Is Larry Cuban Right about the Impact of Computer Technology on Student Learning?

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Abstract

This article seeks to offer some degree of classification of Larry Cuban's view, about the impact of computer Technology on student learning. Cuban is a Professor of Education at the august Stanford University, where the lectures Methods of teaching social studies, history of School Reforms, Curriculum and Instruction Leadership. The context of Cuban's work was resident in his research in schools and universities in the technology rich heart-land of Silicon Valley. It was the findings of his studies in these institutions, which inspired his views that computers are not making the anticipated in roads into assisting students learning, as was previously believed, his book in 2001 "Oversold and underused" under pins his discontent with the prevailing views that computer technology is the answer to classroom learning problems. Cuban's conviction is supported by his research findings that both students and teachers use computers for less at school than at home. In addition, he found out those teachers who use computers as instructional tools do so infrequently and unimaginatively.

It is hoped that this paper will contribute to the willingness of educators to be inspired to integrate computer technology in their classrooms in meaningful and fulfilled ways.

Introduction

Research has generally supported the notion of student learning being enhanced by the use of computer technology in their classroom activities. In fact, education has for decades, discussed this issue**,** and has concluded that greater learning would be taking place, if the classrooms had more computer technologies for both students and teachers. It was against this back-drop, that Cuban investigated the phenomenon. He selected Research sites in the rich computer technology region of Silicon Valley, US. His investigations focused on the classrooms of early childhood and high schools, as well as universities. This paper will focus on two broad findings of the Cuban's study.

a. Both students and teachers use computers far less at school, than at home, and teachers who use computers as instructional tools, do so infrequently and unimaginatively.

b. Historical and organizational economic context influence teachers' use of computers. The use of technology is used meaningfully when teachers have a good understanding of computer technology and believe that it has the power to influence learning.

To what extent then, is Cuban's view widespread? And what do theoreticians and academicians think? This discourse highlights the main thoughts on the subject.

Computer Technology and Teachers

Computer Technology is considered to be any electronic application used in conjunction with the computer. The use of this technology in classrooms is often referred to as educational technology (Parkes & Bain 2005). The belief in applied Technology in classrooms is supported by Chislenko (1997). He feels that the reason for the popularity in computer technology is supported by recent research by Apple Computer Classroom of Tomorrow (ACOT) K-12 (1998) and CEO StarChart Forum (2001), which are leading educational organizations supporting this view. These studies strongly suggested, that computer technology enhances classroom learning activities and student learning. There is strong support for such findings. Literature suggested, that technology works best in the classroom when it is associated with clear measurable educational objectives (Harrington- Lucker, 1997). Educational objectives need to be clear about what should be the role of computer technology in the classroom. Poorly stated educational objectives, teachers' experiences and knowledge can contribute to the backlash against educational computing (Maddux, Johnson and Willis (2001). Maddux *et al* (2001), suggested that computer has the potential to become the single most influential teaching and leaning tool in education. Reeves (1998), supports the view, and suggested two ways computers can achieve this. According to Reeves, classroom participation can use computers in two ways:

a.   Students learning "from" computers and

b.   Students learning "with" computers.

However, the full potential of computer technology as an instructional classroom tool, can only be realized if the teachers are computer knowledgeable and confident in its use. Teachers should also be able to transfer their technological knowledge to students in a fun-fill way that inspires learning.

When Reeves (1998), suggested that students learn "from" computers, he implies that they are learning "about" technologies associated with computers. This is a significant step in institutionalization of computer technology in schools. Here students are primarily taught how to use certain tools of computer technology, such as word processing programmes, programming languages or just exploring the Web. In most developed economies, this only started during the late 1980s. This process of institutionalization of computer technology in schools, is yet to take on real shape in the developing world. Cell phone technology as a function of social status, is far more pronounced in such economies than schools' computer technology use. As a result, students in developed economies are more core-computer-technology literate, than those in developing economies. However, learning "from" computer technology is not the same as using it as an instructional tool. Cuban was not concerned with student's learning "from" computer technology. He saw it, merely as an important first-step, in its use in instruction. A number of studies have shown that teachers must first learn to use general computer technologies before they are able to effectively use it in instruction. Thus, teachers would need to be taught how to use such technologies in their classroom instructional practices.

