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by Don Tapscott

REINVENTING THE UNIVERSITY

L'informatique va transformer radicalement les rôles respectifs du professeur et des étudiants dans le processus d'apprentissage. Le nouveau modèle est interactif, centré sur l'étudiant et personnalisé. Son application suppose l'abandon de la pédagogie conventionnelle en faveur de la création de partenariats et de « cultures » axés sur l'apprentissage. Les universités qui ne s'adaptent pas à ce nouveau modèle sont appelées à disparaître.

Earlier this year, on CBC national radio, I debated the Dean of Education of one of Canada's most prestigious universities who defended the position that "computers have no role in the schools."

I argued that the evidence is clear that while technology is not the solution to what ails the education system, it is a critical element. The computer is changing from a tool for automation to a new communications medium. Effectively integrated into the education system, it can permit us to change the role of the teacher and student in the learning process and, in so doing, transform education to make it more effective and relevant in a knowledge economy.

There is, of course, some irony in this debate. The university educators and the universities themselves risk being made irrelevant by the same forces that are causing the schools to change.

"Thirty years from now big university campuses will be relics." Peter Drucker shocked more than a few university executives and educators in the March 10, 1997 issue of *Forbes* magazine when he described the end of the university as we know it. ("This) is as large a change as when we first got the printed book. It took more than 200 years for the printed book to create the modern school. It won't nearly take that long for the big change

...Already we are beginning to deliver more lectures and classes off campus *via* satellite or two-way video at a fraction of the cost. ...Today's buildings are hopelessly unsuited and totally unneeded."[1]

I personally hope Mr. Drucker is wrong, as I believe there is a role for a campus experience in a young person's life. However, the evidence is mounting. If the universities do not transform themselves and become more relevant and effective for the 21st century, post-secondary learning will be delivered by something other than a university. The same is true for other historical roles of the university including research, scholarship and knowledge creation, retention and dissemination.

For years, educators have discussed how the demands of a new economy and the opportunities provided by new technologies are pressuring the university to change. But possibly the most powerful force for change has gone unnoticed — the students themselves.

There is a new generation of youngsters entering post-secondary education. The baby boom has an echo and it is even louder than the original — eight million strong in Canada alone — our largest generation ever. The youngest are in their diapers and the oldest are 20 — having entered colleges and universities in 1997. This is creating a large population wave that will demand much of the institutions of learning. Between 1996 and 2006 public high school enrollment is expected to increase by 15 percent; the number of high school graduates will increase 17 percent; college enrollment is projected to rise by 14 percent.

But it is not their demographic muscle alone that makes them an unprecedented force to change learning. Rather they are the first generation to grow up in the digital age. Computers and networks are transforming business, entertainment, government and every institution around them. These kids are bathed in bits. Unlike their boomer parents, they have no fear of the new technology because it is not technology to them. This is creating a Generation Lap — they are lapping their parents on the info track. For the first time ever children are an authority on a central innovation facing society. Call them the Net Generation.

Many of these children do not yet have access to the Net, but most have some degree of fluency with the digital media. Nearly all of them have experience with video games. The vast majority of adolescents report they know how to use a computer and almost two thirds say they have used the Net. The Net is coming into households as fast as television did in the 1950s. According to Teenage Research Unlimited (TRU), the percentage of teens who say that it is "in" to be on-line has jumped from 50 percent in 1994 to 74 percent in 1996 and to 88 percent in 1997. It is now on par with dating and partying!

For most N-Geners, time on computers and the Net is taken away from time watching television. When they are on-line they are reading, analysing, authenticating, contextualizing, sorting junk from useful, composing their thoughts, criticizing. My research indicates this is creating a generation of smart, media savvy, innovating, collaborative youngsters who learn though interacting. This generation is exceptionally curious, self-reliant, contrarian, focussed, able to adapt, high in self-esteem and globally orientated. These attributes combined with N-Geners' ease with digital tools spell trouble for the traditional professor and college.

This shift from broadcast to interactive is the cornerstone of the N-Generation. They want to be users — not just viewers or listeners.

If college executives frozen 300 years ago came alive today and looked at the professions — a physician in an operating theater, a pilot in a jumbo cockpit, an engineer designing an automobile in cyberspace — they would surely marvel at how technologies had transformed work. But if they walked into a university lecture hall, they would no doubt be comforted that some things have not changed.

