Chapter One

The Challenge of Change

Today, everyone, if they are to have a job, needs the kind of higher order thinking skills that only those in managerial or professional positions formerly needed. We can only achieve this through major structural reform of our education system.
—Jane Gilbert, 2005, p. 67

Meet Samantha, a Twenty-First-Century Student

Samantha is 25 years old, with a one-year-old baby, and lives with her boyfriend, Shaun, who works as a trainer in a fitness center. She works part-time at a local day care center. She has an old Honda Civic, a "smart" mobile phone, and her own laptop computer with broadband Internet access. She regularly uses Twitter, Skype, Google Search, Google Mail, Facebook, Flickr, iTunes, and YouTube, as well as standard PC software such as Word and Excel.

Material in this chapter first appeared in Ehlers, U-D., and Schneckenberg, D. (eds.) (2010) *Changing cultures in higher education: Moving ahead to future learning.* Heidelberg/London/New York: Springer. Reproduced with permission of the publisher.

She is taking the fourth year of a bachelor of commerce degree from her local college, which is a 35- to 45-minute drive from her home. This is her fifth year in the program. She was unable to complete all her courses in her third and fourth years, because her classes often clashed with her day-care hours, and she kept getting behind with her studies. She is taking almost all her classes on campus, but she managed to find one course in her program that was offered online, which she is enjoying.

In her first year, there were around a hundred students in most of her classes, but this year there are about thirty per class. The college prides itself on its high-technology classrooms, with Smartboards, wireless access, clickers, and three screens in most classrooms. Some of her instructors have started to record their lectures, so she can download them, but others refuse to do so, because if they do, they fear students won't come to the classes (and she agrees with them).

Samantha often uses Facebook to discuss her courses with friends who are in the same class, but most of the instructors don't use anything more than e-mail outside class for communication with students, although one of her instructors has organized online discussion forums. On the whole, she likes being on campus, especially meeting the other students, but the lectures are often boring, so she sometimes joins in the class Tweets about the instructors while they are lecturing, which she finds amusing, if distracting.

She worries about the stress her studies are causing in her relationship with Shaun. She is always studying, driving, working, or looking after the baby. She particularly resents the eight hours a week she spends driving to and from the college, which she would rather spend studying. Shaun has a friend who has moved out of state who wants Shaun to join him as a partner in running a fitness center, but this would mean giving up her studies at her local college, and she doesn't want to do that, as she may have problems getting credit for her courses at a college in another state. The thought of having to start her studies all over again fills her with dread. If that happens, she will enroll with either the University of Phoenix Online, or another of the fully online for-profit universities. They seem to understand her needs better than her local college.

This student is unique, but nor is she atypical of today's students, the majority of whom are 24 or older, working at least part-time, and commuting on a regular basis to college. With new course designs and the proper use of technology, we could do much better for students like Samantha.

Creating Higher Education Institutions Fit for the Twenty-First Century

Universities are resilient. The concept of the university has remained largely unchanged for over 800 years. Universities have always had to balance an uneasy tension between cloistered independence and relevance to society at large, but they have successfully thrown off or resisted control by church, princes, state, and commerce to remain on the whole fully autonomous, at least in Western society. In eight centuries, they have undergone massive expansion, the introduction of fundamentally new areas of scholarship, and radical restructuring, while protecting their core mission. As a result, universities appear to be more strongly established today and certainly more numerous than at any other time in history. Yet often when institutions appear to be all-powerful, they can be extremely vulnerable to changes in the external environment.

Indeed, today universities and colleges are facing strong pressures for further change. For cultural and historical reasons change is likely to be slow, at least for most public institutions. Nevertheless, economic development has been and will continue to be strongly linked to the ability of education systems to adapt to the demands of a knowledge-based society. Thus those postsecondary educational institutions that do change appropriately are likely to gain a strong competitive advantage, both for themselves and for the societies in which they operate. In other words, we need strong universities and colleges that are adapted to the needs of the twenty-first century.

Universities: Failing in Technology

Technology is a key factor for bringing about such relevant and necessary change in higher education institutions, but we will

produce evidence that suggests universities and colleges still don't really "get it" as far as technology is concerned. In particular, universities and colleges in general are underexploiting the potential of technology to change the way that teaching and learning could be designed and delivered, so as to increase flexible access to learning, improve quality, and control or reduce costs, all core challenges faced by higher education institutions today.

