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ABSTRACT

Education is generally regarded as the institution most responsible for providing "survival skills" needed to empower individuals to function effectively within the socio-economic system of a nation. The schooling process is expected to provide common patterns of experiences and knowledge considered essential for promoting economic growth. With the approach of the 21st century, technology must become the driving force in the delivery of instruction to today's youth. Since the birth of microcomputers, the education community has recognized that redesigned teacher training would be essential to the successful integration of technology in classroom instruction. Training teachers and administrators is the key to successful implementation of technology in the classroom. A new paradigm termed techno-literacy is offered as a means of fostering the development of the skills in literacy, numeracy, the humanities, and technologies that are necessary to negotiate economic self-sufficiency in the new technological age. It provides new hope for combating the social determinism that now condemns disenfranchised groups, including African Americans, to conditions associated with social and economic inequality. Techno-literacy suggests that educators have a responsibility to make schools accountable for meeting the needs of children, all of whom must be given the opportunity to learn skills needed to function in a highly technological society. (Contains 11 references.) (Author/SWC)

Changing Ages: Techno-Literacy

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ABSTRACT

Education is generally regarded as the institution most responsible for providing "survival skills" needed to empower individuals to function effectively within the socio-economic system of a nation. In American society, these skills are more or defined by the private sector which serves as the major source for employment relied upon by most individuals to sustain a livelihood for themselves and their families. As such, the schooling process, though variously defined, is expected to provide common patterns of experiences and knowledge considered essential for promoting economic growth.

As we approach the 21st century, technology must become the driving force in the delivery of instruction to today's youth. Since the birth of microcomputers, the education community has recognized that redesign of teacher training would be essential to the successful integration of technology in classroom instruction. While much has changed over the years, the need for teacher support and training has not, as the importance of training teachers and administrators is the key to successful implementation of technology in the classroom.

A new paradigm termed techno-literacy is offered as a means of fostering the development of the skills in literacy, numeracy, the humanities and technologies that are necessary to negotiate economic self-sufficiency in the new technological age. It provides new hope for combating the social determinism that now condemns disenfranchised groups, including African Americans, to conditions associated with social and economic inequality. Techno-Literacy suggests we, as educators, have a responsibility to make schools accountable for meeting the needs of children; all of whom must be given the opportunity to learn skills needed to function in a highly technological society.

Overall, this paper discusses the changing historical ages and the concomitant needs for transforming paradigms, policy and pedagogical practice in ways that empower students to survive in and thrive in a society driven by technology.

Education is generally regarded as the institution most responsible for providing "survival skills" needed to empower individuals to function effectively within the socio-economic system of a nation. In American society, these skills are more or less defined by the private sector which serves as the major source for employment relied upon by most individuals to sustain a livelihood for themselves and their families. As such, the schooling process, though variously defined, is expected to provide common patterns of experiences and knowledge considered essential for promoting economic growth.

At one time, the American economy was driven by agriculture and related processes associated with the production of raw materials. As such, schooling and education functioned to prepare individuals for roles and responsibilities associated with productive farming and farm life. The onset of the Industrial Revolution created needs for workers with abilities quite different from those needed to promote agricultural growth and development. Indeed, a new age was ushered in which even brought dramatic changes in family organization patterns associated with the gentleman farmer and the cultural milieu that once glamorized the folk hero. Extended family networks gave way to the nuclear family structure which emerged from urban living which accompanied industrialization. Clearly, farming skills

could no longer prepare most Americans for survival in an economy driven by mass production of man-made goods. Predictably, mass production techniques were applied to agricultural industries in ways that made it possible for fewer people to grow more and better products. Thousands of jobs once believed to represent security and lifelong support, were eliminated as a by product of industrialization.

Survival in the new Industrial Age required a workforce made up of individuals capable of following directions; individuals who responded to the the authority of supervisors; and, individuals who respected the centrality of power and decision-making within an organization. In reality, the tried-n-true uniform processes of production did not require or welcome creative input of workers or the exercise of individual judgement. People were schooled to accept that the value of their labor was more or less determined by the quantity of marketable commodities they could produce. Concomitantly, a school curriculum focused on linear thinking, actually created an appropriate mind set for workers to function in a workplace where individual creativity could actually impede an industry's ability to meet production quotas relied upon to generate acceptable profit margins.

