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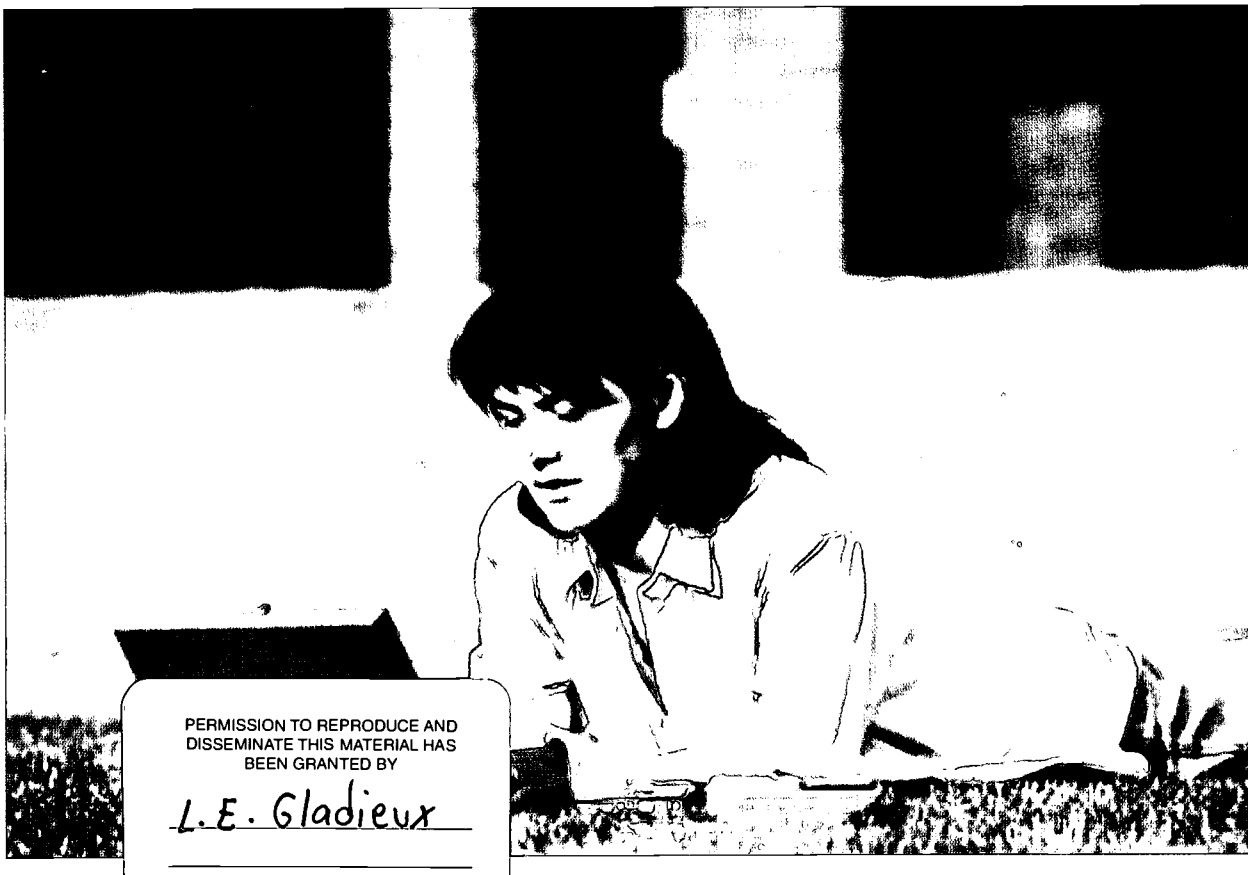
ABSTRACT

This report addresses issues concerned with educational programs provided through the Internet, the "virtual university" and their possible impacts on traditional higher education. It concludes that the new technologies may have the effect of deepening the divide between educational haves and have-nots and that public policy must intervene to narrow this "digital divide." Individual sections discuss the rapid development of technological capacity and recent federal initiatives testing the quality and viability of distance education using various techniques; trends in virtual education at the university and corporate levels; issues of standards and regulation; cost factors; those who will benefit from distance education developments; new barriers for the traditionally underrepresented in higher education; and the public policy challenge. Recommendations are offered to those designing virtual campuses and programs, the communications industry, and public policymakers. Appendices include descriptions of seven leading distance education programs and a listing of Web sites providing courseware or information on distance learning. (Contains 25 references.) (DB)

POLICY PERSPECTIVES

The Virtual University & Educational Opportunity

Issues of Equity and Access for the Next Generation



Lawrence E. Gladieux
&
Watson Scott Swail

The College Board
Educational Excellence for All Students

POLICY PERSPECTIVES

The Virtual University & Educational Opportunity

Issues of Equity and Access for the Next Generation

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The College Board
Washington, D.C.

