

## PILOTS OF THE TWENTY-FIRST CENTURY

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EIGHT-YEAR-OLD MELISSA GROSSENKOPF was engrossed in the Trojan War. All around her were soldiers dressed in exotic armor, on a chaotic battlefield. She heard a sound from behind and turned quickly to "feel" a spear graze her ear.

Spying the citadel of Troy, Melissa pointed with her finger and sailed like a bird to its tower. As a baritone voice read from Homer's *Iliad*, she saw life as it was in 1200 BCE: the finely crafted stone walls, the houses crowded together, the storage jars beneath the floor boards. Upon reaching to examine a shiny pot, she was transported to a copper smelting operation, and educated on the fabrication of bronze and its influence on the progress of humanity. Through the eyes of Heinrich Schliemann, she learned archeology and how lost histories are unearthed.

Satisfied, she returned to Troy to enter the beguiling Trojan Horse, to see the city finally sacked and burned, its women carried away. Through Odysseus she learned about duty and patience, through Agamemnon, strategy and valor.

Melissa peeled off her virtual-reality headgear and ran outside to play soccer.

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Joel Altman, age twelve, set up the tripod with care. Every detail had been planned out the day before; last-minute changes were made through a conference call after they'd all gone home.

Joel learned that making a documentary film was not easy. His team of classmates roamed databases all over the world looking for tidbits of information, like in a galactic Easter-egg hunt. From a class in Nome, Alaska, they gathered data on migratory birds. An English class in Germany got to review and critique the screenplay. Another class would do the editing and titles. Yet another would produce a theme song with their school orchestra and choir.

The project taught Joel teamwork and cooperation, communication, schedules, duty, commitment. Proud to be part of a dynamic global team, he couldn't wait to get the film into distribution and show it on the new Video Internet to his e-mail pen pals in Tokyo and Helsinki.

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The most fundamental, and perhaps most critically important change in the twenty-first century will be in our schools. Our global citizens will be divided into two worldwide camps: those who can soar in the Fourth Dimension and those still enmeshed in the Second and Third. With the advance of technology, computers, robotics, and artificial intelligence, those who have relied on routine tasks to make a living will be displaced by low-cost mechanization, or held hostage to wages forever depressed. Unskilled people in Bangladesh or inner-city Chicago will share the same lot.

The other group will have made the leap into the new millennium in highly competitive jobs. Those who know how to combine diverse building blocks of knowledge and resources will be in great demand and will receive high salaries and royalties. The global market will leverage superior skills; those with average talent will make a living, but will never become rich.

Here is the challenge for government in the twenty-first century. If

a country is a *physical place* defined by the people who live in it, then its standard of living is set by the collective income of its people. Everything else—corporations, banks, stock exchanges—exist only in the Fourth Dimension, and have little to do with notions of country (except for the people working in them).

In such a world, if a government can have only one function, *education* should be the one. Nothing else a government provides—roads, tax laws, regulations, defense, police—comes even close in importance. If education is in place, helping people earn a high standard of living and compete in the global marketplace will follow naturally. Without education, in time, the economy collapses, tax revenues plummet, ethics and morality turn to chaos, drugs and violence rule, technology and defense deteriorate, democracy degrades, the infrastructure rots—all is for naught.

Our schools are frighteningly ill-equipped for the challenges ahead. Except for the overhead projector and colored chalk, they are identical to medieval ones. Thirty or so desks are facing an overwhelmed teacher lecturing about this or that, while students look out the window. Then comes the "test," the bell rings, and off they go to the next lecture.

The school system of the past was well-suited to the Industrial Age just ended. Our current schools mimic the bureaucratic, hierarchical factory system, with everyone in one place from the beginning to the end of the shift, at which point students can go home. Too often, the instructor spills forth doctrines not to be questioned, and the students blindly carry out instructions. For some, this assembly line is too easy, leading to boredom and unmet potential. For others, the line is too hard, leading to humiliation and rejection. Either way, society loses for not marshaling all its human resources.

## SCHOOLROOMS WITHOUT WALLS

THE COUNTRIES THAT THRIVE in the twenty-first century will be those adapting their educational systems to the Placeless Society.

People will need not only to solve problems but also to define the problems to be solved. They will be self-motivated, adapt easily to teamwork, combine knowledge from multiple disciplines, and be conversant with electronic media as a source and medium of knowledge.

But how can this be translated in our schools?

To adapt to the Fourth Dimension, schools will need to use its very tools: interactive multimedia systems and computer technology, combined with heightened sensory stimulation (3-D sound and wrap-around vision). Unlike books, in which knowledge is presented linearly page after page, the new systems will allow knowledge to be freely “navigated” by the student. Such systems can be distributed to all students—in the suburbs, in the inner cities, in rural areas—and provide an equal access to knowledge. They would incorporate the views of the leading specialists in the field under study and the best pedagogues. Students would progress at their own pace.

