Innovations, Research, and Technology: Role and Importance of Computer-Assisted Instruction (CAI) in 21st Century

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Abstract

CAI technologies are technologies used to engage students in certain tasks or activities, and their purpose is to induce advanced learning. While controlling the rising cost of education, higher education institutions must improve the quality of education, find innovative ways to use technologies in their courses, provide results that satisfy customers in the job market, and play an effective leadership role in global education and the economy. CAI technologies provide an excellent opportunity to challenge problems and meet social expectations. Nowadays, everyone is talking about and writing about computer and communication technologies and their magical contributions to better educational programs. The center stage of this attention is the Internet and its tools, such as FTP (File Transfer Protocol), Telnet (Remote Access), Gopher, and the most exciting World Wide Web (WWW). The World Wide Web is a global interactive, dynamic, distributed, graphical hypertext information system, which brings a new starting point and imagination for how to redesign the process of teaching and learning. The main purpose of CAI technologies is to provide students and teachers with more options for learning, teaching, research, communication, and sharing knowledge. The use of CAI technologies requires major planning for the training of teachers and students; major planning for providing communication opportunities, and major commitments to changing the operating culture in the teaching-learning process. In this paper, I will explain the role and importance of computer-assisted instruction technologies in the 21st century.

Keywords: *Educational innovation, 21st-century skills, computer-assisted instruction*

Introduction

In the traditional teaching and learning methods, higher education institutions use textbooks and lectures as the basis to design courses with time and place frameworks for students. In this model, the main purpose is to meet the requirements for the mastery of a lifelong professional knowledge system. The technological explosion in education and the workplace has changed the educational requirements for successful careers.

Skills of Using CAI Technologies

In addition to mastering the knowledge system,

college graduates must also develop specific abilities to use computer-assisted technologies in the process of teaching and learning:

Critical thinking skills-computer resources and applications can help develop problem-solving abilities and stimulate critical thinking. Intelligent stems can help expand this ability. This ability is a very important quality for the success of the information society.

Process design ability to find the right way of communication and access to the required resources is very important to complete the task. Students should learn to design an effective process for accessing and analyzing information is very important for students in today's multi-resource environment. Students need to develop clear strategies for accessing, operating, and using the information to design processes to complete the required tasks.

Teamwork- In today's workplace, the completion of all tasks is based on teamwork. Students should learn how to become team members, how to contribute to the process, how to use computers to communicate with team members and understand the roles of other members of the team.

Results-oriented process- In today's multi-resource environment, it is very important for students to design the process from expected results to process based on expected results (bottom-up design).

Communication skills-Knowing how to use computers and communication tools and how to use them to complete the process is an important part of student abilities. In addition to electronic communication, students should also develop the interpersonal communication skills of team members.

Computer and communication technology can solve the two major obstacles of teaching and learning, namely location and time. Computer education is becoming more and more popular and effective in higher education institutions. Most higher education institutions have actively provided computer-based courses for distance education students. My prediction is that in a few years, traditional students (undergraduates) will also have the opportunity to choose some courses that are independent of location (campus) and time (course schedule). Technology not only brings new teaching and learning methods but also provides opportunities for teaching and learning (virtual classrooms) for every one from anywhere.

In the future, students' personal goals, the results they want, and their learning style will play an important role in curriculum design. With the advent of the Internet and the information superhighway, new definitions of teaching and learning are easier to design and implement. Finally, technology provides the following changes for a more realistic and effective teaching and learning environment.

- It allows students to play an active role in the teaching and learning process.
- It provides teachers with more teaching options and more time to evaluate the progress of activities.
- It can prevent obstacles such as time, location, and limited resources.

- It will transform teacher-centered to student-centered education.
- Change from process-oriented to result-oriented teaching and learning.
- It helps students prepare for the difficult global economy.
- It helps students become more effective members of the information society.
- It provides opportunities for virtual universities.
- It provides joint research opportunities for researchers from all over the world.

Views of educationists on the role of CAI

Paul Glewwe ... Suzanne Wisniewski, "Educational Economics" (Second Edition), 2020, on computer-assisted learning

Of all the studies examined; on the impact of computer-assisted instruction on student learning; Most of the estimated effects are positive and statistically significant, but there are also a few negative results where the effects are not statistically significant or significant This heterogeneity of results emphasizes the importance of plan design and the integration of high- tech investment with teacher training and teaching.

Eight high-quality studies report the significant and positive impact of information and communication (ICT) interventions on student learning. One is from India, six are from China, and one is from Costa Rica.

