Technology and Education:
Stumbling from Past to Present

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In the American public schools, a *de facto* policy termed "social promotion" has been operant for decades. Students with poor academic performance have been advanced so that they can stay with their peers rather than being held back a grade or provided with sufficient help to meet standards for academic promotion. The practice has become so prevalent that, in many school systems, students are graduating from high school deficient in basic reading, writing and math skills.

At the opposite end of the spectrum, American high schools have been creating advanced placement courses, programs like "college in the schools" and "post secondary options" where high school students can take university courses through agreements between the high schools and local colleges and universities. These programs recognize that many students, not necessarily those classified as talented, have the maturity and intellectual capabilities to function at levels beyond the standard high school curriculum.

What society seems to be acknowledging is that students, as individuals, have varied needs and capabilities that are not being recognized or fully met by the current system. Some of the rising costs faced by the system are due to an attempt to meet all the needs of a varied population within the confines of a static system, one that was designed for a world that was substantively different than what is present today.

In thinking about the current situation one cannot but reflect on the past. Alexander the Great was conquering the known world at the age of sixteen. Some youth pass rituals admitting them to adult membership in societies at the age of 12. And in some parts of the world, it has become a necessity for children well below their preteens to seek gainful employment to help support families.

While some of these practices seem abhorrent, and remind us of the world of Dickens, we nevertheless start to recognize that biological age is not always the principle determinant of a person's ability to learn or to function within a society. Additionally, as far as education is considered, we have yet to determine the full capabilities of persons to learn at very early ages, whether in music, art or information technologies. In fact, there seems to be some indication that children and youth are often very capable of adult-challenging competencies in information and communication technologies (ITC).

The advent of modern ICT, primarily the microcomputer and the Internet, has not only expanded opportunities for learning but also has made us aware of the potentials that are afforded individuals of all ages. Students in kindergarten utilize the Internet and even gain some mastery over complex programs such as geographical information systems and Adobe PhotoShop. E-mail brings youth together across international boundaries, and the Web supports their curiosity of history, diverse presents, and alternative futures.

Manufacturers of personal digital assistants, PDAs, are stuffing more power into smaller spaces, and are intent on selling them to students in the K-12 systems and universities. These devices, with their plethora of attachments, from laboratory probes to digital cameras and wireless connectivity, are becoming standard tools along with rulers, pencils and textbooks. More than likely, they can potentially replace all three.

In the beginning, students learned their multiplication tables and sums. Pencil and paper and the slide rule were eventually supplanted by mechanical and then electronic calculators. Simple, credit card-sized, hand held calculators were rapidly succeeded by multifunction graphing units in the K-12 curriculum. Students still learn their "sums" but now have more powerful tools to explore and create the emerging world. The same expansion of opportunity appears in all disciplines as students have global access to knowledge and knowledgeable persons.

Technology needs to be seen as a small signal riding on the larger waves of social and cultural changes. At times they are in phase, and the positive wave is amplified; at other times the interaction is more

destructive. Instead of providing a reason for leapfrogging toward solutions, many problems seen in the K-12 system are currently amplified by emerging technologies.

Unequal access to technology has given rise to the term, "digital divide," code for concern that those who have access to such technology will have significant advantage over those who do not. However, the digital revolution increasingly divides students, not by the haves and the have-nots, but by those who are best able to master digital opportunities vs. those who cannot or will not.

The recognition of "multiple intelligences" does not change the situation or the recognition that individuals display unique and uneven capabilities from physical dexterity to mental acuity, or that these capabilities develop at different rates. Kurt Vonnegut put a twist on this reality in his short story, *Harrison Bergeron*, describing a world in which technology was being used to suppress the development of talent and skills, so that the society would gain performance equity.

At a time when technology is directly and indirectly addressing these differences, energy is being expended to maintain the obsolete educational production line, including testing and certifying. All of this is happening at a time when children are going through puberty at an earlier age, have access to better nutrition and health care and, particularly, are exposed to a vast knowledge base residing outside the walls of formal education systems.

In the United States lamentations over the exposure of elementary school children to large amounts of materials once deemed age-inappropriate continue apace, despite the reality that media sophistication of students is growing at a faster pace, turning classroom experiences into the equivalent of folk medicine in an age of magnetic resonance imagery and heart implants. Implications for the post secondary systems also loom large, particularly for the production courses that feed colleges and universities. If students can demonstrate competencies at an earlier age and a proclivity for self-directed learning through access to technologies, the need to "standardize" the college experience in the first two years becomes less important, and students must be met where their needs are at

the time of matriculation. This adaptation will prove expense, even while it promotes the emergence of knowledge production and innovation among youth.

Overall, emerging technologies support the potential for students to escape the lock-step of existing age-graded education, bringing about new potentials for age-irrelevant and age-mixed learning among peers, collaborators, mentors and coaches.