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A Study of Relationship between Computer-Assisted Instruction and English Learning Achievements--A Qualitative Study Using In-Depth Interviews with English Teachers

Han Kwang Chen* 

Department of Applied Foreign Language, JinWen University of Science and Technology, Taiwan; Louie321@just.edu.tw.

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Abstract

With the widespread adoption of computers and the internet, we are in the midst of an information explosion. Computers have become essential for every household, used for entertaining, working, learning, and practically anything else. Using the computer as a tool to learn english has become common. Not only can the effects of learning be seen quickly, but also errors can be found and corrected immediately. Learning english with the assistance of a computer has become an inevitable trend. Outside of language, Computer Assisted Instruction (CAI) techniques have been adopted by teachers in many other fields. CAI systems are usually developed step by step. The entire teaching system is programmed gradually and precisely to satisfy the different requirements of users of all ages. Alternatively, different programs are devised for different purposes, each of which is specially developed for a specific group or a single purpose so that they are more user-friendly and users can better learn and obtain the information they want. With the assistance of computers and the internet, this kind of cooperative learning aimed at using language for communicating effectively will become more interesting and attractive. And teachers may devise a variety of teaching programs according to students' level of familiarity with the internet. To study the relationship between computer-assisted instruction and english learning achievements, a qualitative study was conducted through in-depth interviews with english teachers. The researchers interviewed three english teachers ages 30 to 45 at a private university in Taipei County, all good at CAI. The study found that to keep up with the trend of CAI and globalization, teachers have to have various skills. They should have relevant knowledge of science and technology to use the internet to design different class activities competently. In addition, teachers need to understand students' learning styles, and they must care about students' learning processes.

Keywords: Educational technology, Technology integration, Computer-assisted instruction, Qualitative study.

 Corresponding Author: Louie321@just.edu.tw



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1 | Introduction

With the advance of technology, integrating it with teaching is necessary nowadays. Even teaching content has been transformed into e-files and uploaded to the internet for teachers and students to utilize whenever possible. In the basic teaching modes, from teaching objectives, entry behavior, teaching activities, and teaching evaluation, interactive devices and multimedia are the most suitable to be used in programmed instruction, which developed from associationism in learning theory and can be divided into different units, sequenced according to their difficulties [1]. By operant conditioning learning of associationism, in learning from an english article, from vocabulary to writing, a correct association (the lowest level of learning) is established between every reaction and its corresponding stimulus (e.g., vocabulary vs. mother language). Then many individual “associations between stimulus and reaction” are linked to form a systematic and organized chain reaction. First, it conforms to the principle of individualized instruction Second, it constitutes a reactive learning environment Third, it maintains learning motivation and excludes external interference. Fourth, it helps expose learning difficulties more easily and allows teachers to guide studying.

Today there are many mature language learning platforms on the internet (Blackboard, Moodle), such as Easy Test and E-learning; students can use that to study after school by themselves and by teachers for uploading and sharing data, bulletins, and discussions between teachers and students. Students may utilize these learning resources to learn english vocabulary, grammar, pronunciation, and listening comprehension, improve their reading ability, and compose sentences. There are pictures, videos (teachers explain or form some concepts before reading), audio files, and vocabulary entries (consisting only of Chinese and english or combined with pictures, sound, and words), helping students understand cultural backgrounds, grammar skills, and reading strategies through practice and games, some other convenient tools (on-line dictionary, recordings, repetitive recitals, MP3 down-load, etc.), and CIP at school. Some software gives pretests, allowing students to monitor their progress. Regarding the associationism mentioned above, repetitive practice alone is insufficient for improving english reading comprehension. Therefore, there is also cognitive theory, which regards an individual’s recognition and understanding of affairs in the environment as the requirements of learning [2]. Students know what they will learn to use the software to learn and understand in the most convenient way.