According to Reeves, most learning "from" computer applications is based on behavioural theories of learning. On the other hand, Reeves's second category is learning "with" technology is generally compatible with constructivism theories

of learning. In this setting, computer technologies become cognitive tools. When used as cognitive tools, computer technologies serve, and build students' social skills, cognitive perspective, tolerance, creativity and high order thinking skills. It is within this context that teachers should be able to use computers as agents of support-structures for students learning. It provides and supports fun, curiosity, academic independence and interdependence. Teachers need to be properly educated in integrating such technologies into their classroom activities.

Using computer technologies across the curriculum, is known to promote learning, and is supported by Wenglinsky (1998) and others. However, there are descending voices. Maddux *et al* (2001), suggested that there two reasons for the negative views about the use of computer technologies in classrooms. They suggested:

a.   Inadequate or nonexistent training for teachers and

b.   Poor or inappropriate software*.*

These are only two of the problems, which plague the realization of computer technology as an enhancer of learning. Kulik and Kulik (1991), concluded from a review of literature that the use of computer-based instruction is generally effective in classrooms. But an analysis by Clark (1985) of much of the same literature, questioned whether computers contributed anything to the effectiveness of classroom instruction. The work of Reeves (1998) has also highlighted the diversity of opinions about the use of computer technology in classrooms. Reeves cites Oppenheimer (1997) as offering a view that is representative of those with a negative opinion about the use of computer technology in the classroom. According to Oppenheimer, there is no credible evidence that frequent use of computer, has significantly improved teaching and learning; in spite of the large scale cut-backs in other subjects in US, to accommodate "computers in every classroom". So Cuban does have a point; and he is not alone.

What meaningful objectives does classroom technology serve? Who are the gatekeepers of such classroom technology? Cuban's concern is rooted in the belief that teachers must be expert users of technology. This concern was shared by Guha (2001), and motivated his quantitative study, to understand the relation between teachers' technology competency and the quality and frequency of computer technology use, as an instructional tool in elementary grade classrooms. Guha's work confirmed teachers desire to become computer technology competent. In addition, the study clearly showed a relation between teachers' competence and the manner and frequency of using technology in the classrooms. The view held by teachers in Guha's study was that they needed more knowledge in the use of technology, and this was supported by teachers in another study conducted by Fer (2004).

Fer's study was a qualitative evaluation of in-service secondary school teachers' Emotional Intelligent (EQ). EQ is the generator for self-efficacy and self-management in learning activities. One of the findings of this study, was that teachers believed that it was only when both they and their students developed the appropriate EQ skills, that the true intent of embracing and learning new technologies can be realized. Thus both Guha and Fers' works indicated a need to address the technology competency of teachers before, they can become meaningful gatekeepers of technology in the classroom.

This was also the findings of Cuban's work; tool teachers first, then ask them to implement classroom technology. The miscarriage in the process, has always been, that the arrival of technology was placed chronologically ahead of developing teacher competence. Cuban does not dispel the greatness of classroom technologies in enhancing learning; what he is at odds with, is the inadequate teacher preparation for the reform process. Maddux *et al*, (2001) have advanced a similar concern about the need for teacher-technology literacy. They emphasize teacher competence in Type I and Type II educational computer applications. Type I is the simpler of the two.

Type I Software is designed to allow students to practice skills that they already acquired. Thus, if students have been taught vocabulary, parts of speech; the drill-and-practice software can be used by students to practice and develop competency in these areas. These Software can be written in simple Logo computer language. Drill-and-practice programmes are also call Computer Assisted Instruction (CAI). Generally, type I programmes are aimed at acquisition of facts by rote memory (Maddux et al 2001). As a result, these programmes are not expensive and tend to support very little student-centred learning. Teachers must be educated and trained in Type I Software, before using it in their class activities.