Although managing technology in a way that leads to the transformation of teaching and learning is the primary focus of this book, any discussion of information and communications technologies must be placed within the overall context of the role and mission of postsecondary educational institutions. We start then by examining the issues and challenges facing universities and colleges today, and suggest that although their core mission and values should remain largely unchanged, radical change is needed in their organization and in particular in the design and delivery of their teaching, if they are to be "fit for purpose" for the twenty-first century.

We will also argue that information and communications technologies have a crucial role to play in such changes, but for technology to be used fully and effectively, major changes are needed in the prevailing culture of the academy and the way in which it is managed. The aim of this book, therefore, is to examine how best to manage information and communications technologies, so that universities and colleges can appropriately address their main challenges and goals, can provide the kind of teaching and learning needed in the twenty-first century, and thus better serve students like Samantha.

Universities and Colleges in an Industrial Society

The organization and structure of the modern university began to form in the mid- to late-nineteenth century. The forces leading to these changes were complex and interrelated. The growth of the nation state and the extension of empire required a large increase in government bureaucrats, who tended to be taught the classics (philosophy, history, Greek, and Latin). The rise of science, and the recognition of its importance for economic development

through the Industrial Revolution, was another factor. Thomas Huxley in Britain and Wilhelm von Humboldt in Germany were two key figures who promoted the growth of science and engineering in the university. Indeed, Huxley had to start his own program for teaching biology at the Royal School of Mines—which later became Imperial College—because neither Oxford nor Cambridge University was willing to teach scientific biology at the time (Desmond, 1997).

Consequently the number of universities and colleges in Europe and North America expanded considerably toward the end of the nineteenth century. The land-grant universities in the United States in particular were developed to support agricultural expansion, and "red brick" universities were opened in the industrial cities of Britain to meet the increasing demand for engineers and scientists for local industries. Despite this expansion, though, entrance to university in many countries was limited largely to a small, elite minority of upper-class or rich middle-class students. As late as 1969, less than 8% of 18-years-olds (children born in 1951) were admitted to university in Britain (Perry, 1976).

As a result, teaching methods in particular were suited to what today would be considered small classes, even at the undergraduate level, with seminar classes of 20 or less and smaller group tutorials of three or four students with a senior research professor for students in their last year of an undergraduate program. This remains today the ideal paradigm of university teaching for many professors and instructors.

In the United States and Canada, the move to a mass system of higher education began earlier, following the Second World War, when returning servicemen were given scholarships to attend university, and for the last half of the twentieth century, access to university and colleges was expanded rapidly. For a mix of social and economic reasons, from the 1960s onwards, governments in Europe also started again to rapidly expand the number of university places, so that by the end of the century, in many Western countries more than half the 19-year-old cohort are now admitted to some form of postsecondary education. The figure for Canada in 2004 was 52% (Statistics Canada, 2009), and currently there are over 18 million students in postsecondary education in the United States (U.S. Census Bureau, 2009).

This represents a massive increase in numbers, and not surprisingly, governments, although spending ever more each year on postsecondary education, have not been able or willing to fund the staffing of universities and colleges at a level that would maintain the low class sizes common when access was limited. Thus in many North American universities, there are first- and second-year undergraduate courses with more than 1,000 students, taught mainly in large lecture classes, often by nontenured instructors or even graduate students. However, at the same time, completion rates (that is, the proportion of students who enter a degree program who go on to complete the degree program within six years) in undergraduate four-year degree programs remain below 60% in the United States for many public universities (Bowen, Chingus, & McPherson, 2009). In other words, universities are failing a significant number of students each year.

The widening of access has resulted in a much more diverse student population. The biggest change is in the number of older and part-time students (including students who are technically classified as full-time, but who are in fact also holding down part-time jobs to pay for tuition and other costs, like Samantha). The mean age of students in North American postsecondary education institutions now stands at 24 years old, but the spread of ages is much wider, with many students taking longer than the minimum time to graduate, or returning to study after graduation for further qualifications. Many are married with young families. For such students, academic study is a relatively small component of an extremely busy lifestyle.

By definition, many of the students who now attend university or college are not in the top 10% of academic achievers, and therefore are likely to need more support and assistance with learning. With the growth of international students, and increased immigration, there are now wider differences in language and culture, which also influence the context of teaching and learning. Yet the modes of teaching have changed little to accommodate these massive changes in the nature of the student body, with lectures, wet labs, and pen and paper examinations being the norm rather than the exception.

