark. The data collected from the pre-test and post-test for EG and CG were analyzed using mean and standard deviation to answer the research questions 1 to 3 while independent sample t-test was used in testing the null hypotheses 1to 3 at 0.05 level of significant using SPSS 21.0 version.

Presentation of Results

Research Question1: What is the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions?

Table 1: Mean Gain Scores of Economics Achievement for EG and CG

Variables	N	Pre-Test $\overline{X}$	Post-Test $\overline{X}$	Mean Gain Score $\overline{X}$
Experimental Group	48	20.3 1	30.15	9.84
Control Group	52	12.45	16.41	3.96

Source: Field work (2018)

Table 1 shows mean scores of pre-test and post-test for the experimental group are 20.31 and 30.15 while pre-test and post-test for the control group are 12.45 and 16.41 respectively. The mean gain scores for the experimental group is 9.84 while that of the control group is 3.96. This shows that experimental group had higher mean gain scores than the control group. This result is also presented in the simple bar chart below fig 1.

Fig 1: Results of Experimental Group and Control Group

Research Question2: What are the mean interest scores of rural and urban students taught Economics using computer-assisted instructions?

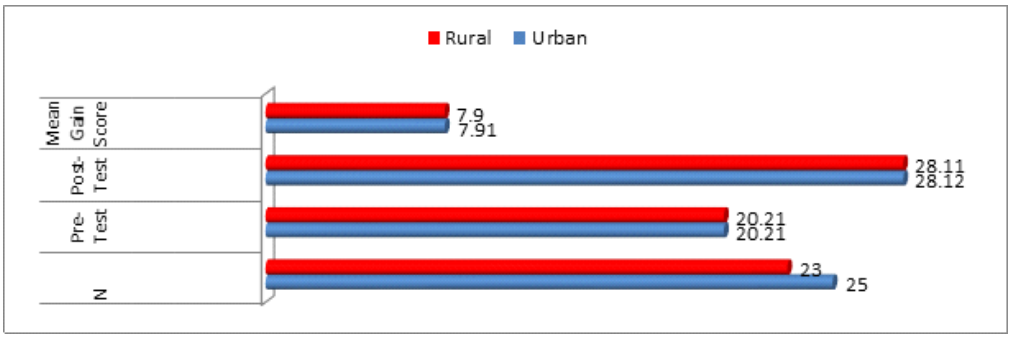
Table 2: Mean Gain Scores for Urban and Rural Students in Experimental Group

Variable	N	Pre-Test $\overline{X}$	Post-Test $\overline{X}$	Mean Gain Score $\overline{X}$
Urban	25	20.21	28.12	7.91
Rural	23	20.21	28.11	7.90

Source: Field work (2018)

Table 2 shows mean scores of pre-test and post-test for urban are 20.21 and 28.12 while pre-test and post-test for rural are 20.21 and 28.11 respectively. The mean gain scores for urban is 7.91 while that of rural is 7.90. This shows that urban and rural students in the experimental group had almost the same mean interest scores during the treatment. This result is also presented in the simple bar chart below fig 2.

Fig 2: Result of Urban and Rural Students I n Experimental Group



Research Question3: What are the in the mean interest scores of male and female students taught Economics using conventional instructions?

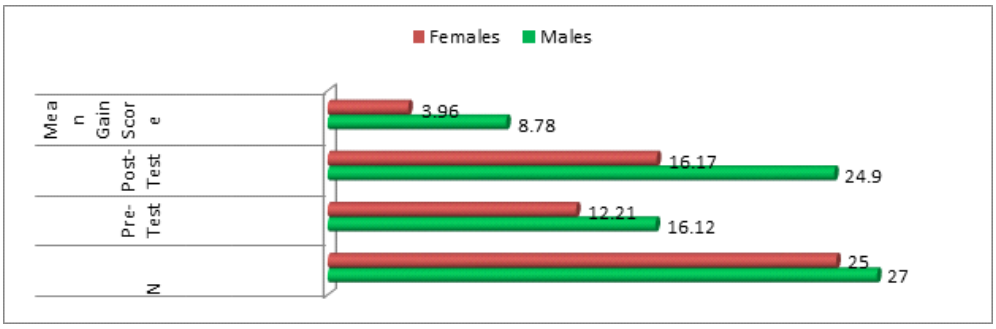
Table 3: Mean Gain scores for Male and Female Students' in Control Group

