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Preparing Teachers, Student Teachers, and Schools for the 21st Century: Review of Recent Reports in the U.S.

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Abstract: The year 1996 marked the initiation of Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge. The grant program aimed to integrate technology in the field of education in the 21st century. This grant program generated many reports in an attempt to measure its success as well as to comment on the state of schools, teachers, and teacher preparation in Schools of Education in utilizing technology to improve teaching and learning. This brief paper endeavors to create a synthesis of the recent research and opinions about the introduction of technology into the classroom as proposed by this plan, and will, in some cases, call for revisions. At the same time, the writing assesses, from a perspective enriched by time, exactly how much of what was suggested by the educational experts was actually put into effect.

INTRODUCTION

In 1997 the report elaborated by the National Council for the Accreditation of Teacher Education (NCATE) affirmed that there is not one single question to be asked with respect to the way in which new technologies will be used in schools, although all seem to be in agreement that students should have access to computers, media and other technologies in the classroom. Some believe that these technologies are necessary because they develop capacities for a professional future. Others see the potential that they could have for social participation. Finally, and perhaps most importantly, the research corroborates that using technology can actually improve a student's learning process. What is less certain is when and how the new technologies will be sufficiently integrated into schools to createa paradigm shift where technology is easily and reliable available and teachers have the time and expertise to build effective learning resources.

One year before in 1996, the Clinton Administration fought hard for technology in schools and set a lofty goal: to integrate technology in all public schools by the year 2000. This project was called *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge* (U.S. Department of Education, 1996). This project was carried out from 1996 to 2000 at a total cost of two billion dollars. It was based on the following four pillars or objectives: availability and access to the necessary hardware for instructive use; appropriate educational content (software and other applications); internet connections in all schools; adequate training and professional development for teachers.

Coinciding with Clinton's proposal, the CEO Forum on Education and Technology emerged in the fall of 1996 in order to aid in the preparation American schools so that all students may become productive citizens and workers in the 21st century (cfr. www.ceoforum.org). From this project, diverse publications were reported on the four pillars of the project initiated by Clinton: hardware, content, internet access, and professional training for teachers (CEO Forum, 1997, 1999, 2000a, 2000b, 2001). The CEO Forum (2001) presents some specifics about the impact of the enormous investment of the *Getting America's Students Ready for the 21st Century* project evaluated by the CEO Forum. These reports are followed by others that evaluate the use of technology in schools as well as the information offered by the Schools of Education (cfr. OTA, 1995; NCTAF, 1996; NCATE, 1997; ACE, 1999;WBC, 2000; NCES, 2000; NCREL, 2001; U. S. Department of Education, 2001).

This briefpaper is based on these reports and other documents produced in the second half of the 1990's and the first years of 2000 that study, analyze, and evaluate the use of technology in schools, as well as training of in-service and pre-service teachers. There were two effects of this reports. First they gave way to the creation of the program *Preparing Tomorrow's Teachers to Use Technology* in 1999, financed by the U.S. Congress through the Department of Education. The principal goals of this program concerned the preparation of future teachers (current student teachers) through many different program efforts but especially faculty development. Second the elaboration and implementation of technology standards developed by the International Society for Technology in Education (ISTE).

METHODOLOGY

The following reports were studied in preparation of this paper: CEO Forum (1997, 1999, 2000a, 2000b, 2001), OTA (1995), NCTAF (1996), NCATE (1997), ACE (1999), WBC (2000), NCES (2000), NCREL (2001) and Parthnership for 21st Century Skills (2003).

The revision of these reports is focused on three questions:

- What are the major conclusions regarding to the educational potency that the new technologies offer to schools?
- What are the programs and methods of technology integration that have been shown to be effective in supporting and improving teaching and learning?
- What is the status of training in educational technology for in-service teachers and for the preparation of future teachers in Schools of Education?? It is necessary to reform these Programs?

Lastly, conclusions are drawn that attempt to estimate to extent to which the recommendations for the implementation of technology in these schools have been carried out, and new recommendations are devised.

