THE EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION FOR EDUCATIONAL PURPOSES: A REVIEW OF RECENT RESEARCH

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Abstract: This research paper reviews the available studies that are carried out for comparing the instructional efficacy of computer assisted instruction to conventional classroom instruction during the past two decades. Studies based on empirical researches rather than teachers' judgements have been reviewed. Researchers have discovered the effectiveness of computer assisted instruction for teaching various teaching subjects at elementary level to higher level. The purpose of this review paper is to present a critical, comprehensive, review of literature on the effect of computer assisted instruction on different subjects' teaching and learning with the goal of giving an outline what is currently known and providing guidance for future research. The research report on 51 empirical studies dealing with the efficacy of, and implications for in various subjects presents a valid assessment for understanding the effectiveness of Computer Assisted Instruction in the field of education. The 51 studies were taken under consideration over a period of 20 years. 5 i.e. 9.8% studies showed no difference between computer assisted instruction and conventional instruction; 46 i.e. 90.2% studies favoured computer assisted instruction over conventional method of instruction; and no study favoured conventional instruction over computer assisted instruction. Results for mathematics, social sciences, language, grammar, physics, biology and chemistry were examined. Social science and science subjects like Chemistry, Physics and Biology are the subjects with the highest percentage of results favouring computer assisted instruction. Positive results favoured the computer assisted instructional programme over the conventional method of instruction.

Keywords: Effectiveness; Educational; Computer Assisted Instruction; Review.

I.   Introduction

As we know that instructional technology is an essential element of educational technology which contributes to the efficacy as well as efficiency of teaching learning process. In the present scenario the concept of teaching supplemented by technological devices is not new. Technology not only helps to bring about desirable changes in the teaching learning process but also it makes the entire process more interesting, motivating and interactive. Today's students are ever more techno-friendly so there has been an increased demand to bring advanced educational technologies into the classroom. They expect that the presentation of the content should meet with their needs. They cannot be satisfied with only one-way conventional methods of teaching. Technology experts have claimed that use of computer technologies can transform teaching learning process positively because technology not only provides increased access to information, but also provides unlimited opportunities to teachers and students to collaborate with peers and experts. Technology also helps to exchange ideas and explore topics in different ways that would not be possible in a traditional classroom approach.

Use of computers for educational settings has been witnessed since 1960s when computers first made their appearance in schools, and this increase can be attributed to the rapid growth of computer technology which has made powerful microcomputers and software programmes capable of presenting complex learning material by sophisticated effects like graphs, pictures, animation, music, videos etc. These technological accomplishments coincided with beliefs among teachers and educators that the computer could enhance learning by functioning as an expert tutor providing individualized instruction in comparison to traditional instruction. This inference can be similar to **Yuen-Kuang et al (2007)** who presented a meta-analysis by synthesizing existing research studies for comparing the impact of computer assisted instruction versus traditional instruction on student's achievement in Taiwan resulting that the effect of CAI in instruction is positive over traditional instruction.

II.　　　Method

This review article includes empirical researches addressing the efficacy of and implications for, the computer assisted instruction in elementary schools (1-5), junior schools (6-7), secondary and senior secondary schools (9-12) and college and Universities in teaching various subjects. To select the investigations for inclusion, the author first carried out a database search of the ERIC and Inflibnet Center databases to identify articles related to the effectiveness of and instructional uses related to computer assisted instruction from 1998 to 2018. After eliminating all overlapped and irrelevant studies our search yielded 51 research works covering all disciplines involving teachers and students at elementary level, secondary level, senior secondary level, and college level.

This review is organized according to the subject matter of the studies: mathematics, social sciences, physics, chemistry, biology (science) and languages.

Mathematics:

Total 13 studies were reviewed in Mathematics. From the reviewed literature, it is clearly seen that in 11 of 13 studies CAI is proved an effective approach and has a great impact on learning in Mathematics. It is found that CAI is superior to the traditional method. Researches by **Muthulaxmi (2016), Albina (2016), Kumund (2013), Sharmila (2013), Bharti (2011), Raghu (2006), Subhas (2002), Kim (2017), Karakis (2016), Mcintosh (2014), Sinkins (1993)** etc. were related to the topics of Mathematics like algebra, Geometry etc of higher secondary as well as secondary level students and proved that well designed computer assisted instruction is profound on learning Mathematics whereas in two studies **Spradlin (2009) and Clinkscales (2002)** did not found any significant difference in performance of students between the two methods. **Karakis,H. (2016)** assessed the effect of computer assisted instruction on students' attitudes towards a lesson of Mathematics and towards learning mathematics. The study was experimental. The design of the study was one group pre-test post-test design. 28 students studying in Balikesis, Turkey was selected for conducting research. The results of the research showed that computer instructinal material increased academic success and had a positive effect on motivation. **Mcintosh (2014)** used entertaining and interactive computer assisted instructional software Timez Attack for improvising the fluency of multiplication facts recall in 9-10 years children who were not giving performance up to the expected level. Results indicated improved fluency in multiplication fact recall. **Spradlin K. Dye (2009)** carried out a study for comparing academic achievement of students studying in a developmental mathematics course using conventional method of instructions, traditional instruction cum computer assisted instruction and online distance learning. The results of the study showed that there was no statistically significant difference at the post test stage of students who were taught through traditional instruction and supplemented with Computer Assisted Instruction. **Yilmaz et al (2017)** studied the effects of Computer Assisted Instructional materials on approximate number skills of students with mathematics learning difficulties. The study was performed with pre-test – post-test using quasi experimental research design with a single subject. The research was conducted at elementary level consisting a girl and two boys of 3rd grade. The findings of the study revealed that the approximate skills of the students have been developed and significant increase was observed in their speed of participating.