At the beginning of the 21st century, many things are decided on the internet and by computers. english teaching resources on the internet are abundant, and english teachers depend on these internet resources and Computer Assisted Instruction (CAI). This article investigates software testing and the efficiency variance between its reading instruction and traditional textbooks to improve teaching quality and further boost students’ learning interest and efficiency. As far as study methods, this study adopts a qualitative research methodology and conducts in-depth interviews. To understand english teachers’ teaching strategies as applied to English teaching and their students’ learning efficiency, researchers interviewed three english teachers who worked at the applied english Department of a private University of science and technology in New Taipei City and utilized a great quantity of internet resources and CAI, including systems for handing in assignments, discussion between teachers and students, sharing web links to related information provided by the teachers, video lectures uploaded for students to review at home, and on-line tests etc. Additionally, the purpose of this study is also to understand how and to what level the teachers integrated information technology with teaching, what information technology they used, and whether their teaching process (from teaching objectives, passing on concepts, practice, to evaluation) has somehow changed, whether instruction time has been shortened if the students can easily follow the teaching objectives, and students’ reaction (like or dislike, cooperative or not, what effect it has on learning, etc.).

2 | Literature Review

CAI stands for computer assisted instruction, which describes utilizing computers to help students learn. The essential feature of CAI is breaking down the barrier formed by time and space and replacing traditional teaching methods and features. Compared with traditional teaching, CAI decreases the cost of human resources and increases students’ willingness to learn and happiness.

2.1 | CAI Theory and Concept

Despite critiques of CAI, such as “lack of effective theoretical source of education”, “utilizing computer science and applying it to education is difficult”, or “computer-assisted learning still can’t interact with learners effectively” [3]. The researchers have continued developing language learning software to cope with these problems. This study expects to understand what effective assistance CAI has given to learners in different areas as follows:

CAI has been gradually applied to school operations and business training, and the internet has become a platform for users to share knowledge. As college students are supposed to be self-disciplined, some neglect their studies, so teachers need to spend more time teaching [4]. But CAI is learner-oriented and can be used to judge whether students have reached the pre-established goal. Computer systems also can help teachers do their work, allowing them to better focus on course arrangement and student guidance.

Compared with traditional teaching, CAI is a multiple-to-multiple interactive mode that fully complements traditional teaching. Interactive learning functions effectively and one of its advantages is to break down the barrier formed by time and space. Users can absorb knowledge rapidly through the “Q & A” teaching method, which emphasizes the questions students face. Therefore, the elements of CAI include the interaction of learners, learning content, teachers, etc. An ideal interactive learning environment for the CAI system contains the following elements: encouragement given to students, correction of errors, and instant interaction between students, teachers, and programmers. For example, Adler-Kassner and Peynolds [5] utilized computers for a fundamental writing course. The computers could easily take the articles they wrote and begin an instant meeting for discussion. They also found that students were more enthusiastic on the internet than in class about feedback and discussion. As a result, students became more confident about learning [6].

The internet and language learning software can improve students’ reading comprehension, and students can study independently and practice repetitively through multimedia. Wise and Olson [7] utilized the ROSS program to research the effect of CAI [6]. Although most of the studies of CAI focused on fundamental reading comprehension, such as word identification and pronunciation, the elements mentioned above emphasized complex meaning, progress, and the procedure of reading comprehension. The internet has become popular thanks to its availability, ease of operation, and free resources. It is convenient for users to explore and study information and post photos and articles. Students expand their reading range and conduct discussions through e-mail or chat to increase reading pleasure. They can search for information if they are unfamiliar with some professional knowledge or foreign culture [8].

CAI is very fashionable at present. Information technology-related theories make reading comprehension easier to improve. Students can improve their skills in language and reading, increase their cultural and professional knowledge through computer programs and the internet, their reading comprehension, and their ability to solve everyday problems [9]. Some CAI programs, such as vocabulary and phonological awareness, can train students to get better at reading. Other programs can improve students’ reading comprehension, making them read more fluently or allowing them to tell stories in their own words. The teachers must first understand students’ needs, clearly define their objectives, and then select appropriate CAI software to establish a beneficial network [10].

First, computer-assisted reading instruction should focus on understanding inner meaning and reading comprehension. Second, computer-assisted reading instruction should provide learning activities to spark students’ thinking. Third, computer-assisted reading instruction should be able to expand students’ theoretical framework of knowledge. Fourth, computer-assisted reading instruction should be able to accommodate students’ different subjects and fields. And finally, computer-assisted reading instruction should be able to cultivate students’ ability to read and write.

Students can acquire something by searching, discussing, or exchanging experiences with partners using software or networks [11]. After reading relevant articles, the author divides CAI courses into three categories:

instruction through e-mail, a network platform to improve language ability, and instruction through computer programs.