SUMMARY OF CONCLUSIONS

One can observe fairly easily some of the ideas about the use and integration of technology in the teaching field that repeatedly occur throughout these reports., For example, statements on the importance of securing reliable access to computers, software, digital content, and internet connections, and the need for reform in Education Programs to adequately train future teachers occur frequently.

Some of the measures adopted from the 1990's into the first years of 2000 have taken the following recommendations well into account.

• The project *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge* carried out over the 1996-2000 period has been responsible for connecting the majority of schools to the internet and generally making computers more available (see main result on CEO Forum, 2001).

• The *International Society of Technology Education* (ISTE) has elaborated a collection of standards (NETS) for students (1998), teachers (2000), and administrators (2001) that have been adopted in 41 states –88% of United States– (Roblyer, 2003).

• The U.S. Department of Education has sponsored a project since 1999 that finances teacher training programs in Education Schools nationwide, primarily getting future teachers used to using and current Professors better acquainted with educational technology: *Preparing Tomorrow's Teachers to Use Technology Program (PT3).*

The repercussions of Clinton's investment are evaluated in the CEO Forum (2001) report. This work gathers data corresponding to four pillars which the technological success rests upon: hardware, connectability, digital content, and professor/teacher training. The objectives to incorporate equipment (or hardware) and internet connections have been covered. However, there is still a lot of work to be done with regard to the other pillars: the integration of digital content and teacher training.

The statistics verify that the availability and price of equipment as well as connectability have improved substantially since 1996 (see CEO Forum, 2001). In fact, the ratio of students to computer has decreased tremendously from 24 in 1996 to 5.4 students per computer with Internet access in 2001 (http://nces.ed.gov/pubs2002/internet/4.asp) . The percentage of schools that had internet connections in 1996 was 35%; and in 2000, it becomes 98%. On the other hand, if we observe these the data related to digital content, we can appreciate better teachers and future/teachers/students how they use the computer and as a helpful tool in preparing classes and research papers. These statistics concur with Cuban's study (2001) in the Silicon Valley, where like students, teachers follow a path from kindergarden, to primary and secondary school, and then university, so current professors have not received technology modeling or training as a student. Consequently, it is no surprise to discover that there are today very few professors who really understand the how to improve their teaching with technology.

The data from all of the reports investigated in this brief paper reflect and emphasize the idea that the mere introduction of technology in itself does not require any necessary break from traditional teaching methods. Teaching methods are changing though, due to other factors having to do more with teacher training and institutional support. The 2 million potential job openings in the teaching field before 2007-2008 have catalyzed a revamping of the future teacher technology training process (Hussar, 1994).

As a final valuation, it is relevant to bring the following ideas to light:

Redefining teacher training. Some of the suggestions that the articles offer are: a) To keep in mind two effective ways to impart technology courses for teachers activities offering a traditional course for people who are able and want to attend a class as well as providing one online for those who would prefer to teach themselves. b) Training will include a didactic element in addition to the technical component, and should promote good practices that infuse technology into the teaching and learning process to effectively support and improve learning and other more general practices such as staying aware of new developments and methods through distribution lists and specialized journals. c) A resource center should be made available to those teachers in training programs where they can access any other information they need, ask questions, and preferably, get help from qualified instructional technology specialists. d) Some teachers who have more experience with the new technology should serve as mentors for newer ones, and even technologically apt students may have a role as a technical aid in class.

Technical and pedagogical support. Teachers will feel more comfortable and assured when innovating and introducing technology if they know that they can always go to someone for help if needed. More emphasis has often been placed on the technical side of things, when in reality it seems almost more important that a teacher have a pedagogical support who can orient his/her use of technology and evaluate how coherent it is with the goals of the course. For example, in the BU-PT3 project awardedto Boston University's School of Education, graduate students of educational technology support and train education professors as they worked to appropriately integrate technology into their teaching. .

Not to underestimate the beliefs of teachers. It is clear that the teachers who tend to adopt technology quickly are the ones who feel comfortable and enthused by active, student-centered methodologies. On the other hand, the most resistant teachers are those who cling to their old lecture because they are afraid that they will lose control of the class if they abandon the teaching style that they know. This fact suggests that orienting the training of teachers not

so much toward the purely technical, but focusing it instead on the positive pedagogical effects the new style would render (cooperative work, problem solving, research, etc.) and becoming familiar with cutting-edge technology in the process.