Once again a new "age" is upon us and America must wrestle again with questions about who should be taught what and why. The schooling enterprise which emerged in response to the demands of industrialization, must now be

reconfigured to respond to an economy driven by technology and rapid knowledge production. While no one has a crystal ball to predict the future, it seems apparent that industrial skills, knowledge and attitudes will not prepare individuals for a technological world. Unlike their industrial predecessors, the world of work for today's student is largely unknown. Recognizing the role of the private sector in shaping educational goals, the Committee for Economic Development (1984) conducted a survey of some 438 large companies, including a random sample of Fortune 500 companies; 6,000 small companies randomly sampled from the membership of the National Federation of Independent businesses; and 500 post secondary institutions. This Survey of Employer Needs identified sixty attributes that were grouped into clusters which represented broad skills, attitudes and behaviors.

It appears that skills not deemed critical for success in the industrial workplace now emerge as basic skills for the technological work place of the future. More specifically, skills and attributes identified by employers as being essential for success included: ***striving to do work well, learning how to learn, priority setting, numeric skills, problem solving and decision-making, and communicating.*** When asked to identify skills most likely to lead to advancement, large and small companies alike ranked "learning how to learn" as most important. The same respondents consistently stated that these attributes were particularly difficult to find in young applicants; a concern that has been echoed in numerous

reports on the condition of education in the United States. For example, the most recent report from the National Assessment of Educational Progress (NAEP) found that fewer than one in every five students in grades four, eight and 12 demonstrated competency in mathematics; fewer than one half, i.e. 41%, of the nations 17 year olds can summarize, understand and explain the kind of material found in encyclopedias and literary works. Less than half of the high school seniors demonstrated detailed knowledge of scientific information; and, most are unable to design science experiments or apply scientific knowledge to interpret graphs and tables. Only one forth said they had ever conducted science experiments. When compared to their peers globally, American children ranked 12th among 14 nations in science achievement; and, 13th in mathematics (CDF: p.41-43).

If students are graduating from high school without the skills and knowledge needed to survive in the past it is doubtful that they will survive in the future unless there are drastic interventions into the ways schools operate and in the ways institutions of higher learning prepare education professionals. Reflecting on what people have described as the decline of the public schools, Urabanski observed:

> The problem with today's schools is not that they are no longer as good as they once were. The problem with today's schools is that they are precisely what they always were, while the world around them has changed significantly. Schools must be restructured as centers of inquiry and reflection, not of unexamined traditions. (1988, p.48)

These "unexamined traditions" include fixed content and methodologies presumed to be reflective of best practice. As a result, today's students and teachers continue to perform the same functions, pretty much in the same ways as their

industrial age predecessors. Needless to say, these institutionalized practices continue to produce mentalities more suited for an industrial past than for a technological present and future.

As we approach the 21st century, technology must become the driving force in the delivery of instruction to today's youth. Since the birth of microcomputers, the education community has recognized that redesign of teacher training is essential to the successful integration of technology in classroom instruction. While much has changed over the years, the need for teacher support and training has not as these components remain as the key to successful implementation of technology in the classroom.

In schools across the nation, teachers are still using calculators to average students' daily test grades, and they continue to create lesson plans and homework assignments for students using freehand. With today's technological innovations, teachers should have skills that will enable them to use new innovations such as multimedia computers, digital cameras, scanners, in focus video projectors, in focus LCD panels, CD-recorders, video conferencing systems, and numerous software packages; i.e. Hyper studio, PowerPoint, Word Perfect, Netscape, and Microsoft works, to name a few. Many educators fear making massive investments in technological training. Their prior experiences with educational reform have lead them to believe that the "new" revolution in computer use will pass in a few years like the so many other "new" revolutions in the past. As Decker Walker wrote:

> It is impossible to predict how long computers-in-education will hold the spotlight of public and professional attention. Five years would be an excellent run; 10 years would be the best since progressive education. What concerns me, however, is not the length of the run but what will remain in the schools when the boom has run its course and a new act has captured the spotlight.

> When that happens, the fate of computers-in-education will depend on the instructional uses to which teachers and students can put their computers (Walker, 1983, p. 244).

Still others fear that the emphasis on technology may overshadow important efforts to develop basics in math, reading, communication skills, and science. In reality, technology and the new demands of the technological age should lead educators to redefine these cherished basics and the ways in which they are taught. A considerable body of research has already revealed that computer technology can enhance the learning skills of at-risk students by developing critical thinking and problem-solving skills, as well as, encouraging collaborative learning. Further, systems can be implemented to facilitate interaction among parents, teachers and students; an outcome already known to improve school performance (Poirot and Canales, 1993; Norris, 1994; Poirot and Robinson, 1994). Nevertheless, the collective fears expressed by too many educators may partially explain an observation made by Gwen Solomon of the US Department of Education: "technology is everywhere but in the schools."