Variable	N	Pre-Test $\overline{X}$	Post-Test $\overline{X}$	Mean Gain Score $\overline{X}$
Males	27	16.12	24.9	8.78
Females	25	12.21	16. 17	3.96

Source: Field work (2018)

Table 3 shows mean scores of pre-test and post-test for male are 16.12 and 24.9 while pre-test and post-test scores for female are 12.21 and 16.17 respectively. The mean gain scores for the male is 8.78 while that of the female is 3.96. This shows that male students had the higher score than female students in the control group. This result is also presented in the simple bar chart below fig 3.

Fig 3: Result for Male and Female Students' in Control Group



Testing of Hypotheses

Hypothesis 1: There is no significant difference in the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions.

Table 4: Mean Achievement Score of Students in Experimental and Control Groups Control Group

Control Group	N	Mean	Std Dev	t_{cal}	t_{tab}	Df	p-value
Experimental Group	48	16.12	24.9				
				7.11	1.67	98	.000*
Control Group	52	12.21	16. 17				

* Significant at 0.05 level

Table 4 shows the mean, standard deviation, t-values and p-value for both the experimental and control group. The t-value computed which is 7.11 > tabulated value 1.67 at the 0.05 level of significance and degree of freedom 98 via one-tail. Also, the p-value 0.000 is < 0.05 which means that the null hypothesis was rejected. That implies that there was a significant difference in the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions.

Hypothesis 2: There is no significant difference in the mean interest scores of rural and urban students taught Economics using computer assisted instructions.

Table 5. Mean Interest Scores of Urban and Rural students in Experimental Group

Variable	N	Mean	Std Dev	t_{cal}	t_{tab}	Df	P-value
Urban	25	16.12	24.9				
				1.21	1.68	46	0.431*
Rural	23	12.21	16. 17				

* Not Significant at 0.05 level

Table 5 shows that the mean, standard deviation, t-value and p-value of urban and rural students in experimental group. The t-value computed which is 1.21 < tabulated value 1.67 at the 0.05 level of significance and degree of freedom 46 via one-tail. Also the p-value 0.431 is > 0.05 which means that the null hypothesis was accepted. That implies that there was no significant difference in the mean interest scores of rural and urban students taught Economics using computer assisted instructions.

Hypothesis 3: There is no significant difference in the mean interest scores of male and female students taught Economics using conventional instructions.

Table 6. Mean Interest Scores of Male and Female students in Control Group

Variable	N	Mean	Std Dev	t_{cal}	t_{crit}	Df	p-value
Male	27	16.12	24.9	4.21	1.68	50	.000*
Female	25	12.21	16. 17				

* Significant at 0.05 level

Table 6 shows the mean, standard deviation, t-values and p-value for male and female students in control group. The t-value computed which is 4.21 > tabulated value 1.68 at the 0.05 level of significance and degree of freedom 50 via one-tail. Also, the p-value 0.000 is < 0.05 which means that the null hypothesis was rejected. This implication is that there was a significant difference in the mean interest scores of male and female students taught Economics using conventional instructions.

Summary of the Major Findings

Based on the results of the analysis, the following major findings emerged from the study:

1. There was a statistically significant difference in the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions
2. There was no statistically significant difference in mean interest scores of male and female in the experimental group and
3. Male in the control group performed significantly better than their female counterparts in the same group.