Attention to the process of acquisition of technology. Cuban's works (1986, 2001) mention how over time, the same mistakes have been committed when trying to introduce technology in the classroom, from the radio to cinema to television. Through these means, the teacher has typically tried to force some kind of technology that he/she has not mastered by any means, does not adapt well to the course's content, and does not know how to benefit from it. To explain this, Cuban (1986: 108) gathers the ideas about behaviors of people in the faces of changes that threaten their security, that they do not understand, or if they are forced or obliged to change. When this is the case, teachers and professors need time to discuss their reservations about technology and to search with knowledgeable and experienced colleagues for ways in which technology can help them to improve their teaching. It is necessary that techynology's value be explained and discovered if resistence and opposition are to be avoided.

Suppport on the part of the institution. For a plan to be successful at any institution, it is necessary to have their unconditional support—through action plans described earlier, incentives that promote the integration of technology, procedures for evaluating its efficacy based on student responses and teachers' labor and effort (standards that recognize new skills learned with technology), either through the promotion of teachers (criteria for hiring and promotion). The chart produced by the CEO Forum (2000a) "Star Chart: A Self-Assessment Tool for the Colleges of Education" can help an institution get to know its strong and weak points, and can also help it propose a plan of action based on these results.

Lastly, it seems important to underscore that *the introduction of technology in itself would not modify the methodology of the teacher*, as the statistics collected in the CEO (2001) report make manifest, and Cuban also affirms in his recent research (2001). Some of the most interesting potentialities that the introduction of technologies promises concern the development of more active teaching methodologies, and at times an exchange of the classical teacher and student roles (ISTE, 1998: 2) which have been identified as characteristics of a quality education. In other words, a good teacher can bring technology into the "traditional" environment from time to time and see some of the potential learning advantages, without amending his rudimentary curriculum per se. Nonetheless, Collins (1991) persuasively suggests that the technological innovations that are introduced tend to provoke a change toward a more active, and student-centered methodology and enhance their literacy for the digital age.

Cuban (1986, 2001) found that teachers adopt technology to help them do what they already were doing, that is they "replicate old models" but in new ways. Many elementary school teachers are constructivist with or without technology, and when they adopt technology, they use it in constructivist ways because that is comfortable for them. As we move into high school and college, teachers become more didactic but that does not mean they cannot adopt technology, in fact they do adopt it if they have training and time and support. For example, lecturers who use power point are still teaching didactically, but now their lecture is an illustrated didactic. If it is effective, and perhaps we should say more effective than the lecture was without the illustration, then it is a good thing, even though it is still didactic teaching. Vale found that "faculty tended to utilize the same pedagogical methods in software as they already did in regular teaching, turning to the computer primarily for areas that were difficult to teach or learn" (Vale, 2004, p. v). Despite this, we argue that there is still a constructivist tendency in the way that online and other digital teaching resources support learning and collaboration both in and outside of the classroom. For example, lecturers can post on the web their notes, or power point, or a video of themselves lecturing. The difference is that on the web, students can study it in pieces and have discussions about specific segments. The technologically facile instructor can add questions and activities and use the lecture materials to take the instruction to a deeper and more interactive level. In this scenario, technology does encourage constructivist pedagogy but it does not discourage didactic pedagogy. If the goal is to really to get the most of the integration of technology in education, then the teacher has to be trained to be innovative with methodology and be supported in implementing technologies creatively.

REFERENCES

ACE (1999) *To Touch the Future: Transforming the Way Teachers are Taught. An action agenda for college and university presidents*. ACE (American Council on Education). [on-line] [http://www.acenet.edu/resources/presnet/teacher-ed-rpt.pdf] (May 2003).

ACOT (1995) *Changing the Conversation About Teaching Learning & Technology Report on 10 Years of ACOT Research*, Apple Computer, Inc, California [on-line] [www.apple.com/la/education/acot/acotlibrary.html] (May 2003).

