An Appraisal of the Effects of Technological Changes and Development on Learners in Higher Education

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ABSTRACT

The effects of technology in higher education have focused on a variety of physical, social, and cognitive contexts of learning and indeed have changed in its theoretical platform over the years. Technological developments continue to offer new experiences in both theory and practice of learning, teaching and growing for those in higher education. Through a comprehensive analysis, this paper will look at the effects of educational technology in higher education. The paper will also discuss the role of distant education in learners and, take a look at computer-assisted instruction in higher education. It must be noted that the possibilities of technology are endless in learning, teaching and growing.

Introduction

Technological advancement is rapidly evolving and changing academic orientation at all levels of higher learning. Numerous research studies have concluded the importance of computer-based instruction on students' learning, attitudes, and instructional time. Numerous researches cited a positive effect for computer-assisted instruction on academic development (especially in reading), reporting that students using the Reading Partner exerted more mental effort, showed better meta-cognitive reconstruction, and improved significantly in reading comprehension. Even, the simple word processing experiences are said to lead to improvements in reading and comprehension. Thus, the use of computer-based instruction has been found to have a moderate positive effect on students' achievement. As colleges and universities begin to infuse technology into their curricular, it is apparent that the impact of technology on higher learning will not only
enhance student's development, but also will bring about the much-needed change and boost in various discipline. This paper will be a comprehensive inquiry into how effective technological development has aided learners in higher education.

These authors contend that technological changes and development in higher education continue to offer new experiences in theory, practice, teaching and learning. A good paradigmatic shift, from professor-centered to a student-centered system of learning has particular implication for the problem of teaching. This will create an ideal learning environment for students employing the new technologies to address variances from the technological advancement. Another implication for faculty is a shift from traditional to new roles and classroom responsibilities. The transition from lecture to facilitator continues to further the cause of technological advancement. This paper will articulate that technological advancement will continue to propel higher educational development at the following levels:

i. as globalization impacts every facet of society, its globalization impacts on higher education and vice versa are subjects of this paper. It is imperative to study the role/impact of technology in higher education;

ii. the infusion of the (latest) technology, including digital will enhance the quality of curriculum as well as the theoretical and job market skills of students the paper argues;

iii. the ongoing technological invention and innovation provide the higher education with newer horizons in theory and practice, and teaching and learning.

It must be noted that technologies, which have had the greatest impact on education, are those that augment the existing curriculum, allowing both immediate enhancement and encouraging further curriculum development. Today, the availability of technology has become a given in colleges and universities across the United States. The phenomenon of computerization of education and training has become a global phenomenon and it is almost imperative for institutions of higher learning to claim access to computer technology and thence to the ever expanding and ubiquitous internet.

Today educators are realizing the importance of infusing technology into their curriculum. Computer technology has become one of the wheels educators continue to use to produce
graduates who meet the challenges of the present and those of the future, by helping and assisting students to become academically astute, competitive, competent. Furthermore, it must be noted that computer technology is also a great vehicle for motivating students to learn.

Over the last twenty years, computer technology has assumed an increasingly prominent role, and schools have gradually responded by developing curriculum to meet the demands of students that will give students the skills necessary to compete in the global marketplace.

Numerous research studies have been conducted to determine the effects of computer-based instruction on learning, student attitudes, and instructional time. Kulik and Kulik (1987) combined several data in one analysis of 199 comparative studies: thirty-two in institutions of higher learning, and twenty-four in adult settings. The results of conventional instruction, raised examination scores by .031 standard deviations, or 50th to the 61st percentile. Twenty-eight of the studies reported that computer-based instruction reduced instructional time by an average of 32%, and 17 studies indicated that students' attitudes toward institution were raised 0.28 standard deviations.

Other reviews came to similar conclusions: the use of computer-based instruction, when compared to conventional instruction, has a moderate positive effect on student achievement and attitudes toward computers and instruction, and substantially reduces instruction time. These results indicate that computer-based instruction have positive benefits, although certainty is not a panacea.

 Appropriately so, educational applications of computers can be categorized in one of three classifications: tutor, tool, and tutee. In this categorization scheme, the computer takes on three different roles. It either serves as a tutor or teacher, as a handy tool, or as a tutee for students. In tutor applications the computer act by performing a teaching role. Thus, the computer tutors the student. In tool application the computer serves as an instructional tool similar to a pencil, typewriter, and microscope, slide rule, piano, or drafting table. With the computer, students can calculate numbers with great speed and accuracy. Students can type and, edit papers, reports, and themes as well as use a word-processing computer program. The computer can even be used as a tool to assist the student composer and artists. In a tutee capacity, the computer becomes the tutee, or student, and the user becomes the teacher. The user has to teach the computer to do some task.
Here the user has to learn how to communicate with the computer in a language that computer understands. In essence, the learner must learn how to write computer programs. A computer program is a set of commands that tell the computer how to accomplish a particular task or solve a problem.