Finally, in most economically advanced countries, the unit costs of higher education have steadily increased year after year,

without any sign of abating. Between 1995 and 2005, average tuition and fees rose 51% at public four-year institutions and 30% at community colleges in the United States (The College Board, 2005; Johnson, 2009). The average cost per student per year in tertiary education (excluding R&D costs) in the United States in 2006 was just over $22,000 per student, compared with an average of $7,500 per student for European countries (OECD, 2009, p. 202). Thus although there are now many more postsecondary students, the average cost per student continues to increase, putting excessive pressure on government funding, tuition fees, and hence costs to parents and students. More disturbingly, these increases in overall costs have not been matched by similar proportions of spending on direct teaching and learning activities (such as increasing the number of faculty). Most of the increased expenditure has gone into other areas, such as administration, fund raising, and campus facilities (Wellman, Desrochers, Lenihan, Kirshstein, Hurlburt, & Honegger, 2009). Thus postsecondary education has become larger, more costly, but less efficient.

Despite these challenges, modern universities and colleges still have many features of industrial organizations (Carlton & Perloff, 2000; Gilbert, 2005). Classes are organized at scheduled times in a fixed location on the assumption of full-time attendance. Students receive (at least within the same course) a standard or common product, regarding the curriculum (same lectures, same reading lists, and so on, for each student in the course). The institution is divided into departmental silos, with a hierarchical management structure. The Spellings Commission in the United States (U.S. Department of Education, 2006) even pushed (unsuccessfully) for standardized measurements of output, to allow comparison in performance between institutions, reflecting a classic industrial mentality of standardized products.

The Growth of the Knowledge-Based Economy

It is debatable whether the expansion of postsecondary education led to the growth of a knowledge-based economy or vice versa, but the two are inextricably linked. Peter Drucker (1969) is

credited with coining the term "knowledge-based economy." He made the simple but powerful distinction between people who work with their hands and those who work with their heads. Typical knowledge-based occupations can be found in biotechnology, telecommunications, banking and insurance, computing and electronics, health, entertainment, and education. These enterprises depend heavily on information and communications technologies for the creation, storage, transmission, analysis, and application of information in ways that create knowledge.

Labor is a major cost in industrial organizations. Cheaper labor means lower costs and hence competitive prices. In a globalized market, factories move to the lowest cost labor market. Thus we have seen to a large extent the deindustrialization of former industrial economies. (The shift is not quite that simple. Manufacturing remains important in advanced economies, but manufacturing itself is becoming increasingly dependent on innovation and knowledge-based components. For instance, Volkswagen estimates that over 70% of the cost of their cars comes from research, design, digital technology, and marketing, all knowledge-based activities. As a result, manufacturing in advanced economies is becoming increasingly focused on high-end manufacturing with a strong knowledge-based component.)

It is probably no coincidence however that as the numbers of graduates from universities and colleges increased year by year, so did the expansion of the knowledge-based economy, thus balancing to some extent the jobs lost in the industrial sector. Knowledge-based jobs of course require large numbers of people with higher levels of education, and this to some extent compensates more economically advanced economies for their lost of industrial jobs. Knowledge-based work is generally classified as service industries. The Canadian Services Coalition and the Canadian Chambers of Commerce (2006, p. 3) report:

> The amount of employment represented by the services sector as a percentage of total employment, in comparison to the agriculture and industry sectors, has been steadily increasing over the last 25 years. In fact, according to Statistics Canada, 80 percent of all new jobs within Canada between 1992 and 2005 were in the services industry.

Similar data would apply to other economically advanced countries, but on a different time scale; whereas the crossover between people employed in service industries surpassed those employed in manufacturing in Canada in 1991, this crossover occurred in Britain, the heartland of industrialization, in 2007 (Financial Times, 2009). (Note that services include both high-paid knowledge-based work and low-paid unskilled work.) Thus, to maintain the high living standards of economically advanced countries, it is essential to develop knowledge-based industries, and the large proportion of the population receiving postsecondary education helps to feed and stimulate that market.

Skills and Competencies in a Knowledge-Based Economy

Industrially based businesses revolve around the manufacturing and distribution of goods. Because of the benefits of economies of scale in manufacturing—the same product using the same manufacturing process operating on a very large scale to offset the high capital costs of a production line—goods are produced in large factories, with relatively unskilled manual workers organized around a strict division of labor, with separate, narrowly defined jobs and even different unions for each step in the industrial process. Management of course is hierarchical, with owners, managers, supervisors, and workers.

Knowledge-based businesses operate very differently. They are often small—two or three people, sometimes recent graduates who start their own company—and even when they grow large, such as Microsoft, Apple, or Google, they employ far fewer workers than the large industrially based companies. The majority of knowledge-based companies employ less than 100 people, so the spread of work is much flatter. In such companies, workers have to be multiskilled. A typical worker in a small computer software company has to be an entrepreneurial manager, an accountant, a software specialist, and a marketer.