Instruction through E-mail

Students hone their skills in reading and writing under instruction through e-mail [12]. They have learned how to communicate with others, understand different cultures and relevant concepts, and compare and contrast them. Moreover, students can think critically when they come across theoretical structures, plots, or characters they don't identify with. Students can search for feedback provided by peers online [13].

Instruction through a network platform to improve language ability

internet platforms can provide useful communication tools. Teachers can upload good articles to the network for students to read. When students can't grasp the concepts in a certain course, teachers can upload their suggestions. Students can read stories chosen by teachers at home and answer questions posted online to practice their skills in reading.

Web search engines have become trendy recently. With a search engine such as an online dictionary, students can look up new words while reading articles. Computers can help students understand new words in articles but can't help teachers understand students' vocabulary proficiency. Consulting an online dictionary rather than a traditional paper saves time and is more efficient [14].

2.2 | CAI Learning Result and Satisfaction

To assess the result of a student's learning, learners need to be tested. Additionally, learning satisfaction is how learners enjoy their learning processes. They are affected by many factors, such as teaching methods and styles, personal relations, and students' learning motivations and intentions. So in a way, learning results and satisfaction [15] indicate students' sense of accomplishment and satisfaction and provide other researchers and teachers with a reference point and metrics for improving teaching methods [2].

We can understand students' learning results through the following items: the content of the course, interactive courses, the information covered in the course, students' performance and the internet system. We can understand CAI's objective and subjective learning results through these five items. In addition, we need to focus on the process rather than the expected results [16], [17].

With the internet and computers booming, digital teaching courses have rapidly become fashionable. Many researchers point out that aspiring students want to learn more and that even the dropout rate is decreasing [18]. Given this, digital teaching courses not only help improve teaching and understand students' satisfaction with CAI but also help us to understand the learning results of internet-assisted instruction [19], [20].

Learning reading and satisfaction

The online reading of CAI provides resources for learning to help students practice and improve their reading speed. The learning effect will be limited if we rely solely on reading and practice. Active cooperative learning may yield twice the result with half the effort.

- I. Enable students to develop good information-collection habits.
- II. Train students to think and solve problems through cooperative learning.
- III. Knowledge can be absorbed and recited forever.
- IV. More significant learning results.

Satisfaction

- I. More than 70% of users of university networks confirmed that networks could help with learning.

- II. More than 73% of users of university networks looked up data through networks rather than through the library.
- III. More than half of the users of university networks were afraid of expressing their opinions while physically in class.
- IV. More than 56% of users of university networks agreed that they could keep good relationships with their professors by e-mail (“Networks and Life Project Survey” by American PEW Company) [21].

2.3 | CAI Advantage and Disadvantage

Using interesting teaching materials, a good network teaching platform can attract students and improve teaching effects. The wisdom of experts and free network functions are necessary to design a good network teaching platform attractive to students. However, according to the author's standard, few network teaching platforms are good enough.

Some scholars argued that CAI might help students improve their learning performance, reinforce their attitudes and motivation, and give them many chances to practice. On the other hand, it also allows teachers to spend less time preparing teaching materials. Some argued that teachers and students must possess basic technical knowledge and that CAI cannot deal with unexpected situations. This attempts to paint CAI as not worthy of learning. Nonetheless, learning programs are now designed according to different scholars' suggestions and teachers' needs [22].

For a long time, computers have been regarded as a potential tool for accelerating the speed of learning foreign languages [23]. Unfortunately, many early attempts to combine computers with the teaching of foreign languages failed, and the hardware and administrative system of schools need to be changed to improve this kind of CAI. For example, the network server needs to be adjusted, administrative staff needs more training, and traditional teaching methods need to be changed. To determine whether this will work or not, members of the faculty still have to cooperate with each other to improve english teaching [24].

To follow the long-term plan for national development, of all the key questions about course planning, information technology is the most important, which, combined with teaching, plays an essential role in curriculum design. Computers and networks are used to assist in teaching. Multimedia is applied to improve students' interest in learning. Furthermore, teaching materials are the trend of teaching reform.

3 | Study Method

The researcher interviewed three english teachers ages 30 to 45 at a private university of science and technology, all of whom are good at CAI. We recorded what they said in the interviews using a voice recorder; then, we transformed the record into a Word file, sorted out the data, tabulated them, and compared them. The questionnaire Contents are shown below:

We interviewed three teachers with the assistance of a computer, who have a lot of teaching experience and are popular with students. Their success is ascribed to: 1) they have devoted their time and energy to planning for class activities, and 2) they know how to combine technology with teaching. The questionnaire includes questions as follows:

- I. What are their teaching theories?
- II. Which of the three CAI modes do they use most often?
- III. How have they designed their teaching plans?
- IV. What kind of unexpected problems have they encountered while using CAI, and how have they dealt with them?
- V. What benefits have they obtained from CAI?