Many colleges and universities worldwide have become more willing to concede that learning need not take place in the classroom (Baker, 1992); that learning can take place at home, at work, and during leisure hours. Many have concluded that students can learn outside the classroom through distance education options; this concept implies that student can live and learn away from campus.

Systematic reforms continue to bring changes in post secondary education. As Van Dusen (1997) noted, time and distance effectively removed as constraints, colleges and universities are serving a more heterogeneous clientele with diverse education backgrounds and needs. Thus the difference between learning in the traditional and virtual classroom is the extent of interaction. In the traditional classroom, the potential for learner- instructor and learner-learner is very high, but instructors have ignored the change and continue to employ the lecture styles as the ubiquitous method of instruction. In virtual classroom, technology supports collaborative learning, heterogeneous groupings, and problem solving and higher order thinking skills, and educational processes that a lecture format can take place.

In a study conducted by Atkinson (1995), to show the effect of Stanford University computer-based curriculum for development of reading,, findings revealed that students exposed to computer-assisted instruction received greater gains than those who were not. Atkinson also demonstrated significant gains for boys than girls. This gain is worth noting since females have been known to excel in reading than do boys.

In a similar vein, hosts of research endeavor have also concluded that computer-assisted instruction on academic development is promising. It must be noted here that beginning writers have a level of competency that is masked when they write with pencil and paper but writing with word processor provides a level of support that enables them to write at more advanced pace. Other reviews have come to similar conclusions that the use of computer-based instruction, when compared to conventional instruction, has a moderate positive effect on student achievement and
attitudes toward computers and instruction, and thus reduced instructional time.

**Theoretical framework**

This research work is anchored on theory of modernization

**Background:**

Technological explosion continue to emerge as a source of pressure across institutions of higher learning. This is due in part to research and development efforts within institutions as many institutions across the country are research-oriented. However, a great deal of technological development occurs outside institution. This development is the result of government - sponsored research efforts and the efforts of numerous educational organizations, including the American Association of School Administrators, National Association of Education, University Council for Education Administration, National Council of Professors of Educational Administration, Association for Supervision and Curriculum Development, National Society for the Study of Education and the American Educational Research Association.

During the 1940s, school houses across the nation were being equipped with the latest technological development in education. The equipment was supposed to bring about mass educational reform, changing the face of the learner forever. This piece of revolutionary hardware was nothing more than the chalkboard. As classrooms changed, needs changed also.

Today, educators continue to interweave technology into their curriculum. Programs as well as degrees are being awarded, as computer technology became the conduit educators continue to use in engaging students to become academically astute, competitive and productive members of the mainstream. Computer technology is said to be a great vehicle for motivating students to learn. With its many capabilities, the computer is vast and has a considerate number of resources available and can as well open up a learning environment by allowing users to navigate multiple networks that will assemble information for various topics of interest.

Komoski (1969) defines technology as a concept reflected in the attitudes held by people who address themselves to means-ends relationships. Presumably so, at colleges and universities, the means are the instructional sequences and campus environments; the ends are the lecturing criteria
achieved by students. The most difficult task faced by the educational technologist is the introduction of this form of inquiry into the contemporary institutions where, typically, the relationships between activities and effects are rarely considered. The use of well-defined instructional technology objectives offers a great deal of potential for learners.

Evaluating technology in education is important in all school curricula at all levels of education appraisal in terms of present intellectual and cultural desires, world forces and technological advancements. As Ebrahim (2000) noted:

Technology has the potential to make significant impact on education at all learning levels, but will be only as powerful as the degree to which it is integrated effectively into the total instructional program (p. 13).