April 1999

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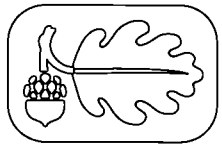

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Preface

This report grew out of a paper we prepared for the Conference on Lifelong Learning sponsored by the Programme on Institutional Management in Higher Education (IMHE) of the Organisation for Economic Co-operation and Development (OECD) in Paris, France in September 1998.

The world of the Internet is expanding and changing so rapidly one worries in writing such a paper that it might be outdated before anyone could read it! Our primary focus, however, is an abiding concern in America: equity of educational access. What is the potential of the latest information technologies for expanding opportunities for postsecondary education? There is no doubt that the World Wide Web shatters barriers of time and space in the delivery of instruction. But its advent is also likely to create new barriers and inequities, simply because of the differential availability of the required technology.

This report concludes, in fact, that the result of the new technologies may be to deepen the divide between educational haves and have-nots, and that the marketplace alone will not fix the problem. Public policy must intervene to narrow the "digital divide" between whites and minorities, the wealthy and less advantaged.

While we write primarily based on U.S. experience, the trends and issues are not far different in Asia, Europe, and other parts of the world, as the forces of economic and technological globalization reshape tertiary education everywhere. Response to the paper at the OECD suggested that the potential for greater inequity exists not only between socioeconomic groups within societies but between the First World and Third World.

As Ernest J. Wilson, director of the Center for International Development and Conflict Management at the University of Maryland, asked recently at an international conference on information technology, "Is the Internet becoming a new engine of global inequality?"

Ermelinda Carvajal provided research assistance for this report. William Lynch, executive director of the Center for Distance and Mediated Learning at the George Washington University, provided helpful suggestions, as did Clifford Adelman of the U.S. Department of Education and Janine Farhat, John Deupree, and Natalie Nielsen of the College Board. Ginny Perrin provided editorial assistance. Scott Swail and Rich Koch designed and prepared the layout for printing.

Lawrence E. Gladieux
Executive Director for Policy Analysis

Introduction

If equality of educational opportunity can be established, democracy will be real and justified. For this is the vital truth beneath its catchwords: that though men cannot be equal, their access to educational opportunity can be made more nearly equal (Durant, 1968, p. 79).

Lighting a fire in the student's heart, role modeling and nurturing may contribute more to learning than the neatest hyper-linked courseware (Dertouzos, 1998, p. 20).

A burgeoning computer market and the advent of the Internet and World Wide Web have sparked a rapid increase in the electronic delivery of higher education. Technology-based distance education has been around a long time, but its growth has surged in the 1990s, resulting in an industry that is growing by hundreds, if not thousands, of online courses each month. Training through the Internet is becoming big business worldwide. The "virtual university" is edging its way on to the wide screen of educators, policy-makers, and students. The vision of students collecting certificates or degrees without ever setting foot in a classroom has captured the imagination of education entrepreneurs and Wall Street investors.

Management pundit Peter Drucker has predicted that the residential university campus as we know it will be defunct within 30 years. A better bet is that traditional higher education will change, not disappear. The question is: How will it change? The fact is, computer and related technologies are evolving so quickly—and new providers and brokers of higher education proliferating so rapidly—no one knows.

A healthy skepticism is in order when evaluating claims for the transforming power of virtual instruction. A good deal of hype, from both commercial and nonprofit sponsors, accompanies its marketing. Also, history suggests that the impact of cutting-edge technology consistently falls short of its proponents' expectations. Early in this century, Thomas Edison speculated that motion pictures would replace textbooks as the principal medium of instruction. Fifty years ago many heralded instructional television as the salvation of classroom teaching.

This said, however, today's expanding, interactive computer networks possess a power, promise, and allure that institutions, governments, corporations, the nonprofit sector, and students are responding to in unprecedented ways. This paper reviews recent developments in information technology and distance learning, and how—along with economic forces—they are fueling a global market for higher education.

For the most part we raise questions. The computer-based technologies that are driving the change are so new that there is very little experience, much less systematic data, on which to assess the future.

