Review Of Literature On Effect Of Computer Assisted Instruction On The Achievement And Retention Of Tenth Grade Students

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Abstract: 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.

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Introduction:

The popularity of internet and ICT facilities has motivated provision of online and digital services generally. These digital technologies are crucial for improving learning efficiency and high-quality education provision globally. Nowadays, many educational software packages are available online as well as on storage devices that enhances teachers' instruction in several ways. Use of computers for instruction enables learners' progress at their own pace. Therefore, computer assisted instruction (CAI) improves the quality of teaching and learning especially for students with learning disabilities, since learners receive feedback instantly. Furthermore, it allows learners perfect learning skill and procedure by repetition of specific learning task as an opportunity to master certain concepts quickly and effectively.

The increasing penetration of computers and the internet has profoundly changed how firms and markets operate, and the education industry has been no exception. The U.S. Department of Education states that "technology ushers in fundamental structural changes that can be integral to achieving significant improvements in productivity. [. . .] Technology also has the power to transform teaching by ushering in a new model of connected teaching. This model links teachers to their students and to professional content, resources, and systems to help them improve their own instruction and personalize learning."1 It is not surprising, then, that the use of technology in the classroom has been the subject of growing interest among both academic researchers and policy makers. In addition to increasing productivity inside the classroom and updating the pedagogical paradigm, technology can improve the delivery of high-quality education to underserved areas. Specifically, computer-aided learning (CAL) can narrow the education gap between urban and rural areas, reducing inequalities in education achievement. In China, the setting of our study, rural schools are facing a variety of challenges, including poorly qualified teachers, insufficient resources, and large classes (Hannum, 1999). In 2000, only 14.3% of teachers in rural secondary schools had a bachelor's degree, compared with 32% of teachers in urban secondary schools. Rural schools also had an average student–teacher ratio of 17.13, much higher than the 12.43 student–teacher ratio in urban schools.2 Lower levels of school inputs are associated with worse outcomes. Only 7.1% of students in rural middle schools enroll in high school, while high-school enrollment is 9.4 times higher in urban schools (2000 Census). The existence of a large and persisting rural–urban educational gap is not specific to China. In fact, it is a common occurrence in most developing economies, such as India (Sonalde Desai and Veena Kulkarni, 2008; Banerjee et al., 2007), Pakistan (Beg et al., 2019), and subSaharan African countries (Zhang,

2006).3 Reducing the inequality in education outcomes between rural and urban schools is not a simple task. Standard methods, such as subsidies to high-quality teachers for relocation to rural areas, are often ineffective. Experienced teachers have attractive outside options in urban areas that they prefer over subsidies to move to isolated locations with few amenities. CAL, however, could connect highly effective teachers in urban areas to students in rural schools without forcing the teachers to relocate.

Review of Literature

According to Suson and Ermac (2020), computer assisted (or aided) Instruction (CAI) refers to the use of computer as a tool for enhancing instructional quality. In a nutshell, CAI is the use of computer software programs to improve teaching and learning activities in both the traditional and virtual classroom. 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.

Specifically, we study a 2004 reform in China that connected high-quality teachers in urban areas with more than 100 million students in rural primary and middle schools through the use of satellite internet. Over four years, the program installed satellite dishes, computer rooms, and other multimedia equipment in rural schools. At the same time, the Ministry of Education selected the most accomplished teachers in the country to record special lectures in Beijing. The lectures, as well as other study materials, were then deployed to rural schools via the internet and physical CDs. Due to its great number of targeted students, this program is often considered the largest education-technology intervention in the world to date (Yu and Wang, 2006; McQuaide, 2009)