Today, it is not unusual to see children of developed world and especially the United States to be living in a technologically sophisticated and challenging world. Children learn to interact quite naturally with rapid changing technology through its innumerable forms that ranges from television to VCRS, video games, stereo systems, cameras, microwaves, calculators, lap top computers, etc. The learning channel on PBS features programs that utilizes instructional technology such as encyclopedias, multi media dictionaries, and sophisticated games that make the learning process more exciting. Subsequently, technology has become inextricably linked to learning and acquisition of knowledge

Healy (2000) acknowledges that computers will make a distinction not only in the ways students learn, but also in the way their brains approach information processing. Technology has the tremendous potential for enhancing learning and preparing students for great many tasks. Kilpatrick and Cuban (1998) concluded that computers and internet connections are rapidly becoming common place in colleges and universities, yet it is widely acknowledged that the technology has not had the significant impact on teaching and learning that many expected. Thus teachers must learn and know the technology not only to create new ways to communicate, but also new reasons for students to communicate and collaborate on learning and integrating technology. Epinoza and McKinzie (2000) found that computer-collaborative process itself promotes problem solving and thinking skills thus, driving the learning process.
Use of Computer Technology in Classroom

Although information technology promises to uncover new worlds of knowledge and opportunities, in today’s society technological promise threatens to drive a wedge into efforts to bring equity to schools. Furthermore, in the information age, knowledge is wealth. Although the wealth keeps growing, as such, there is a major disparity in the distribution of this so-called wealth.

The computer revolution is here, all across the world, and the arrival of computerized society is being announced. Computers appear to be revolutionizing every aspect of society and they are changing the face of instructions, they are altering the way students think and spend their leisure time. It has revolutionized the ways information is generated, stored, and transmitted.

Advocates have seen computers bringing about changes in schools, and are beginning to take advantage of the power of the computer to make significant improvement in the conduct and effectiveness of the school. The computer is a jack-of-all-trades. It can be used as a workbook page or a science laboratory, a teaching machine, or a personal tutor, a four-dimensional model or a fantasy world to be explored. It can compute grades for an entire class and generate reports that analyze the progress of every student in a given class. It can teach and be taught. It is indeed a tireless servant at the command of the teacher who wishes to use it. The computer can also be a horror. The single guarantee is that a computer always interacts with its users. Regardless of what is done to it, it responds, either it does what is expected or gives back a message that says it cannot do it, or stops dead at its track.

Using Educational Technology: A Social Change Process

Unfortunately, the potential positive impacts of educational technology will not be realized unless they are fully used in schools. This is due to the fact that these technologies are not self-implementing, thus they demand significant amount of effort at both the individual and organizational levels to successfully implement and integrate. It is noteworthy to consider the use of educational technologies as a process of social change, one involving the adoption and assimilation of innovation according to Tornatzky and Fleischer (1990). It must also be noted that there are several uses to the process of technological implementation.
Planning: Since educational technologies encompass a family of related hardware, software, and knowledge, the adoption and implementation process is likely to be a long-term affair that includes many stages and phases. This suggests the need for a comprehensive, participative planning process that includes vision, strategy, action steps, and milestones.

Training: The adoption and implementation of new technologies, particularly ones that are complex and extensive in scope demand that users acquire new knowledge and skills. In the context of educational technologies, this implies not only operating knowledge about specific hardware and software, but conceptual knowledge about how to envision technology-mediated instructional delivery. These knowledge shortcomings need be addressed in a comprehensive implementation approach.

Technical Support: Educational technologies are also self-maintaining. A school that has adopted and implemented a wide range of technologies, for both instructional and administrative applications, is in effect operating a highly complex socio-technical system. Teachers need help, in the form of practical and prompt technical support, in order to realize the potential benefits of these technologies.

Change strategies: While not all schools self-consciously consider the use of educational technologies as a social change process, some do. Of those that appreciate the nuances of organizational change, it will be appropriate to adopt some deliberate strategies and tactics to manage and guide the process.

Scholars and students are aware that computer technology has quickly become an intricate part of development and an important vehicle for change from the conventional way of learning to the now technology-based learning. However, the concept and process do not seem not to be synonymously associated with conceptualization of computer and change. According to Bruce A. Westleym the University of Kentucky no aspect of social change has been extensively researched as the relationship between communication and change, individual and social, and in particular the part played by the organization and corporate America as well as institutions of higher learning.

Although, a poorly conceived technology could do schools irreparable harm, modern education, like the society which nurtures it, can only address its problems with human feeling, wisdom,
knowledge, and scientific techniques at its disposal. Appropriately so, however crude or misdirected it is in its past applications, modern technology represents man's efforts to use scientific development to cope with human problems, including those in education.

**Using Technology to Attain and Sustain Excellence in Teaching and Learning.**

Technology, according to Robert Muffoletto (2001) is a hybrid of natural sciences and engineering striving to secularize and modernize the western world. He went on to say that it is not only a collection of devices, but as a disinterested, scientifically-based process or management system, it provides a framework for thinking about the identification and solution to predefined problem.