Because knowledge-based companies do not need direct access to raw materials, they can be located wherever there are good Internet services. However, because of their need to access highly qualified workers, such companies are often found in

clusters around universities. Nevertheless, knowledge-based companies are often virtual in that they work primarily over the Internet. Small companies tend to build networks and partnerships with other companies that can provide added-value services, allowing a small company to focus on its core business, such as a software product. Workers in knowledge-based industries need to continue to learn throughout life, to keep up to date in their fields and indeed to develop new knowledge that can be applied to their work.

The skills and competencies in knowledge-based companies have been clearly identified (see, for example, Conference Board of Canada, 1991; The Partnership for 21st Century Skills, 2009). Workers in such industries are expected to have the following:

- Good communication skills (reading, writing, speaking, listening)
- Ability to learn independently
- Social skills (ethics, positive attitudes, responsibility)
- Teamwork
- Ability to adapt to changing circumstances
- Thinking skills (problem solving; critical, logical, and numerical thinking)
- Knowledge navigation (where to get information and how to process it)

In particular, knowledge-based workers need to be entrepreneurial, not necessarily in the sense of being skilled at making money, but in seeing an opportunity, and doing what is necessary to make it happen. Knowledge-based companies depend on innovation—creating, modifying, and improving products and services—rather than reproducing the same product all the time, as in an industrial organization. Thus knowledge-based workers need to be creative and risk takers.

Most universities would claim to develop thinking skills such as problem solving and critical thinking (the basis for training mandarins in the civil service, for instance), but these are not generic skills: they need to be embedded within the professional discipline, because problem solving in business is different from problem solving in medicine. Not only does the content base

differ between medicine and business, but so too does the approach to problem solving. We shall see that the need to embed skills within a subject domain applies also to information and communications technology skills.

Rationales for the Use of Information and Communication Technologies in Teaching and Learning

Most people understand the importance and influence of information and communications technologies in modern society. Information and communications technologies can be thought of as the raw materials of a knowledge-based economy, in that they provide the means for creating, storing, analyzing, transferring, reproducing, and transforming information.

However, it would be a mistake to see information and communications technologies merely as modern tools for preserving and reproducing knowledge, as if knowledge is somehow separate from or independent of the technology. The technology of the mass-produced, printed book led to great changes in society, economics, and the development and dissemination of new knowledge. The new information and communications technologies are having a similar effect. For this reason, then, we need to examine carefully the reasons or rationale for the use of information and communications technologies for teaching and learning (or e-learning, as it is often called, for the sake of brevity).

1. Enhancing the Quality of Teaching and Learning

The choice of wording here is deliberate. One of the authors was working at one institution on a committee trying to set down the key goals or the rationale for their use of e-learning. A colleague suggested: "to improve the quality of teaching." This was rejected by other members of the committee, who argued that the quality of the teaching was already excellent—technology would enhance it, but not improve it.

It is difficult to find good data on the extent to which technology is being used to enhance the quality of teaching and learning.

However, survey evidence by the Sloan Consortium (Allen & Seaman, 2006, 2008) and anecdotal evidence from learning management system (LMS) managers and data extracted from learning management systems suggest that enhancing classroom teaching is still the major form of e-learning in postsecondary education.

The big question that needs to be asked though is whether the quality of teaching in our postsecondary institutions is already of high quality and thus merely needs to be enhanced with technology (the icing on the cake), or is there major room for improvement in how we teach?

Can the high investment in technology be justified if it is merely added on as an enhancement to what is already being done? For instance, in many large research universities, lecture theaters or even small seminar rooms now have at least three screens—one on each side at the front of the room, and one in the middle at the back so the lecturer can see what students are seeing. Certainly this enables everyone in the room to see what is going on, but nothing else changes. The teaching goals are the same, the student-teacher ratio is unaffected, and is there any suggestion that students will learn more because of this? Lecture capture—the video recording of a lecture, stored on a server for later downloading by students—is another example. Can the investment of $6,000 per classroom be justified in terms of better learning? If not, cost is being added without any measurable benefits.