Discussion of Results

The results obtained in table 4 clearly shows that computed value which is 7.11 > tabulated value 1.67 at the 0.05 level of significance and degree of freedom 98 via one-tail. Also, the p-value 0.000 is < 0.05 which means that the null hypothesis that says there is no significant difference in the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions was rejected. This implies that students in the experimental group performed better than those students in control group confirmed by t-test statistics. Thus, there was a statistically significant difference in the mean achievement scores of students taught Economics using computer-assisted instructions and those taught using conventional instructions. It is clearly shown in table 1, the harvested achievement mean gain scores of the experimental group 9.84 > control group 3.96, therefore students taught Economics using computer-assisted instructions harvested higher scores over their counterparts in traditional methods of instructions. The results corroborated with that of (Okoro 2011, Uwalaka, 2013) opined that achievement could be enhanced when students have a chance to interact and partner with one another on a given task, under assessment. In line, the above statement, Tabassum (2004) found that computer-assisted instruction (CAI) was equally effective for both male and female students.

The results obtained in table 5 clearly shows that the mean, standard deviation, t-value and p-value of urban and rural students in the experimental group. The t-value computed which is 1.21 < tabulated value 1.67 at the 0.05 level of significance and degree of freedom 46 via one-tail. Also, the p-value 0.431 is > 0.05 which means that the null hypothesis that says there is no significant difference in the mean interest scores of rural and urban students taught Economics using computer-assisted instructions is accepted. This means that urban and rural students in the experimental group performed significantly the same in relation their interest in learning during treatment. The harvested mean interest scores in table 2 for urban 7.91 = rural 7.90. It means when students are placed in a good learning condition, permits interest and motivates them to perform equally. The result agrees with that of Macmillan (2012) opinion that when students (irrespective of location), is enhanced when they are taught and learned using Computer-Assisted Instruction (CAI). The researcher is of the opinion that despite the differing conditions of livelihood in urban and rural areas, the non-existent difference in the achievement of students in both urban and rural schools may have arisen from the fact that both urban and rural students were subjected to equal opportunities in learning Economics using CA

Lastly, the results obtained in table 6 clearly shows that the mean, standard deviation, t-value and p-value of urban and rural students in the experimental group. The t-value computed which is 4.21 > tabulated value 1.68 at the 0.05 level of significance and degree of freedom 50 via one-tail. Also, the p-value 0.000 is < 0.05 which means that the null hypothesis that says there is no significant difference in the mean interest scores of male and female students taught Economics using conventional instructions is rejected. This means that male students in the control group performed significantly better than their female counterpart in the same group. The harvested mean interest scores in table 3 for male 8.78 > 3.96. It means in most cases, male students performed significantly better than their female counterpart. The result agrees with that of Salihu and Aminu (2017) opinion that in conventional or traditional class male students mostly performed very well than their female counterparts.

Conclusion

It was concluded that the students' performance in Economics harvested richly results for students in experimental class as against their counterparts taught using traditional instructional methods. Students' interest and performance in Economics is not encouraging as a result of traditional teaching method, notes giving and taking, chalkboard illustrations, demonstrations and other teacher-centered methods which enable students to only form mental models of concepts presented to them. This method of presentation of concepts may lead to loss of interest in learning as students tend to forget what they learn easily. However, there is an indication that performance of students in Economics would be greatly improved if students were exposed to computer-assisted instructions would motivate students to have interest and enhanced students' performance in economics in secondary schools.

Recommendations

Based on the major findings, the following recommendations were made:

1. Secondary school teachers should use computer-assisted instructional methods in teaching and learning of Economics will improve students' performance and interest in Economics.

2. State Government and community should provide instructional materials like computers and its accessories to facilitate quality teaching and learning.

3. Seminars, workshops, and conferences should be organized by the state ministry of education for teachers to educate them on how to use ICT tools in various modern teaching methods such as CAI for effective teaching and learning of Economics.

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