The quality of education that students are receiving has been the focus of much discussion, criticism, supports, and efforts of change in recent years. The global atmosphere of society is not often reflected in schools. Of particular interest is the necessary ability of students to be able to assume an adult role in a thinking, communicating, global society. One way to provide rich critical thinking experiences and motivation for achieving thinking process is through critical reviewing activities. The world is increasingly more visual. Using visuals to develop thinking skills seem not only practical but also necessary.

United States is a technological society; therefore, it is imperative that the goal of education in all appearances be to develop a basic knowledge of the structure and operating principles behind most common tools. As the technology has grown more complex, interests in conveying this knowledge to all students before graduating from high school has diminished, even as use of high technology has expanded. This attitude causes a number of problems concerning the nature of the relationship between humans and machines. Postman (1993) notes that, all technologies are ecological since their introduction sends ripples of change throughout the entire social system. Many of the changes are indirect. Usually they are undesirable, and it is eventually difficult to detect side effects according to Bowers (1988). This is why, in the case of computers, one has to consider that they have penetrated every human activity because they replace or stimulate a certain part of one's thinking.

Sietzer and Monke (2001) noted that uses of computer in classroom and in education might be
classified into four broad categories. As a development tool which according to Papert (1980) draws students into a thinking environment; the second one is called programmed instruction, introduced conceptually by the renowned psychologist B.F. Skinner in the early 1950s. The third use is to stimulate experiments and the fourth and final use is to serve as productivity tools, both within the content areas and as an area of study for future use.

It must be noted that educational technologies are also self-maintaining. An institution that has adopted and implemented a wide range of technologies, for both instructional and administrative applications, is in effect operating a highly complex socio-technical system. While not all institutions self-consciously consider the use of educational technologies as a social change process, some do. Of those that appreciate the nuances of organizational change, some adopt deliberate strategies and tactics to manage and guide the process.

It is appropriate to note that the true value of educational efforts should be judged on the basis of the qualities and quantities of learning affected as well as by things called educational technology that must be measured and evaluated. In a nationwide study, the Commission on Instructional Technology identified several potential benefits of educational technology; they are: (1) technology can make education more productive. This is more pronounced in the ways technology has proven its ability to speed up the learning process, thus, allowing the teacher to make the best use of his time. Technology has also been found to reduce instructor's burden of administrative tasks so they can focus on the business of transmitting information (2) Technology can make education more individual. This has proven to be productive when applied properly. It has been seen to open up many avenues of learning and has been seen to increase the alternatives as well as permitting students to find directions more easily. (3) Technology can give instruction a more scientific base. This can be seen when instructional technology provides a framework necessary for designing the conditions of learning that are more closely related to how people learn. (4) Technology can make instruction more powerful. Media technology can stimulate reality, bring distant and remote events to students, compress or expand the time visual or auditory events take place, magnify or reduce the size of objects, dramatize or simplify events. (5) Technology can make learning more immediate. The elements of immediacy allow the technology to help bridge the gap between the world outside and the world inside the institution of learning. Thus television, film, and other media curriculum can easily be made dynamic. Knowledge and reality, filtered
through the words of textbooks with teachers all too often reach the students as predigested conclusions. It must be noted that if technology is creatively applied, reality can be studied almost directly and the students' route to knowledge and understanding be more meaningful. And finally, (5) technology can make access to education more equal. It is a known fact that equal access to rich learning environments is not always possible without some resort to technology. Thus with the aid of television or film, nearly all universities and colleges can have the luxury of seeing Martin Lawrence play a cop. The faculty and students of a small rural college can have direct access to the greatest libraries in the country. Thus citizens can be anywhere to take advantage of technology. It transmits the effect/impact of knowledge to everyone.

Access to educational computing remains a primary concern. Developing countries and poor communities are at disadvantage in the use of computers. Who is accessing and who is not accessing computers and related technology in classrooms? Educators must continue to make conceited efforts to make appropriate and adjustments necessary to keep striving for equitable access. (Christensen, Larry, Hammons, Kathy, Merrill, Reynolds, Tolman, and Bret, 1992)

The impact of technological changes in classrooms should be congruent to the impact of technological changes in society.