Language:

Language includes reading, vocabulary, spelling, punctuation, syntax and verbal analogies. Total 16 studies were found in English language. 13 studies found positive result for computer assisted instruction. **Bhagirath (2017), Jain (2017), Law Man Ching (2016), Kunkel,Ahmed (2015), Smith, longberg (2012) Leela (2014), Jebamalar (2012), Bostain (2011), Vimal (2010) and Acharya (2005), Torres (1993)** established the effectiveness of CAI in the subject of English grammar, acquisition of vocabulary. Whereas **Smith (2012), Longberg (2012) and Kilikaya (2005)** concluded that there is no difference between the computer assisted instruction and conventional instructions of teaching.

Thanka leela P (2014) made a study to enhance English vocabulary of secondary students at Manonmanium University. In this study three sample groups were formed. Control group was taught by chalk and talk method (CMT), experimental group I was taught by computer based instruction (CBI) and the experimental group II was taught by CMT cum CBI. The experimental group II performed significantly better than other two groups. This result showed that CMT accompanied by CBI helped the students to acquire more difficult vocabulary. **Law, Man-ching (2016)** performed a study in Hong Kong Kindergartens. In this study the impact of computer assisted instruction on phonological processing skill was assessed. The results indicated that experimental group outperformed than the control group. **Torres, Paula (1993)** carried out a research to determine the impact of computer-assisted instruction

on the teaching of handwriting skills. It was concluded from the results that computer-assisted instruction with reinforcement can greatly enhance the learning of handwriting skills. **Sorina, Carolina (2017)** conducted a study to determine the effect of the use of JClic software as pedagogical tool on students' performance to teach Simple Present Perfect. The participants involved were 17 students in the 1st year of bachelor's degree programme, enrolled in Science and Technology Studies. The findings of the research concluded that the use of JClic software, as a computer-assisted language learning (CALL) tool, can greatly enhance students' learning in Simple Present Perfect tense.

Science:

Total 15 studies were considered in science covering the topics of physics, chemistry, biology, and general science. The results of all studies concluded that computer assisted instruction is more effective in comparison to conventional method**. Kareem (2018) and Yavuz (2005) Suresh (2015), Sah (2014), Kulkarni (2014), Uzma (2013), Pushkrit (2012), Sushil (2013), Sushma (2011), Prakash (2009), Nirmala (2006), Pandian (2004), Ashwal (2001), Sethuraman (1998), Hazeena (1995)** conducted studies to see the effectiveness of CAI in different branches of science like Physics, Biology and Chemistry at secondary and senior secondary level. In the observation, CAI was found more effective in comparison of traditional method of teaching.

Kareem, A. A. (2018) evaluated difference in academic achievement of students when taught science (Physics, Chemistry and Biology) with and without computer tablets. The study revealed that there was a significant positive effect of treatment on students' achievement in science subjects. **Yavuz Aybe (2005)** examined the effectiveness of conceptual change instruction accompanied with demonstration and computer assisted concept mapping. The study was carried out on seventh grade students understanding matter concepts. 75, seventh grade students from four classes of a General Science Course were taught in this study. The results discovered that conceptual change instruction assisted with demonstration and computer assisted concept mapping provided a better learning of scientific conceptions related to matter concepts and produced more positive attitudes toward science as a school subject than traditionally designed science instruction. **Tyagi, Sushma (2011)** developed computer assisted instruction module in biology for class XII. The researcher compared CAI method and conventional teaching and studied the user's reaction towards computer assisted instruction. Findings of study proved that computer assisted instruction has significantly increased the achievement of the students in comparison of conventional method of teaching. It was also revealed that students have favourable reaction towards CAI.

Social science:

In Social science usually called social studies below the college level total 7 studies were considered. The topics covered were history, geography, economics, and value education. In all studies computer assisted instruction was proved significantly better than conventional method of teaching. Researches by **Doddamani (2011)** in geography, **Mayur (2015)** in value education, **Monika (2015) and Nidhi (2009)** in Technology proved that CAI is significantly better than conventional medium of teaching. **Gita (2013)** revealed effectiveness of CAI in Economics. **Doddamani (2011)** conducted a study to find out the effective strategy for teaching geography at the secondary school level. Findings of the study revealed that multimedia interactive packages are more effective and efficient than the conventional method. **Sangeetha (2007)** carried out a study to develop and validate a computer based multimedia package for teaching history and to know its effect on learning among secondary school students of Coimbatore district. The finding of this study clearly indicates that multimedia method is more effective than the conventional teaching method for teaching history.

III.   Conclusion

This review covered a span of 20 years from 1998 to 2018 for reviewing studies. The overall findings suggested that computer assisted instruction method of instruction is more effective than conventional method of instruction.

The present review was based on 51 empirical studies about the comparison of conventional method i.e. lecture method of teaching and computer assisted instruction. The present review covered a span of 20 years from 1998 to 2018. 46 studies out of 51 i.e. 90.2% showed that computer assisted instruction was significantly effective than conventional method of teaching. Only 5 studies out of 51 studies i.e. 9.8% showed that there is no significant difference between conventional method of teaching and computer assisted instruction. No study showed that conventional method is better than computer assisted instruction. Results for mathematics, social sciences, language, grammar, physics, biology and chemistry were examined. Social science and science (Physics, Chemistry and

Biology) are the subjects with the greatest percentage of results that strongly favoured computer assisted instruction over conventional method of instruction. The positive result establishes the preference of computer assisted instruction over conventional method of teaching.

It can be concluded that computer assisted instruction offers an opportunity to receive instruction through a variety of multimedia, to be actively engaged in the teaching learning process, to choose when and where they want to learn, to study at their own pace and to receive immediate and accurate feedback whereas traditional method of teaching lacks in these approaches.

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