The cornerstone of broadcast learning is the lecture-based college course. The professor is assumed to be the source of knowledge and the students vassals. Professors transmit information to those students who are "tuned in," who receive information into short-term memory and through notes, practice and repetition build deeper cognitive structures required for effective recall and synthesis. This mode is enhanced in some disciplines through essays, labs and even seminar discussions. Of course many professors are working hard to move beyond this model, but it remains dominant overall.

Imagine the impact on this model of millions of fresh thinking, energized youth — accustomed to learning by interacting and armed with the most powerful learned tools in history — hitting the university. This wave has just begun. Their size combined with their digital mastery and interest in a new approach to learning is creating a new force shifting post-secondary education to a more interactive and networked model.

In this context the pressures to transform the university make more sense.

Lifelong learning for a knowledge economy requires a new view of the university

For the young boomers looking forward to the world of work, life was divided into the period when you learned and the period when you did. You went to school and maybe university and learned a competency — trade or profession — and for the rest of your life your challenge was simply to "keep up" with developments in your field. Today many boomers can expect to reinvent their knowledge base constantly. Learning has become a continuous, lifelong process. The N-Gen is entering a world of lifelong learning from day one, and unlike the schools of the boomers, today's educational system can anticipate this.

Richard Soderberg of the National Technological University puts it well: "People mistakenly think that once they've graduated from university they are good for the next decade — when they're really good for the

next ten seconds." This is a reflection of the knowledge explosion in which the knowledge base of humanity is now doubling annually.

As a result, the idea of a university as a place of learning for a certain period of one's life is inadequate. This is reflected in the shift to part-time education. Many students need to work to fund university attendance. Many more in the workforce are registering in university courses as part of the trend in lifelong learning. According to the National Center for Educational Statistics, part-time students are now "the new majority." Nearly half of college and university students attend on a part-time basis — 6.6 million in 1993 up from 3 million in 1970. Over the same time period the number of full-time students grew by only 38 percent. Seventy six million adults (40 percent of the population) participated in one or more adult education activities during 1994. Those with more education are more likely to take additional courses. College graduates are nearly twice as likely to sign up for adult education courses compared to those who have not attended college.[2]

Carol Twigg, of the university consortium Educom, notes how the knowledge explosion has an impact on the curriculum in post-secondary education. "To use your broadcast metaphor, the professor says 'Here is your curriculum, I will broadcast it at you, you will somehow absorb it and then move on and be prepared for life.' This is literally a joke." She says we can no longer prepare students to live in a world of rapid change by "shoveling" knowledge at them. "No one has yet come to grips with this whole concept of learning how to learn. No one is doing that in a full curricular sense."

Private companies are taking responsibility for a growing proportion of post-secondary learning

For the youngster entering the workforce, work equals learning equals work. Because the new economy is knowledge-based and learning is part of day-to-day economic activity and life, the firm becomes a school in order to compete.

Evidence for this is articulated in the little known but very stimulating book *The Monster Under the Bed* by Stan Davis and Jim Botkin. The book argues that education, once the province of the church, then the government, is increasingly falling to business since it is business that ends up having to train knowledge workers. Say Davis and Botkin, "With the move from an agrarian to an industrial economy, the small rural schoolhouse was supplanted by the big brick urban schoolhouse. Four decades ago we began to move to another economy, but we have yet to develop a new educational paradigm, let alone create the 'schoolhouse' of the future, which may be neither school nor house."[3]

Motorola U now has formal accreditation for courses it provides to employees. Many larger companies such as Xerox, Andersen Worldwide and IBM have huge university-like campuses. At Hamburger U students do not learn to flip burgers, they learn how to manage a restaurant, deal with customers, handle employee problems, do accounting and perform other day-to-day challenges.