Type II Software is designed for active learning in classroom environments, where students-centred philosophy can be applied. The aim of the Type II applications is development of high-order-thinking (HOT) skills. So whereas, Word Gallery 3.0 programme as Type 1, is suited for elementary school children, Gasper Woodbury series, Type II are mathematics focused, and have their foundation in anchored instruction and problem based instruction.

A language lesson, could require students in high school to scan a map of the world, and then search the internet to find out the places where French, Setwana and Portuguese, for example, are spoken. Students could then locate those places on the scanned map. Later, students could conduct a research to understand how such places arrived at those vernaculars, and write those findings using one of the application software. Additionally, students could also search and use clipart graphics (pictures) to communicate personal introductions and greetings in the three languages, or write a short cartoon. This kind of task is best done in a collaborative manner, applying the principals of constructivism. In this task a number of technologies would be used. Herein lies the strength of Cuban's concern. Teachers must have been knowledgeable in these technologies in order to assist students in the different array of appropriate technologies. Thus, Cuban seems to be of the view that the contribution to learning, that technology offers is limited, unless teachers are competent to lead the technological change.

The other point of concern that Cuban has is the level of use of computers in the classroom. The point made is that if teachers are not able to use technology, students are hardly going to use the computers during classroom practice. His study sees historical and organizational economics, as constrains to wide-spread use of computers. The increased funding for computers in USA schools from the 1980s onwards, have not yielded the success that was anticipated, nor placed US teachers at the top of technology use in classrooms, argues Cuban. Most countries have started to inject millions of dollars into classroom technology. Poor schools are thus likely to offer less access to technology and their teachers least technology

literate. However, studies by Valdez (2005) suggested, that there are currently no differences in Internet access between US poor and wealthier schools. This implies, that rich schools are not doing enough with their resources. In support of this, critics suggest that the hype about placing computers in US classrooms is almost "entirely wasteful". This view comes against the background of low technology literacy, in some of US school Districts. However studies by Apple Computer Classroom of Tomorrow (1998) and CEO Start Chart Forum (2001) are huge success stories about the impact of computer technology in student learning, and so offer substantial justification for investment in classroom technology. Thus, all schools; poor schools, rich schools and previously disadvantaged schools, should make an investment in classroom technology.

The work of Wenglinsky (1998) encourages and justifies investment in classroom technology. His work offered statistical data that showed increased access to technology. The study indicated that significant numbers of rural and urban students as well as, student from diverse economical and racial backgrounds now have access to technology in US schools and homes. A similar experience is currently taking place in South Africa. The African "One computer per child" project is offering student and teachers access to classroom technology on the continent.

Studies have also shown that some teachers are unwilling and even opposed to using technology in the classroom. This is usually the case, when teachers are not competent in the use of the technology. The critics might be right; technology is failing to justify its significance to student learning in most subject areas. It is possible, that the negative criticism associated with classroom technology, emerged from poor teaching, inappropriate methodology and uninspired teachers. If this continues, it could seriously diminish the promise that technology offers for reforming classroom experiences (Valdez, 2005).

One of the dilemma, which the proponents of technology faces, is promoting its use in an appropriate teaching-learning environment. Backer (2001), is keen to identify constructivist-compatible Instruction (CCI) as the preferred environment. This is contingent on the quality of teacher knowledge and of effectively using technology as an instructional tool.

Technology-driven classroom activities are known to support a wide range of learning styles; and motivate learners with special learning needs. Still a lot needs to be done if the hype about classroom technology is not to become a mere vapour. Bain (2004) has cited studies by IMPACT 2, which found low levels of computer use in British Schools; a developed country. So is Larry Cuban right? Are computers underused in the classrooms, and so do not justify their investment?