The reluctance of teachers to fully commit themselves to becoming technologically literate must be addressed. For the public schools, teacher involvement is the key aspect for successful technology infusion process. After all, it is the teacher who develops and implements the actual lesson plans for classroom instruction. As such, the advice of Abrams and Many (1997) seems particularly relevant:

> Teachers who have not yet decided to adopt technology personally should continue to be exposed to the possibilities, gently encouraged, and offered support; but, their participation cannot be forced. More

will result from supporting the willing than from cajoling the reluctant. To try to interest reluctant colleagues, inquire as to the areas of their teaching that cause them the most difficulty. Explore the potential for technological intervention. If there is an acknowledged problem, that teacher may be more willing to consider a new approach. If not, try again next year. (p.377)

On a broader scale, successful integration of technology in the delivery systems of public schools will require support from the district office in a number of areas. These areas include technology coordination, planning, integration, teacher involvement, staff development, hardware configuration, facilities and funding for successful implementation of technology infusion (Lockard, Abrams & Many, 1997). Successful coordination of technology literacy programs in schools requires effective leadership to provide training seminars for classroom teachers and administrators. Teachers will also need access to resource persons in the district. Even with training needs and administrative support, teachers do not have the time to create individualized tools or make new technologies possible. Teachers may possess general ideas regarding these areas, but a specialist can help the teachers put their ideas into practice, either by creating software applications or by customizing existing technologies. Infusing technology in a school curriculum requires a carefully developed plan that includes a long-term view involving factors such a system-wide applications and major involvement of teachers/administrators (Lockard, Abrams & Many, 1997). One can not overlook the importance of articulation across grade levels because each teacher needs to know what students have previously learned to effectively plan for his/her own grade level. Finally, on-going staff development, appropriate hardware/software, appropriately

equipped facilities, and adequate funding are all needed in in any plan for successful technology infusion in the schools.

Efforts just described, are needed to fully address the magnitude of the literacy dilemma which poses major threats for this nation's economic competitiveness, democratic traditions, and even the national defense. As eluded to earlier in this discourse, communities and schools are failing to produce a fully literate population. In many large urban districts, for example, more than half the students drop out before completing high school. Although some later finish their schooling, many of these individuals fail to acquire the marginal level of competence in basic academic skills and other desirable attributes identified by the private sector as essential for success.

To confront this issue of literacy failure and to provide knowledge, skills and experiences to meet the demands of the technological age, government leaders, educators, business and political leaders must restructure or generate new theories and goals for education and schooling. Philosophies and pedagogical paradigms must be refashioned to better address the needs of the learner. Thus, literacy programs must be both intensive and extensive to accomplish the task of meshing education, technology and culture.

In recent times, two major bodies of theory have been advanced to explain literacy and its continuing role in this society. Both bear significantly on the students' cultures, experiences, needs and knowledge bases. One contends that literacy is a continuous ever-changing activity, transformed by critical life events which include life-span transitions, defined and shaped by cultural and community beliefs about the nature of education and the expected rewards of learning. In this sense, literacy becomes a functional activity. While people continue to value books, reading and learning, they are also confronted with the reality of ensuring a livelihood (Gadsden,

1995). Another body of theory maintains that literacy is a set of pedagogical principles aimed at empowering students to create and reflect on their creations and the impact of such creations on their communities and families (Lee, 1995). Drawing on both schools of thought can provide great insight for systematizing new understandings, beliefs and practices related to a new paradigm referred to here as ***techno-literacy***.

Broadly defined, techno-literacy is a means of fostering the development of the skills in literacy, numeracy, the humanities and technologies that are necessary to negotiate economic self-sufficiency in the new technological age. It provides new hope for combating the social determinism that now condemns the disenfranchised groups including African Americans, to social and economic inequality. Techno-literacy suggests educators have a responsibility to make schools accountable for meeting the needs of children; all of whom must be given the opportunity to learn skills needed to function in a highly technological society. The following are suggested as priories and guiding principles associated with developing a techno-literate society:

1. Schools must nurture each student's capacity to meet the obligations of personal, social and intellectual growth.

2. Education must be made more inclusive by involving more of its constituency for more of its allotted time in educational activities that that utilize state of the art technologies to teach students what they did not previously know but could benefit from knowing; including vicarious experiences made possible by using the INTERNET.

3. Learning situations should be made more powerful by combining formal studies with appropriate concrete experiences and challenging productive activities that incorporate new technologies.

4.Students should be provided, as a part of routine instruction, experiences in choosing, devising, implementing, and managing their own learning to enable them to become self-sufficient, life-long learners.

Overall, students trained to experience and direct their own sensory, emotional, and mental functions will be better able to achieve self-understanding and skills in self-directed learning which undergird techno-literacy.

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