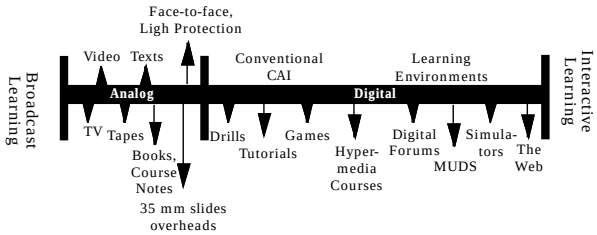
Davis and Botkin present data to show that private course days growth in just one year is now greater than the enrollment growth in all the new conventional college campuses built in the US between 1960 and 1990. "Employee education is not growing 100 percent faster than academia, but 100 times — or 10,000 percent faster,"[4] say Davis and Botkin.

And for Carol Twigg this is just the beginning. "Once the business community takes the step to integrate themselves with education, there will be an explosion in learning products. They're all still trying to sell to the higher education buyers instead of the end consumer. Once they get that piece, then I think we will see a real change."

The new media enables interactive learning, anywhere

The concept of the university as a place is being challenged by networks and a new generation that wants to network to learn.

In the mid 1970s I was doing graduate work in educational psychology at the University of Alberta and found myself in one of the first classes to take an online course. We learned "multivariant" analysis using a CAI (Computer Aided Instruction) package called Plato. This course was set up by a visionary in computer-mediated education named Dr. Steve Hunka. We sat down in front of a computer terminal that was connected to a computer-controlled slide display, all connected to a mini computer (this was before PCs). The course was fabulous. It took me step-by-step through the material but unlike traditional courses, I could stop and review something I did not understand or fast forward through material I felt I grasped. I could test myself at various points and the system kept a record for me of how I was doing. Eventually, when I was ready, the system gave me a formal test. The final exam was also conducted on the computer. There was more face-to- face interaction as Dr. Hunka was freed up from lecturing to spend time with us one on one.



Source: *Growing Up Digital: The Rise of the Net Generation*[5]

However, because of the cost of such systems, the effort required to create the "courseware," the considerable expertise required to implement them and the huge cultural change in the teaching model, these CAI systems did not really take off. Today the situation has

changed dramatically. There are a wide range of tools and the Net itself, which creates a new paradigm in the delivery of learning.

The continuum in learning technologies from broadcast to interactive learning are illustrated above.

A good example of interactive learning was set up by Ron Owston, professor of education at York University in Toronto. He designed a hypermedia course for prospective teachers which has two dozen modules.[6] Each module has a topic description and suggested readings with corresponding hot links to the original source. There are also electronic seminars available to each student where the professor participates on more of a peer basis than as the authority who owns all knowledge. Outside experts and facilitators are invited (I was one). There are various assignments, which the students submit on-line and also research tools to help them conduct in-depth investigations of topics and data. The environment also contains information regarding the process of the course, such as schedules, marking systems, *etc.*

The new media can help create a culture for learning,[7] where the learner enjoys enhanced interactivity and connections with others. Rather than some professor regurgitating facts and theories to students, they discuss and learn from each other with the teacher as a participant. They construct narratives that make sense out of their own experiences. Various digital forums, enable brainstorming, debate, the influencing of each other — in other words, social learning.

And the results of the shift to interactive learning? The research evidence is very strong and growing:

Compared with students enrolled in conventionally taught courses, students who use well-crafted computer-mediated instruction... generally achieve higher scores on summary examinations, learn their lessons in less time, like their classes more, and develop more positive attitudes towards the subject matter they're learning. These results hold for a broad range of students stretching from elementary to college students, studying across a broad range of disciplines, from mathematics to the social sciences to the humanities.[8]

The New University — anyplace, anytime, interactive learning

The threat to the engineering school at Queens is not MIT. Rather, consider Motorola U and the hundreds of other private companies that will soon offer inexpensive, fully accredited, great quality courses on the Net — self-paced learning available anyplace, anytime. The role of a university as the repository of knowledge is changing as all firms must develop elaborate knowledge management programs so that they can be effective by knowing what they know and what is to be known. The role of the university Librarian is not so much to manage storage of information but rather that of consultant and knowledge navigator — roles that exist in the private sector. Even the university as a centre of specialized research is questionable, unless effective partnerships with private firms can be forged.

While progress is slow, there are some powerful examples of faculty and colleges transforming themselves. A new model is emerging where the university becomes a resource to individuals and firms for lifelong learning — independent of time and place. The campus becomes a node on a network where the benefits of face to face interaction can still be achieved.