**Conclusion.**

Technology is happening in society and schools and it is transforming institutions across the board. It must be noted that each technology offers certain possibilities that interact with already existing cultural attributes to change things when technology is introduced. Technology is potentially explosive, not merely addictive. The continual rush of technology is inevitable from the standpoint of technological worldview. According to Robert M. Boody (University of Iowa) the real question in relation to technology in schools is not how much we can afford right now, but rather, what should education be like, in which aspects within that specific technologies contribute and how is technology changing society and education. Specific technologies can be a part of improving education, but not as a merely technical solution.

Real education has to do with the transmission and development of culture. Technology, as content, does have a place in schooling, as does technology as pedagogy part of the place of
technology in schooling is to develop critical awareness toward it. Thus, in a world where students are bombarded with so much video, audio, and other electronic media, students need to become for instance, video literate for their own defense; regardless of the ultimate use of video and other technologies for education, students should be taught how to appraise them, and use them as a tool or as a mode of understanding the world, and not to hold them as the world itself.

Overwhelmingly the literature suggests that computer technology does, in fact, enhance student achievement in the core content area of higher learning. Thus computer technology is seen today as the magnifier of change or the enabler of change. As such it is vital that colleges and universities make concerted efforts to provide students with learning opportunities that will enhance the learning process thus improve students matriculation. Although, Kilpatrick and Cuban (1998) found little change or impact on academic achievement due to teacher readiness/student readiness can be linked to lack of knowledge and skill; other researchers have cited positive effects on students’ achievement in reading, using computer assistance with great improvements in reading just by using simple word processing. It is also noteworthy that computer assisted instruction positively affects achievement.

Educators are faced with many concerns in this rapidly changing world. Technology continues to increase the pace of change, bringing new perspectives as well as new opportunities. The data compiled by Kulik and Kulik (1987) in the analysis of 199 comparative studies reveals that the technology-based instruction was a positive factor in raising examination for student learners.

Access to educational computing remains a primary concern. And especially in developing countries where schools are experiencing shortages and disadvantages in the use of computer technology to enhance learning skills; efforts should be made to propagate the impact of technological changes in classrooms as well as its impact on society. Higher institutions of learning must continue to make available the necessary assistance that will help to sustain educational development and help students achieve their respective potentials.

Computerized education will mean philosophical variation in the manner in which schooling is carried on. Those affected will have conflicting opinions about the viability and values of this new approach to teaching and learning. Computer instruction will help to equalize opportunities because computers are capable of teaching the same information with accuracy everywhere with
equivalent software. Although computers cannot eliminate the differences individual students bring to the school, it can however, provide them with the tools and means to achieving excellent education which will in turn prepare them for the economic, social and cultural diversities of the 21st century. As the locomotive evolves from a steam engine to a high-speed bullet train, society must remember that curriculum is the engine and technology is one of the conduits for improved student achievement.

As American higher education continues to focus on multiculturalism and student diversity, colleges and universities must recognize the needs and demands of the adult learner (Hazzard, 1993). Colleges and Universities are at the crossroads between modest experimentation with and mainstream adoption of information technologies. As a result of serious repercussion, the following recommendations are warranted; (1) a paradigm shift can occur in institutions committed to a comprehensive reform; (2) changes in classroom focus from "the sage on the stage" to collaborative learning are likely to fail without a substantial commitment to professional development; (3) higher education will continue to be market-driven, requiring redoubled efforts to define academic productivities; (4) new constituencies appear to be well served by a variety of distance learning venues; (5) the total quality management movement has made impressive inroads in higher education administration; (6) the use of instructional technology rises, national support for applications' development had been dilatory; and (7) the historic commitment to core values in traditional undergraduate education has wavered.

Today, adult learners constitute a significant portion of the total student population enrolled in colleges and universities. It is apparent that there are many barriers and personal concerns that must be addressed. As Ervin (1977) noted, the enrollment of part-time students in higher education will continue to increase with significant impact on the delivery of educational program and services. Professionals and practitioners in higher education should be concerned and be acquainted with new and innovative types of services to meet the needs of adult learners. The American Council of Education (19740 summarized it by saying:

The physical and sensory equipment of people of all ages in ample for most kinds of learning if used efficiently... there is nothing about aging itself, which prevents or seriously hampers learning. continuing education
has become an important enterprise for millions of adults, and the effectiveness of such education is a matter of utmost social and national importance (p.35).

Challenges will continue to arise as integration of technology into colleges and universities progresses. Efforts to find new and innovative solutions will become a common occurrence among those responsible for making technology decisions at the faculty and administrative and staff levels. These challenges will force colleges and universities to revisit their mission statements, in particular in response to access and services.
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