Universities and colleges generally follow a form of teaching that is largely historical in origin, and which has not accommodated well to the major shift that has occurred as a result of opening up access to postsecondary education. It has accommodated even less well to the opportunities (or affordances) that new technology offers. Using technology to enhance the quality of teaching is just accommodating technology to the old ways of doing things. We are adding quadraphonic sound and a GPS system to a horse and cart, but it's still a horse and cart. We believe new models for teaching and learning are needed that build on the strengths and opportunities that technology provides, and, incidentally, also build on the tremendous research advances made over the last 60 years in understanding how students learn, and how best to teach (Christensen Hughes & Mighty, 2010).

Thus, using technology to enhance the quality of learning merely increases costs without any measurable benefits. It does not address the need to change a teaching model that poorly serves mass higher education. It does not make the best use of technology. It may be a necessary first step to engage faculty in the use of technology for teaching. Nevertheless, we shall see that using technology this way does not usually lead to more fundamental changes.

2. Accommodating to the Learning Style of Millennials

One of the goals sometimes claimed for e-learning is that it accommodates better to the learning styles or needs of Millennial students, or put another way, these students will learn better through e-learning because it fits their experience and ways of behaving.

Who are the "Millennials"? This is a term used for those born between the mid-1970s to early 1990s inclusive. Other terms for people born in these years are Generation Y, the Net Generation, or Digital Natives. The term describes learners who have grown up with technology such as computers and the Internet all through their life. They are assumed to be technology-savvy, are able to multitask, have developed specific skills such as video game playing, and are sometimes described as having a sense of entitlement ("it's all about me")—after all, they are the children of the Baby Boomers (Alsop, 2008).

More specifically, with regard to higher education, Oblinger and Oblinger (2005a) identify the following characteristics as being typical for Millennials:

- Digitally literate in the sense of being comfortable and familiar with digital technology
- Connected to friends and the world through technology
- Immediacy: rapid multitasking, fast response to communications
- Experiential: they prefer to learn by doing rather than being told
- Highly social: "they gravitate toward activities that promote and reinforce social interaction"

- Group work: they prefer to work and play in groups or teams
- A preference for structure rather than ambiguity
- Engagement and interaction: an orientation toward action and inductive reasoning rather than reflection
- A preference for visual (that is, graphics, video) and kinesthetic learning rather than learning through text
- Active engagement in issues that matter to Millennials

Writers such as Prensky (2001) and Oblinger and Oblinger (2005b) argue that education needs to be adapted to meet the needs of these learners. Millennials need to be actively engaged, need to be motivated and interested to learn, and above all need to be immersed in a technological environment for learning.

Bullen, Morgan, Belfer, and Qayyum (2009) challenge these findings:

> A review of literature on the millennial learner and implications for education reveals that most of the claims are supported by reference to a relatively small number of publications. . . . What all of these works have in common is that they make grand claims about the difference between the millennial generation and all previous generations and they argue that this difference has huge implications for education. But most significantly, these claims are made with reference to almost no empirical data. For the most part, they rely on anecdotal observations or speculation. In the rare cases, where there is hard data, it is usually not representative.

Bullen and his colleagues are right to draw attention to the source of such claims. Going back to the original research is always a good idea, and often on this topic the empirical database is very weak, with small samples and often with samples skewed toward high users of technology. However, it is also important to look at what exactly is being claimed. For instance, Oblinger and Oblinger (2005b) comment:

> Although these trends are described in generational terms, age may be less important than exposure to technology. For example, individuals who are heavy users of IT tend to have characteristics similar to the Net Gen.

In another paper in the same publication, Hartman, Moskal, and Dziuban (2005) report on a survey of students at the University of Central Florida. The University of Central Florida (UCF) regularly conducts formative and summative surveys of students' online learning experiences (UCF has a high proportion of blended and fully online courses). In the 2004 survey there were 1,489 online student responses, representing a return rate of approximately 30%. They found for a start that there was "substantial age diversity in the distributed learning population in metropolitan universities" (Hartman, Moskal, & Dziuban, 2005). Over half the students (55%) were in fact Generation X students, and almost as many students were Boomers (22%) as Millennials (Net Gens) (23%). Over five years the proportion of Millennials will have increased, but in most institutions they are likely to remain a minority of students, because of the increasing number of older students returning to postsecondary education. However, these older students will in most cases also have had an increased level of exposure to technology than their predecessors.

Another finding from the Hartman, Moskal, and Dziuban paper is that Millennials indicated less engagement with online learning than their older counterparts. Although this may be counter to the argument that Millennials are more comfortable with technology and therefore need technology-based teaching, it is consistent with the finding that older or more mature students do better at online and distance learning.