We write primarily from a U.S. perspective, but the trends and issues are increasingly global. We focus especially on the question of access. Will the new technologies expand opportunities for those who have been traditionally underrepresented in higher education? Or are these technologies liable to deepen the divide between the rich and poor, the educational haves and have-nots in today's society?

Build It and They Will Come

Twenty years ago, only 50,000 computers existed on the planet. Today, that many units are sold every 10 hours around the world. Internet expansion has been even more dramatic. In 1985, about 300,000 e-mail users were registered worldwide. Ten years later, the U.S. alone accounted for over 80 million users (Jones, 1997).

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Ten years later, the U.S. alone accounted for over 80 million users.

The technological evolution from an industrial society to one dependent on information and knowledge has forever altered how we learn and do things. Providers of education and training are harnessing communications technology to complement and sometimes supplant the traditional classroom. Again, distance education is not new. Today's virtual instruction has its roots in correspondence schools. But it has the potential to transcend barriers of time and space in ways unimagined only a few years ago. Almost anything—text, data, images, video, audio—can be delivered electronically, almost anywhere in the world, almost any time and in real time, over the Internet. Imaging and Web-based technologies are also constantly enhancing the potential for two-way communications between and among teachers and students in remote locations.

The development of this technological capacity has resulted from a push–pull relationship between providers and the public: technological advances have created awareness and appetite among users, while usage has pushed providers to further develop the technologies. Dolence and Norris suggest a Darwinian element in this societal shift:

> *Society is undergoing a fundamental transformation from the Industrial Age to the Information age... All people, organizations, societies and nations are affected, although not at the same pace or to the same degree. Those who realign their practices most effectively to the Information Age standards will reap substantial benefits. Those who do not will be replaced or diminished by more nimble competitors. (Dolence & Norris, 1995, p. 2).*

From the student perspective, we must realize that today's high school graduates are already children of the "information age," and that tomorrow's students will be even more conditioned by electronic media. Today's university students increasingly *expect* to learn with computers and the latest information technology, not least because an increasingly competitive labor market demands no less. As Kenneth Green puts it, institutions engage in "a kind of educational malpractice" if they fail to provide students with technology training as part of their educational experience (Green, 1997b, p. 9).

Distance Education and U.S. Financial Aid Policy

To protect both students and taxpayers against potential fraud and abuse, the federal Higher Education Act has generally inhibited government aid to distance education. Among other constraints, postsecondary institutions that enroll more than 50 percent of their students in distance education courses are ineligible for student aid funds under Title IV of the Act. In 1998, however, Congress authorized the Secretary of Education to waive such regulations on a limited basis and test the quality and viability of distance education using various technologies.

The new law defines distance education as an educational process that separates, in time or place, the student and instructor and includes courses offered by computer transmission, television, electronic conferencing, videocassettes or discs, or correspondence. Up to 15 institutions may be funded in 1999 to take part in a demonstation program, and the statute specifies that the Western Governors University shall be one of the participants. An additional 35 institutions may participate in the third year of the program.

The demonstration is intended to help determine: a) the most effective technologies for delivering quality education via distance course offerings; b) statutory and regulatory requirements that should be altered to provide greater access to high-quality distance education; and c) appropriate federal assistance for students enrolled in distance education. The Secretary of Education is required to report back to Congress 18 months after the program is launched and annually thereafter.

The complete Federal Register notice on the distance education pilot program may be found at http://ocfo.ed.gov/fedreg.htm.

Training Needs and Training Providers

Technological opportunity has converged with economic imperative to expand the overall demand for higher education and alter its delivery in time and space. Knowledge-based economies require increasing levels of education and training. In the U.S., estimates of the proportion of future jobs requiring postsecondary training range from 70 to 90 percent. Skill and credential requirements in the job market show no signs of leveling off.

Economic incentives and pressures are pushing U.S. higher education enrollments to record levels. Rates of participation by 18- to 24-year-olds have never been higher, and the market for training and retraining of working adults is booming. Some estimates suggest that almost half of the adult U.S. population engages in some type of part-time education or training, and part-time enrollments are growing three times faster than full-time enrollments.

In fact, patterns of enrollment in U.S. postsecondary education are increasingly complex. The terms "traditional" and "nontraditional" are becoming less useful in describing today's students. Many students are stretching out their education, attending part-time, balancing study with work and family responsibilities, attending intermittently, and attending more than one institution before graduating. For growing numbers of students, the postsecondary experience is no longer a straight shot.