- Banerjee & Linden (2007); found that a 2-year program that provides 2 hours of computer-based mathematics instruction per week increased test scores by 0.48 standard deviations of test score distribution (since Expressed as σ). Unfortunately, the gain decayed to 0.10σ a year after the end of the plan. The authors also found that the cost-effectiveness of this intervention is lower than the remedial guidance plan.
- In China, Lai, Luo, Zhang, Huang, and Scott (2015) used RCT to assess the impact of providing ICT programs for children of migrant workers in Beijing schools one year later. The program provides 80 minutes of computer-assisted math tutoring every week for 3rd-grade students. The author found that mathematics scores improved. Also in China, Lai et al. (2013) evaluated an ICT project similar to Beijing, which focuses on Chinese in Qinghai Province. One year later, the author found that Chinese and mathematics Proceedings ofWebNet'98, World Conference of the WWW, Internet, and Intranet, Orlando, FL, 688–693. Both had significant positive growth.
- Mo et al. (2013) studied the impact of the "one laptop per child" project on 300 floating third-grade students in Beijing, where the computers have computer games consistent with the school curriculum. They found a significant positive impact on math, language, and computer skills testing. Mo et al. (2014) Evaluation of mathematics software for rural boarding students in Shaanxi Province. They found that the mathematics scores of students in grades 3 and grade 5 increased statistically significantly. Mo et al. (2014) evaluated similar

interventions but included boarding students and students living at home. One year later, the average increase in math scores in grades 3 and 5 was significantly positive. Finally, Yang et al. (2013) evaluated an ICT project in three provinces in China; they found that the increase in test scores was not large, but it was statistically significant.

- Alvarez-Marinelli et al. (2016) used RCT to evaluate two computer-assisted language learning (CALL) projects in Costa Rica. Test A: provides CAI English language learning software, tests, assessment tools, and teacher training. Test B: offers a research-based language acquisition CALL course designed for non-English speakers to learn English. The average task completion time for test A was 67 minutes per week, while the average task completion time for test B was 127 minutes per week. When processing A and B combined into a single CALL intervention, the authors found no significant effect after controlling for the initial difference in test scores before the intervention. They think this may reflect that the intervention time is too short to rule out the initial imbalance in spoken English between the intervention group and the control group. However, compared with test B and the control group, test A produced a significant positive effect. The author also estimated that test A increased the scores of the picture vocabulary and comprehension direction tests by 0.32σ and 0.40σ, respectively.

- Finally, a study found the negative effects of ICT interventions. In Romania, Malamud and Pop-Eleches (2011) studied a plan to provide parents of middle school students with vouchers for the purchase of computers. They estimate that receiving such vouchers will significantly reduce students' academic performance. They believe that this result stems from the fact that students report that the time spent playing games has increased, while the time spent reading and doing homework has decreased.

Role of CAI technologies in the classroom

- This is the best way to understand the diversity of learning styles.
- It encourages collaboration and enables more interaction among students.
- CAI Technologies help teachers prepare students for the real world.
- It enables students to access the latest information in a faster and easier way.
- Classroom technology has transformed teachers into encouragers, consultants, and coaches.
- Students can benefit from digital textbooks, which are always updated, useful, creative, and inexpensive.

Findings

Conceptual findings in the internet showed that there are many advantages or importance of the CAI technologies. They are:

- **Easy access to learning materials:** Students can easily find e-books, review materials, sample papers, and test papers from the

previous year on the Internet, which can be used to improve their knowledge base.

- **Accessibility to learning:** Now, students can learn anytime, anywhere through the digital learning model. Students can study at their own pace and place. They do not need special classrooms or study rooms. You can get learning materials with just one click.

- **Knowledge sharing:** Distance is no longer an obstacle. Thanks to the use of cutting-edge technology, students from all over the world can gather on a platform to share their experiences and knowledge.

- **Learning aids:** The use of audio and video materials enables students to easily grasp theoretical concepts and understand practical aspects. In addition, new technologies make it easier for students with disabilities to acquire knowledge. Although they have disabilities, they can use computers, visual materials, and many technical tools to learn. There are a series of effective and powerful learning tools suitable for students of different abilities

- **Distance learning:** Today, students have no difficulties in their lives that can stop them from learning. Now, you can receive education according to your own schedule and convenience. In this way, even working professionals can receive education and improve their skills.

Conclusion

With the advent of technology, a paradigm shift has taken place in the education field. An interactive whiteboard has replaced the traditional blackboard. Through the use of CAI technologies, students can connect with different people around the world and gain career opportunities beyond national boundaries. Learning has become effective through technologies. This is why we need to use powerful and technologically advanced learning tools to educate our students.

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