Education redesigned in this way mimics reality: the senses are simultaneously used, knowledge can be “touched” and “felt,” and the student is free to pause and explore. Especially for children, multimedia education can be infinitely more interesting than the printed book; learning can be made fun without compromising educational integrity. All the while, the student searches out new tools and resources in diverse electronic databases; networks with other students by E-mail, telephone, or videoconferencing; and masters all the skills needed in the economy of the future.

Knowledge becomes interdisciplinary. Even something as seemingly frivolous as organizing a go-cart race can become an anchor tying together profound thought on research in a variety of areas: students could study Newtonian physics, examine common hand tools, or perhaps program robotic machine tools. Then they could research historic competitions, write rules of play employing principals of ethics, design a system of governance and judging, calculate costs, and maybe even translate their results into other languages. In the twenty-first century, the most sought-after employees will be experts at integrating multiple disciplines.

The role of libraries will also change. As our body of knowledge

keeps expanding, libraries based on books will be displaced by electronic media (in France the traditional *bibliothèque* has given way to the *médiathèque*). Electronic dictionaries, for example, offer faster access to data and rapid cross-referencing. Electronic encyclopedias already outsell printed versions. In the electronic format, magazine articles and books are instantly scanned and sorted. New graphic displays will be as clear, readable, and portable as a book. The Millennium Generation growing up with these media will—by the time they are adults—view cellulose books more as dust-collecting relics than sources of knowledge or enlightenment. It is not that the *information* in the books will be displaced, but the *medium* of conveying that information will radically shift.

Perhaps even more important, the students themselves will become a database. By linking terminals electronically, students can exchange ideas with peers around the world. Exploring hobbies together and working on common projects develops vital give-and-take communication skills and an empathy for other cultures. The universe becomes a single classroom without walls.

In the midst of these changes, the teacher’s traditional role will be redefined. A new breed of “celebrity instructors” will evolve whose skills are reproduced a million times through electronic media. Behind the scenes, an industry of programmers, multimedia specialists, and educators will produce interactive scripts designed to stimulate and develop all minds to the maximum of their potentials.

Classroom teachers will still exist, since even in the Placeless Society there is no substitute for the human touch. But they will act more as facilitators, making sure the student is working on the right material, and that progress is being made. They will challenge, guide, and bring students to their full potential as human beings, as individuals.

In the twenty-first century, the school diploma will disappear. Employers will be more interested in what a student knows *right now*, than what he *once* knew. Because of the advancement of knowledge, learning will become not a one-time event like a vaccination, but rather an ongoing process for life. We will find learning systems in factories and companies, even small ones.

Universities will not resemble today's institution. They will continue to educate the youth, but they will also offer lifelong education to individuals of all ages. And with multimedia learning systems, it makes no sense for Nobel laureate professors to deliver the same lecture each semester to 300 or 1,000 students. Better to record good lectures once for wide distribution and allow professors to spend time in small groups on individual concerns.

Universities will refit their sprawling campuses. They will partition lecture halls into smaller meeting rooms fitted with videoconferencing terminals, E-mail systems, and database access. Basic laboratory work will be simulated electronically, allowing students to do chemical experiments, design aircraft wings, or dissect bodies, without the cost of expensive laboratories. The laboratories will then be freed up for truly experimental, cutting-edge work.

With these changes, there will be more learning done at less cost, because once the basic infrastructure is in place, expensive resources can be shared across universities, instruction can be semiautomated, and the cost of adding an additional student with a terminal at home is near zero.

## WHAT DO I DO WITH ALEX?

PARENTS OF THE Millennium Generation are concerned about their children's standing as we collide with the future.

For many, the first step toward quality education will be to control television at home by selecting programming and limiting viewing. They will also train their children in the use of home computers, which will be equipped with software offering the appropriate balance between entertainment and education. Systems are getting more sophisticated every year as glitzy programmers are being nudged aside by serious educators.

More parents are using the global computer networks, such as the Internet and Prodigy, to steer their youngsters to the appropriate forums or databases, harnessing the power of the network for their

schoolwork and hobbies. They encourage the use of E-mail forums where kids can exchange ideas with their peers, whether they are in Asia, Europe, North America, or elsewhere.

Most importantly, parents will recognize that the new electronic gadgets are only tools for the future. There is no substitute for spending time with one's children, and sharing ideas and problems. The family then becomes a grounding point, a source of inspiration, interweaving the lessons at school with those at home to make a seamless whole.

Finally, we must provide high moral and ethical standards. In a polycentric culture, the details will remain personal, but the universal values so important for civil discourse will hold true. In the Placeless Society, each child of the Millennium Generation will span the globe, and your reputation and skills will be the key to whether you are invited into the game.

As we grip the handrails and accelerate into the third millennium, we see unfamiliar structures ahead, and our peripheral vision begins to blur. We need fresh eyes to guide us, and had damn well better prepare our youth.