There are really three separate issues here. Are Millennial learners distinctly different from other students currently in college? Millennial students exist, of course, as they are defined by age. However, Millennials are not a majority of students in many postsecondary educational institutions and there is evidence to suggest that exposure to technology is equally as important as age in determining the learner characteristics described by Oblinger and Oblinger. So one should not put too much emphasis on date of birth as a determining characteristic of today's learner. Also, there is a danger in stereotyping. Not all Millennials behave the same way or have a total immersion in technology.

Are students in college today different from students in college 25 years ago? Despite the lack of rigor of the claims for Millennial learners, it would be surprising if current students are the same

as students 25 years ago, given the exposure of all students to technology over the last 25 years. Thus the characteristics described by Oblinger and Oblinger are likely to apply to many students today. However, there are also other differences that are even more important educationally, such as a much greater proportion of students today being older, studying part-time, and requiring more flexible access to learning.

If students are different, what should instructors do? This is a much more difficult question to answer. Although there is some merit in the argument that students entering postsecondary education now are qualitatively different from previous generations of students—some commentators go so far as to argue that their brains are "wired" differently—one needs to be careful in interpreting this argument in education. Research has shown that skills developed in one context (for example, problem solving in video games) do not necessarily transfer to other contexts (for example, problem solving in business). In particular, students' use of the Internet for social and personal purposes does not necessarily prepare them adequately for academic applications of the Internet, such as searching for reliable sources of information (CIBER, 2008). Finally, there are some inherent requirements in education—such as a disciplined approach to study, critical thinking, evidence-based argumentation, for example—that cannot or should not be abandoned because they do not fit a particular student's preferred learning style.

Nevertheless, instructors should take into account the needs of all the learners they are dealing with. Young people see technology much the same way they see air and water—part of everyday life. It is natural then that they will see technology as a normal component of teaching and learning. Full-time Millennial students on campus have frequently reported that they do not expect technology to replace face-to-face contact with their teacher, and that they expect teachers to help them to know how best to use technology for learning (JISC, 2009). There is not an automatic transfer of technology skills from social and personal use to academic use, and most students are aware of this. The important issue here is that instructors need to understand how technology can be appropriately used for studying, and need to ensure that teaching makes the best use of technology possible. Some

students will need more help than others in their use of technology for learning, but all students will need to learn how to integrate technology successfully within their subject discipline.

Finally, Prensky (2001) and others argue that teachers need to change their strategies, because Millennials are used to being stimulated and engaged outside school, and therefore need to be engaged inside school. This may be true, but why is it special to Millennials? Should not all our students be engaged and challenged, stimulated by learning, and find the joy and excitement of discovery? Intelligent use of technology can help, certainly, but it is not sufficient on its own; it needs to be harnessed to effective teaching strategies, such as collaborative learning, problem- and project-based teaching, and enabling students to take responsibility for their own learning. This should apply to all students, not just the Millennials.

However, with respect to using technology to engage students, there is continuing evidence that students think instructors are not doing well. For instance, a recent report (CDW-G, 2009) found that

- Students rate faculty lack of tech knowledge as the biggest obstacle to classroom technology integration and see it as a growing problem.
- Just 32% of students and 22% of faculty strongly agree that their college/university is preparing students to successfully use technology when they enter the workforce.

Thus we are not failing just Millennials; we are failing *all* our students if we do not use technology to its full potential.

3. To Increase Access to Learning Opportunities and to Increase Flexibility for Students

There are several aspects to using technology to increase access and flexibility. There is reasonably good data (at least from the United States) on the use of technology for fully online learning. Systematic, large-scale surveys conducted by the Sloan Consortium (Allen & Seaman, 2006, 2008), and by the Instructional Technology

Council (2008) indicate that growth in enrollments in fully online learning in postsecondary institutions in North America has been averaging approximately 12–14% per annum over the last five years, compared with 2–5% for enrollments in solely campus-based teaching.

The bulk of this growth has come from conventional, public campus-based institutions moving a proportion of their courses and programs to fully online delivery, often as an option to the regular campus-based courses. Many two-year colleges in the United States for instance now require campus-based students to take at least one fully online course. Cerro Coso Community College, a traditionally campus-based two-year college in California, now has more than 50% of its enrollments in distance courses (Jaschik, 2009). As a spokesperson for the college said, "The students are voting with their mice." Thus fully online courses have demonstrated that even conventional, campus-based students appreciate the flexibility and access that fully online teaching provides, though these students still take most of their program through conventional campus-based teaching. The private, for-profit sector, represented by the University of Phoenix Online, Kaplan University, Nova South Eastern University, Full Sail University, and several others in the United States that offer all their programs online, is expanding even faster than the public sector, with 32% of the online market in 2009 (Garrett, 2009).