VI. Have students easily remembered new words and improved their reading comprehension through CAI?

Table 1. Questionnaire contents.

Name	Professor William	Professor Cindy	Professor Alex
Educational Background	(ESL Education)	Pedagogy	
Experiences	Four years of teaching at university of science and technology	Four years of teaching at university of science and technology	Over 15 years of teaching at some university of science and technology
Teaching methods	English conversation, vocabulary and reading	English conversation, vocabulary	English conversation, reading
CAI	Reading software (reading pass 3)	Reading software (live ABC), teaching platform	Reading software (reading pass 3), teaching platform
interview dates	Oct. 27, Nov. 2, and Nov.7, 2010	Oct. 28, Nov. 3, Nov. 6, Nov. 16, 2010	Oct. 27, Oct. 28, No. 6, and Nov. 11, 2010

Study Results

After the in-depth interview with these teachers, the research found that to teach efficiently, teachers need to have the following characteristics.

Student-centered

The teachers are willing to help students solve their problems with english. These three teachers know that it is good for students to study together. In this way, students can develop their talents, improve their ability to express and relate to others, and increase their motivation to learn through cooperative learning.

Enable students to learn independently

CAI may enable students to learn independently because they may practice exercises at home alone and spend more time practicing. When students answer questions about english conversation or writing, computer programs will directly interact with them, giving appropriate feedback so that students may correct their errors independently. Although CAI cannot replace teachers, it does bring great benefits to teachers.

Bring rich visual images to students

CAI can help improve teaching methods. It brings rich visual images to students. It helps teachers effectively arrange their teaching time in class. The interaction between teachers and students is strong. Teachers can update their teaching materials anytime to allow students to recognize new developments in various fields.

Set up a computer communications network

These three teachers hope that they can improve their teaching methods in the future. They all agree that CAI may provide good learning methods and something more interesting to students. So, they have adopted similar teaching strategies simultaneously.

- I. Professor William set up his blog in english in the hope that his students can develop reading habits, he and his students can share the joy of reading different articles, and students may offer their viewpoints.
- II. Professor Cindy hopes that computer companies can develop 3D english teaching programs, enabling students to learn by practicing, because 3D more closely imitates the real world and allows students to learn english in a virtual environment.
- III. Professor Alex wants computer companies to develop software that can help students read any book.

Comparisons among teaching methods of the three teachers interviewed are shown as the following table:

Table 2. Comparisons among teaching methods of the three teachers interviewed.

Items	Professor William	Professor Cindy	Professor Alex
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Teaching theories		Social constructivism theory	Audio-lingual method and cooperative learning	Student-centered
	Hand phone	Nearly no	yes	No
	Teaching platform	Yes	Yes	Yes
3 CPI modes	Reading software	Yes	No	No
Plan for teaching		Before reading Reading After reading	One-way Multi-way	I know what students want to learn. Plan for teaching contents
Unexpected situation in class	Teacher	1. The website could not be opened due to heavy traffic.	1. The system broke down. 2. The website was suddenly banned.	1. The computer broke down. 2. The computer broke down due to heavy traffic. 3. No problem with teaching materials.
	Students	1. Did their own business like playing on-line games. 2. Students did not take notes in class and downloaded teaching materials after school, so that they made little progress in english. 3. Not familiar with the system	1. The file size of assignment handed in through upload is limited by the system.	1. Not familiar with the system. 2. To prevent cheating, the system did not allow students to scroll back to correct errors. 3. The computer broke down due to heavy traffic.
The advantage of CAI		1. Authentic accent, visual images, and feedback arouse learning interest.	1. Help teachers arrange teaching time effectively. 2. Easily draw students' attention.	1. Different kinds of teaching materials arouse students' interest.
Time for preparing teaching materials		Teaching software provides lots of resources; so teachers need to spend a lot of time selecting appropriate teaching materials.	Spent a lot of time turning the data into the ppt file and trying to understand the functions of platform.	The computer company has prepared data for teachers. So, teachers do not need to spend much time.
	Students' attitude and performance	Yes(depends on students' motivation)	Yes	Yes
Benefits brought to students by CAI	Helpful for students to remember and understand	Yes	Uncertain	Yes
	Suitable to self-learning	Yes	Yes	Yes
Benefits brought to teachers by CAI	Vocabulary, grammar, Background knowledge	Yes	Yes	Uncertain, but students should have interest
		Very good visual effect, but uncertain about students' learning results	1. Enrich courses 2. Spend time more efficiently in class. 3. Strong interaction with students	1. Students' learning time increases 2. For a teacher in the field of business, CAI can combine current economic trend to courses.
CAI in future		Set up reading blog	Computer companies can develop reading strategy software	Computer companies can develop 3D.
Teaching process	CAI Traditional teaching	No obvious difference between the two teaching methods, but the advantage of CAI over traditional teaching method is that teacher can teach students using computers.		
Teaching materials	CAI Traditional teaching	CAI is more effective than traditional teaching, because it can produce visual, hearing, and interactive effect.		