Out of several pedagogical changes introduced by the reform, access to high-quality teachers through remote learning seems to have played the main role in increasing human capital. Other mechanisms, such as access to new technology for local teachers and the inclusion of computer science in the curriculum, are not corroborated by data and anecdotal evidence. Prior research on remote learning highlighted how online education requires a level of selfdiscipline that most students might not have (McPherson and Bacow, 2015). Moreover, it might induce students to postpone studying until just before the exam, leading to suboptimal learning (Figlio, Rush, and Yin, 2013). In our context, however, remote learning happened in the classroom under the direct supervision of local teachers, therefore limiting distractions and procrastination. This study contributes to three main strands of the literature. First, this paper is related to the literature that examines the effects of computer-aided learning on student achievement (see Bulman and Fairlie (2016) and Escueta et al. (2017) for a review).4 Papers in this strand of the literature have reported mixed results. While some studies find insignificant or even negative effects of CAL on test scores (Angrist and Lavy, 2002; Goolsbee and Guryan, 2006), other papers show positive and statistically significant effects (Banerjee et al., 2007; Barrow, Markman, and Rouse, 2009; Muralidharan, Singh, and Ganimian, 2019). In the Chinese context, there are several papers that study smaller-scale CAL experiments (Lai et al., 2013; Mo et al., 2014; Lai et al., 2015; Mo et al., 2015; Lai et al., 2016).

Previous studies have documented positive effects of teacher quality on students' performance (Carrell and

West, 2010; Chetty, Friedman, and Rockoff, 2014; Figlio, Schapiro, and Soter, 2015). Academics and policy makers have investigated several ways to increase teacher quality and, as a result, student performance, including teacher salary or performance pay (Lavy, 2009; Muralidharan and Sundararaman, 2011); training (Jacob and Lefgren, 2004; Harris and Sass, 2011); evaluation (Taylor and Tyler, 2012); and credentials (Clotfelter, Ladd, and Vigdor, 2009).

The learning approach not only conveys knowledge but also emphasizes the process of scientific inquiry. One of the learning approaches that facilitates students to act like scientists is SPS activities. In this learning approach, the teacher acts as a facilitator, guiding and directing students' learning activities so that students can independently construct necessary facts, understand concepts and apply new values into their lives (Siahaan et al. 2017). By this approach, students learn to conduct scientific studies to solve problems similar to those conducted by scientists (Siswanto et al, 2018). Science education should direct students to master the science process directly through experience (MEB, 2005). In other words, learning science should provide students with the opportunity to develop their science process skills (SPS). Therefore, the key to learning science is to develop students' SPS (Supriyatman & Sukarno, 2014). SPSs (SPS) means a uniform series of actions or tasks performed in order to do, make or achieve something in science (Nganyadi, 2021). Science education SPS can be divided into two groups: “Basic” and “Integrated”. The basic SPS refers to the following six actions without a specific sequence: Basic SPS include observing qualities, sorting/classifying, measuring quantities, predicting, inferring, experimenting, and communicating. Integrated SPS are complex processes that combine two or more basic SPS, such as formulating hypotheses, interpreting data, controlling variables, and conducting experiments (Azizoğlu & Dönmez, 2010). Although real laboratories can be used to develop students' science process skills in science learning, in order to comprehensively teach the science concept, an approach is required that makes it easier for students to fully understand the phenomenon (Siswanto et al., 2018). In such a case, simulated experiments have great potential to address the complex activity of the problem solving process (Huppert, Lomask, & Lazarowitz, 2002). Scientific approach-integrated virtual simulation can be used as an alternative method to significantly enhance students' SPS (Siahaan, et al., 2017; Siswanto et al., 2018). However, although learning activities are conducted on materials that are difficult to observe in the real situation, science process skills should be established within each student (Siswanto et al., 2018). Simulated experiments are especially convenient to link the use of simulations to inquiry learning (Eysink et al., 2009). Therefore, computer simulation softwares can affect students' academic success potential (Huppert, Lomask, &Lazarowitz, 2002). Computer simulations include a system or process model that allows the student to explore phenomena by manipulating input variables and observing changes (Eysink et al., 2009). Therefore, computer simulations can also enable students with low reasoning ability to cope successfully with learning concepts and principles in SPS that require high cognitive skills (Huppert, Lomask, & Lazarowitz, 2002).

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