The interactive model is based on discovery rather than instruction. Seymour Papert says, "The scandal of education is that every time you teach something, you (deny) the pleasure and benefit of discovery."[9]

At the risk of sounding equally heretical, there is a shift away from pedagogy — the art, science and profession of teaching — to the creation of learning partnerships and learning cultures. The colleges can become a place to learn, rather than a place to teach. According to John Seely Brown of Xerox Palo Alto Center, "Pedagogy had to do with optimizing the transmission of the information. What we now find is that kids don't want optimized, pre-digested information. They want to learn by doing — where they synthesize their own understanding — usually based on trying things out." Learning becomes experiential.

This is not to say that learning environments or even curricula should not be designed. They can, however, be designed in partnership with the learners or by the learners themselves.

The new model shifts from teacher-centred to learner-centred education, concentrating the learning experience on the individual rather than on the transmitter. In the past, education has tended to focus on the teacher, not the student. This is especially true in post-secondary education where the specific interests and background of the teacher strongly influences the content. Much of the activity in the classroom involves the teacher speaking and the student listening. Learner-centred education begins with an evaluation of the abilities, learning style, social context and other important factors of the student that affect learning. It would extensively use software programs that can structure and tailor the learning experience. It would be more active, with students discussing, debating, researching and collaborating on projects.

The new university emphasizes learning how to navigate and how to learn and think, rather than absorbing materials, and thus prepares youngsters for lifelong learning. This includes learning how to synthesize, not just analyse.

The new model is also highly customized. Mass education was a product of the industrial economy. It came along with mass production, mass marketing and the mass media. Businesses everywhere are shifting to what I described in *The Digital Economy* as a molecular or individualized approach.

The digital media enables students to be treated as individuals — to have highly customized learning expe-

riences based on their background, individual talents, age level, cognitive style, interpersonal preferences and so-on.

As Papert puts it: "What I see as the real contribution of digital media to education is a flexibility that could allow every individual to discover their own personal paths to learning. This will make it possible for the dream of every progressive educator to come true: In the learning environment of the future, every learner will be 'special.'"[10]

The new university is a global institution reaching out to alumni and new students around the world to deliver network-based learning.

Peter Drucker's prediction need not come true for institutions that find within themselves leadership and the capacity to learn as an organization about what can be. Probably one of the most important things educators can do is listen to the students.

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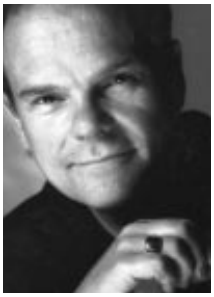

Don Tapscott is Chairman of the Alliance for Converging Technologies — a think tank conducting a multi-million dollar investigation into the impact of the digital media on business and the economy. He is the author of six books including the best sellers *Paradigm Shift* and also *The Digital Economy*. His new book is Growing Up digital: *The Rise of the Net Generation* (McGraw Hill, 1998) discusses the transformation of learning for a knowledge economy. He is also Chair of the Capital Campaign for Trent University.

by Deryn M. Watson

THE REALITY BEHIND THE RHETORIC OF INFORMATION TECHNOLOGY POLICY FOR SCHOOLS

Malgré toute la publicité et tous les investissements consacrés aux technologies de l'information, les recherches indiquent que leur impact sur l'enseignement, au Royaume-Uni et ailleurs, ont été décevants. Le problème tient essentiellement au caractère dichotomique des objectifs. Les TI sont-elles une discipline distincte qui possède sa propre base de connaissances et de compétences, ou sont-elles simplement un outil qui sert principalement à acquérir des connaissances dans d'autres domaines ? Selon l'auteur, l'échec des tentatives en vue d'implanter ces technologies tient à un ensemble de postulats culturels et économiques.

Over the last 20 years there has been a concerted effort to promote the use of Information Technology (IT) in UK schools. Alongside other nations, there have been substantial central government initiatives to put computers into schools; major reports have extolled the virtues of using IT in classrooms. From Computer Assisted Learning (CAL) of the early 1980s, to open learning through the use of telecommunications and the Web in the late 1990s, the rhetoric is the same. Information technology is equated with the modern world, economic success and the future. Schools must