However, there is still probably unmet demand for even more online programs (*eSchool News,* 2009). There is evidence that the trend toward more online learning will intensify over the next five years. For instance, Ambient Insight Research (2009) suggests that by 2014, 20% of all students in postsecondary education in the United States will take all their studies online (compared to 5% in 2009), and 70% of students in postsecondary education in the United States will take some of their classes online (compared to 40% in 2009). Only 20% will take all of their courses in a physical classroom in 2014, compared to 45% in 2009.

The growth is likely to come particularly from lifelong learners, those who have already graduated and are now in the workforce, but returning for more courses and programs. Indeed, with aging populations and the need for continuous learning in

knowledge-based jobs, lifelong learners could soon become the majority in formal postsecondary education, exceeding the numbers coming from high schools, in many economically advanced countries.

Unfortunately the focus of many public universities is not on lifelong learners. The focus is still on getting the best students from high school and moving them into graduate studies to become researchers. Lifelong learners are often seen as "extra" students in an already overloaded system. Universities and, more so, colleges are responding to the lifelong learning market, but not aggressively enough. The lifelong learning market may need new business models that enable tenured faculty to be hired from the revenues generated by full-cost tuition fees for professionally oriented online graduate programs, but if public universities continue to ignore the lifelong learning market, their loss of direct revenue from tuition fees, and loss of public support for failing to meet demand from what is increasingly now their major market, will be damaging.

In conclusion, there is strong evidence that e-learning has been successful in increasing flexibility and thus making postsecondary education more accessible. Enrollments in online courses are increasing far more rapidly than enrollments in campus-based courses, and there are indications that demand for online learning far exceeds the supply, at least in North America. There is also evidence that the trend toward more online learning will intensify over the next five years.

The reason for this has as much to do with the changing nature of the student demographic in North America as it has to do with the greater effectiveness of online learning (although there is some evidence for this as well—see Means, Toyama, Murphy, & Bakia, 2009). Because of increases in tuition fees (inevitable given the increased access to higher education and reluctance to increase taxes to pay for it), more and more students are like Samantha, working at least part-time to pay for their initial undergraduate and graduate education. Furthermore, because of the demands of knowledge-based occupations such as health, telecommunications, and computer software engineering, there is increasing demand from lifelong learners to return for postgraduate studies and continuing education that leads to

further qualifications. Thus, students are increasingly combining work, family, and study. Online learning clearly provides the flexibility that such students need.

4. To Develop the Skills and Competencies Needed in the Twenty-First Century

Several commentators have discussed the difference between learning outcomes suitable for industrial and knowledge-based societies (see for instance, Gilbert, 2005; Conference Board of Canada, 1991). Indeed, in the United States, the Partnership for Twenty-First Century Skills (2009) is an organization set up to promote the development of such skills, which were outlined earlier in this chapter.

These skills can be classified as being "process-oriented" rather than "subject-oriented." However, it would be a mistake to see these skills as being independent of the subject or topic domains in which they need to be used. Skills need to be embedded within a subject or knowledge domain. Thus there are implications for setting learning goals (what is to be learned), curricula (what is to be taught), teaching methodology (how it is taught or learned), and assessment (what is to be examined or assessed). Each of these areas must be adequately addressed, if learning goals for a knowledge-based society are to be achieved.

Where does e-learning fit into this? One of the core competencies now required in nearly all subject domains, and more specifically in different occupations and professions, is embedded digital literacy. This is the ability to use information and communications technologies in ways that are specific to a particular knowledge or occupational domain.

Because digital technology is now so pervasive, all areas of human activity are increasingly being touched by it. Academic knowledge is no different. Almost all subject areas have been affected by the development of information and communications technologies in terms of the content of the curriculum.

To be a scholar now means knowing how to find, analyze, organize, and apply digital information. Studying without the use of technology is increasingly like learning to dive without water. This is not an argument for teaching generic computer literacy

skills, such as how to keyboard or use a word processor, but for using computers for digital imaging in medicine, for graphical information systems in geology, for using wikis to teach writing skills, for knowing which databases hold information relevant to solving a particular medical problem. Thus information and communications technologies are essential for developing these skills. However, without using technology embedded within the teaching, it will not be possible to develop core digital literacy within a particular subject domain.

This has significant implications for the way students are assessed. If we are setting examinations (or other forms of assessment) that do not explicitly assess problem solving, critical thinking, digital literacy, and communications skills within the subject domain, then students will not focus on developing these skills. And as well as assessing such skills, we also need to design our teaching to give students the opportunity to develop and practice such skills.