As an Instructional tool, the use of technology still has a far way to go. As a taught subject, computer and computer related subjects are enjoying top of the class status. The concern is with using technology as an integral part of instruction, driven by appropriate classroom activities and guided by the doctrines of learning theories. It is in this form, that technology begs the questions posed by Cuban. How do classroom technologies, as reflected in educational technology, enhance classroom practice? To what extent can all subject areas integrate technology in their instruction, to make learning fun and develop HOT skills? Educators and researchers on both sides of the divide want the best for students. The disagreement is located in devising methods that inspire both students and teachers into believing

in, and supporting educational Technology. Literature has shown that young minds can readily adapt to learning and using technology. So are the students ready for the wired-classroom?

Computer Technology and Students

The cell phone technology has revolutionized the manner and depth of communication that goes on among youths. They were called aliens by Green and Bigum (1993), in their research on Aliens in the Australian Classrooms. Computer games are the youngsters' main enjoyment for those who can afford them. The public game shops are crowded with young people all trying to beat the computer at its own game. So Green and Bigum called them the new postmodern generation. A generation of techno-centric children; they are aliens and are ready for the wired-classroom.

This view came about because of the students' techno centric desires and aspirations. Technology when used properly, can enhance the achievements of all students, increase family involvement in their child's learning and improve teacher efficacy. Research supports the view that the use of technology offers educational gains for all students regardless of age, race and parental income. The findings by Crawford and Vahey (2002), in their Palm Education pioneers programme study in Australia, demonstrated the reality that technology has a powerful effect on student learning.   They found that the portability and flexibility of handheld computers offered students freedom in communication. Some of their findings showed that technology:

a.   Enhanced students communication and collaboration

b.   Improved quality of instructional activities especially in science

c.   Improved students organizational skills

d.   Enhanced students motivation and

e.   Promoted students autonomous learning

More than 90% of the teachers believed that handheld computers were effective instructional tools that could positively influence students learning. Classroom study by Dodge and March (1995) on WebQuest, suggested a high degree of confidence, and that such form of technology improves students learning. March's (2001) study of Web-and-flow interactive, offers similar findings. These views are also supported by Chislenko (1997), Green and Bigum (1093), McInerney and McInerney (1998), Roberts (2004), Reeves (1998), Wenglinsky (1998), Fer (2004), Guba (2001), and Newhouse (1999). However, are good pen-manship, spelling and grammar gone? There will be disagreements on these issues, but lets use the technology in ways that improve our students and we will minimize any damage of which technology might be accused.

Conclusion

Computer technology is contributing significantly and positively to classroom activities globally. Literature has place constructivism and computer technology

as partners in the reform of educational practices. Educational Technology as an instructional tool is gaining in popularity. A number on universities are now offering qualifications from certificates to doctorates in this discipline. In addition, a great number of these qualifications can be done online, using computer technologies compatible with E-learning.

The name of the specific brand of educational technology varies from technology in the Classroom, to K-12 Technology, to Information Technology in Education, to Distance education technologies. Whatever it is called, teachers now have greater opportunities to become classroom technology literate, and apply their knowledge in the classroom, to promote learning. So Cuban is right, once teachers are capable of using classroom Technology; and has the commitment to promote the use of the technology as an agent of enhancing learning, nothing is impossible. This is becoming a reality is some schools in South Africa. Small workshops are held during holidays in South Africa to assist teachers in developing the requisite knowledge skills and attitude to integrate technology in their classes. A similar report comes from Jamaican educators.

In a large number of Australian schools, classroom technology and constructivism are tooled together to inspire fun, enjoyment, productive learning and high order thinking skills in classroom activities, with amazing positive results. This is common in many large city-schools in the developed world. Cuban was right, increased funding of technology in schools has offered greater access to classroom technology. By extension, more schools from all walks-of-life are better positioned to offer teachers and students technologies that work right, in the classroom. Cuban was right, in many educational institutions of the third world; computers remain the treasured "guest of honor" in principal's offices; with no meaningful effort to institutionalize their use. But this is changing. Cuban was right, historically poor and disadvantaged schools are now receiving increased funding, to satisfy the technology needs of both teachers and students. Students writing skills have improved dramatically, thanks to expert computer software editing features. Things are changing.

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