Bransford, J. D., Brown, A. L. and Cocking R. R. (ed) (2002) *How People Learn. Brain, Mind, Experience, and School. Expanded Edition*. Washington, D.C., National Academy Press.

CEO Forum on Educational and Technology (1997) *From Pillars to Progress*, Washington D.C., CEO Forum [on-line] [www.ceoforum.org/reports.cfm] (April 2003).

CEO Forum on Educational and Technology (1999) *Professional Development: A Link to Better Learning*, Washington D.C., CEO Forum [on-line] [www.ceoforum.org/reports.cfm] (April 2003).

CEO Forum on Educational and Technology (2000a) *Teacher Preparation STaR Chart. A Self-Assessment Tool for Colleges of Education*, Washington D.C., CEO Forum. [on-line] [www.ceoforum.org/reports.cfm] (April 2003).

CEO Forum on Educational and Technology (2000b) *The power of Digital Learning. Integrating Digital Content*, Washington D.C., CEO Forum. [on-line] [www.ceoforum.org/reports.cfm] (April 2003).

CEO Forum on Educational and Technology (2001) *Key Building Blocks for Student Achievment in the 21st Century: Assessment, Alignment, Accountability, Access, Analysis*, Washington D.C., CEO Forum. [on-line] [www.ceoforum.org/reports.cfm] (April 2003).

Collins, A., (1991). The role of computer technology in restructuring schools. *Phi Delta Kappan.* September, pp. 28-36.

Cuban, L. (1986) *Teachers and Machines. The Classroom Use of Technology Since 1920*, New York, N.Y., Teachers College Press.

Cuban, L. (2001) *Oversold and Overused. Computers in the Classroom*, Cambridge, Harvard University Press.

Hussar, W. J. (1994) *Predicting the need for Newly Hired Teachers in the United States to 2008-09*, Washington, D. C., U.S. Department of Education, National Center for Education Statistics.

ISTE (1998) *National Educational Technology. Standars for Students.* Oregon: International Society for Technology in Education, [on-line] [http://cnets.iste.org/pdf/nets_brochure.pdf] (April 2003)

National Center for Education Statistics (2000) *Teachers' Tools for the 21st Century. A Report on Teachers' Use of Technology*, Washington, D. C., Author, U.S. Department of Education.

NCATE (1997) *Technology and the New Professional Teacher: Preparing for the 21st Century Classroom. National Council for Accreditation of Teacher Educacion* [on-line] [www.ncate.org/accred/projects/tech/tech-21.htm] (April 2003)

NCTAF (1996, September) *What Matters Most: Teaching for Amarica's Future, National Commision on Teaching and Amrica's Future*, New York. [on-line] [www.nctaf.org/publications/WhatMatthersMost.pdf] (May 2003)

OTA (1995, April) *Teachers and Technology: Making the Connection. Office of Technology Assessment*, OTA-EHT-616. Washington, D.C.: U.S. Government Printing Office. [on-line] [http://www.wws.princeton.edu/~ota/disk1/1995/9541.html] (April, 2003)

Partnership for 21st Century Skills (2003, July) *Learning for the 21st Century. A Report and Mile Guide for 21st Century Skills*, Partnership for 21st Century Skills

Roblyer, M. D. (2003) 'Getting our Nets Worth. The Role of ISTE´s National Educational Technology Standars', *Learning and Leading with Tecnology.* 30(8): 6-13.

U. S. Department of Education (1996, June) *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge*, Whasington D. C. [on-line] [www.ed.gov/Technology/Plan/NatTechPlan/] (April 2003)

US. Departament of Education (2001) *Measuring impacts and shaping the future: Final conference report.* Washington, DC [on-line] [www.ed.gov/Technology/techconf/2000/] (April 2003).

Vale, K., (2004). The Emergence Of Network-Enhanced Classroom Teaching. Unpublished Doctoral Dissertation, Boston University.

Web-Based Commission WBC (2000, December) *The Power of the Internet for Learning: Moving from Promise to Practice*, Report of the Web-Based Education Commission to the President and the Congress of the United States, Washington, D.C. [on-line] [www.ed.gov/offices/AC/WBEC/FinalReport/] (April 2003)

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