Most academics are aware of the increasing importance of digital technology within their subject discipline. Information technology is no longer just a useful tool that supports university and college administration and, to a lesser extent, teaching and learning; rather it is now an integral and essential component of almost all core higher education activities and as such needs to be used, managed, and organized accordingly. However, using technology for teaching is a necessary but not sufficient requirement for developing the knowledge and skills needed in the twenty-first century. It has to be accompanied by curriculum reform (the content), by changes in teaching methods that facilitate the development of skills in a particular subject domain, and by changes in assessment, to ensure those skills are evaluated.

5. To Improve the Cost-Effectiveness of the System

Institutions and governments face the challenge of balancing the conflicting pressures of increasing access, improving quality, and controlling costs. Can technology provide the fourth side of the square? Can information and communications technologies provide opportunities and potential for both improving

effectiveness, through better qualified graduates and higher completion rates, and also for reducing unit costs, that is, the cost of each graduating student?

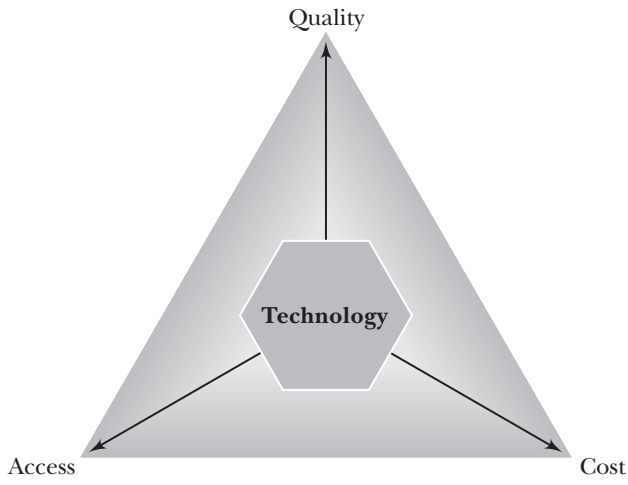
The old-style university is built around the delivery of programs through campus residence, the physical attendance of students at lectures, seminars, libraries, and labs. Information and communications technologies now, however, enable students to access information and services, including interaction with instructors and other students, at any time and any place. Programs can now be delivered in a variety of ways to an increasingly wide variety of students, through face-to-face, blended, or fully online learning. Can we use technology to not only improve the quality of services to students, but also to enable students to study in a more effective way?

The majority of university and college instructors (tenured or contracted) work very hard at teaching, if course and lesson preparation, student assessment, hiring and supervising adjunct faculty, and counseling students are all included. In research universities, teaching is supposed to count for no more than 40% of their activities, and there are strong arguments to be made that good teaching and research reinforce each other in higher education. Time must be found for both. Because the proportion of contract to tenured professors has rapidly increased, the senior, experienced research professor is an extremely scarce and valuable teaching resource, as we shall see in Chapter Seven. Can ways be found to make more effective use of "star" research professors' teaching time? Can technology be used to enable instructors to work smarter, rather than harder, as in many other professions? These are some of the questions we will be exploring in this book.

Conclusion

Daniel (1999) claims that the modern university has to balance three competing forces: access, quality and cost. Can access—or the number of students—be increased without additional cost or a reduction in the quality of teaching? We see technology as one of the key factors that help to balance these three pressures, as illustrated in Figure 1.1.

Figure 1.1. Technology as a Balancing Factor for the Forces Impacting on Higher Education



Source: Adapted from Daniel, 1999.

Our view is that the main reason for investment in technology should be to improve the cost-effectiveness of universities and colleges by increasing flexible access for students, helping develop certain core skills and competencies required in today's society (improving quality), and enabling administrators and teachers to work more effectively.

It is now 20 years since the creation of the World Wide Web and 15 years since universities and colleges started to take a serious look at how information and communications technologies should be managed for teaching and learning. The use of digital technology for finance, student information systems, and other administrative functions is now over 30 years old. So how are higher education institutions responding to the potential and challenge of technology? How are they strategically managing their technological resources? Are they being managed so as to achieve the goals of increased flexibility for students, the development of students with the necessary knowledge and skills for the twenty-first century, and greater cost-effectiveness?

This book explores these questions by looking at a relatively random sample of eleven institutions from five countries and two continents. But first, we need to look at developments in technology. As always, technology is in constant flux, and it is important to understand how these changes are influencing higher education, or will influence it in the future.