5 | Conclusion

Teaching software not only can instruct students, but also help teachers accumulate experience. Without the limitation of time and space, learners may learn whenever they like. This positively affects them and computer-assisted techniques can be adopted in various fields.

CAI has various functions, such as an online dictionary, BBS, online games, Reader's Digest, online questionnaire, voting system, and e-mail, creating a learning environment where students or workers can learn and motivate each other.

The Black Board online learning platform may help teachers and students to avoid wasting their time. Students can download and review the teaching materials uploaded to platform by professors. So, students do not need to take notes, which may bring them disadvantages. Although the three teachers hold positive attitudes to CAI, some defects in teaching perhaps could not be eliminated; for example, the size of an e-file a student uploaded was too large to be permitted. On the other hand, CAI can bring advantages to teachers who use it to instruct students. It can increase students' motivation, teachers can assess students' performances through the computer, and students can interact with computers to review the content of courses at home. The virtual environment also may improve students' learning. If they don't have chances to practice english in daily life, they may do it in different situations simulated in the virtual environment.

The advances of science and technology can only be expected to continue. Computers can help teachers deal with simple tasks, such as recording students' scores and the time spent on exercises. To make the most of these advances, teachers have to possess following skills:

I. Teachers must have relevant knowledge of science and technology.

If teachers teach students using CAI, they must understand the basics of information technology. Although english teachers specialize in english teaching, many of them may not be familiar with computers. Education institutes in Taiwan have provided training in computer science to teachers for a long time. As a result, almost every teacher knows how to use computers, and many teachers have used CAI for teaching. Information technology cannot be ignored due to the progress with CAI, can't be ignored.

II. Teachers need to use the internet well.

Teachers can improve their teaching by using the internet because students can obtain many learning resources. Teachers who come across materials that are difficult to explain can find relevant videos and pictures on the internet to help students understand more clearly. In case of emergency, such as a student using a computer for recording their pronunciations having trouble with a broken microphone, teachers had better prepare related textbooks or alternatives. Teachers have to expect that some problems may occur.

III. Teachers have to design different class activities.

Students may feel tired in class and relax their attention gradually. Therefore, teachers can't always lecture using a computer and need to arrange their teaching time, such as allowing students to discuss the teaching contents with each other. The more stimuli students receive, the more excited they feel.

IV. Teachers need to understand students' learning styles.

Today's students have many gadgets, such as mp3 players, iPods, etc. They bring those things with them wherever they go. Teachers may change the teaching method to accommodate what students want.

V. Teachers must care about students' learning process.

Teachers can't accompany students to instruct them to do exercises. However, after finishing the exercises, students can get feedback immediately from the computer, including useful suggestions and clear directions. Without teachers' help, students may feel frustrated when they encounter difficulties and feel pressured to learn english, leading them to want to give up learning. Teachers must pay close attention to student's progress through the computer to prevent this from affecting motivation.

Thanks to the never-ending changes and technological improvements, the internet has developed more rapidly than anyone could have imagined. With these improvements, people's difficulties in learning English can be solved more easily. Computers and the internet help people efficiently learn English and help teachers more efficiently teach it. Because the internet is boundless and able to break down the barrier formed by time and space, the internet expands not only the range and number of learners but also the teaching methods used. What's more, it can even help to change the content of language teaching materials by enlarging the scope of students' learning materials to cover various topics closely related to daily life.

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