If students increasingly defy categorization, so do institutions. A range of unconventional providers has entered the postsecondary marketplace, offering instruction and credentials in new settings, on flexible schedules—and increasingly by way of the new distance-learning media. A quick search of the Internet reveals scores of Web sites that offer some form of distance education, or information about such learning opportunities. Competition is intense, and lines blur between public and private, for-profit and not-for-profit, and a variety of entrepreneurial combinations in between. (See Appendices A and B at the end of this monograph for a partial listing of these Web sites).

Many corporations have been training their employees for decades; they have essentially brought postsecondary education in house, investing in their own human capital. Some corporate universities have gone further, taking their educational services to the broader pub-

lic. Motorola, for example, estimates that over 20 percent of its 100,000 students come from outside company ranks.

There is also a new breed of freestanding corporate enterprise that is tapping into a growing market for career retraining and advanced degrees. The University of Phoenix, for example, is far-flung, for-profit, and fully accredited. In just 20 years, it has become the largest private university in the U.S., delivering business and other applied degree programs to 56,000 students at 70-plus sites nationwide.

U.S. industry is estimated to have spent $60 billion on formal training in 1997. Most training in the corporate sector remains site-based and is delivered the old-fashioned way, by human instructors. But online and other modes of distance education using information technology are on the rise (Lakewood Publications, 1997). Workplace-bound employees of the future may never have to leave their desks, much less enter a classroom, to receive training.

Meanwhile, more and more traditional institutions of higher education are experimenting with virtual instruction. A U.S. Department of Education survey found that one-third of accredited institutions offered distance education courses in 1995, and a quarter of these institutions offered degrees exclusively through distance education. Penn State (World Campus), the University of Minnesota (Virtual U Minnesota), UCLA (Home Education Network), Lansing Community College, and Florida's Gulf Coast University are taking a lead in the electronic market.

Workplace-bound employees of the future may never have to leave their desks, much less enter a classroom, to receive training.

Higher education institutions are also forming consortia and linking with the private sector to develop, catalog, and disseminate courses and degree programs. Nonprofit and for-profit companies provide software, hardware, and consulting services to support distance education. Denver-based Real Education, Inc., for example, helps institutions that lack the technical capacity to develop state-of-the-art courseware online. On its Web site, Real Education provides an index of course offerings, organized by subject, semester offered, and school from which the instruction originates. From the World Lecture Hall, a Web site organized by the University of Texas, students can download multi-

media course materials from scores of universities. The Globewide Network Academy and The Internet University also coordinate thousands of online courses.

In late 1998, Western Governors University (WGU) began operation as the nation's first exclusively virtual university. WGU was formed by the governors of 17 states (plus Guam), along with a number of business partners including Microsoft, Sun Systems, IBM, and AT&T. It has no plans to hire faculty, but will procure its online academic materials from businesses and institutions of higher education in the U.S. or other countries. Students anywhere in the world can enroll. WGU's mission is to "expand educational opportunities for learners everywhere" and provide access to a "dispersed population of students who might not otherwise have access to higher education and to those needing workplace training" (Blumenstyk, 1998, p. A21).

States participating in WGU are looking for economies of scale in providing higher education services. Some states hope WGU will enable them to fend off political pressures from some communities to build or expand existing brick-and-mortar campuses. The state of California, however, opted out of WGU because state leaders decided they had too much invested in California's 301 colleges and universities to share with other states. Instead, California has developed its own California Virtual University, which recently more than doubled its 700 courses to 1,600.

If some U.S. institutions have ideas of going transnational with their distance course offerings, so do many others around the world. Our search of the Internet (see Appendix B) turned up virtual-learning Web sites from Argentina, Australia, Belize, Brazil, Canada, Costa Rica, Ghana, Israel, the Netherlands, New Zealand, South Africa, Spain, Sri Lanka, and the United Kingdom, among other countries. The U.K.'s Open University has been a world leader in distance education for a quarter century. Now it is entering the U.S. market in partnership with WGU, Florida State University, and campuses of California State University, and has established an Open University of the United States (Marchese, 1998).

Who Will Regulate a Global Market?

Even a cursory tour of World Wide Web distance-learning sites is impressive. But there are many unanswered questions about higher education's recent online surge. Not least is how to provide quality assurance.

The new information technology knows no boundaries and opens a potential world of possibilities for students. Pronouncements on behalf of virtual instruction emphasize that it is learner-centered. It takes the classroom to the student rather than the other way around. Students have more control over where, how, and when they learn. But how will students distinguish among providers of virtual training? How will they assess the relative quality and utility of educational opportunities offered in cyberspace? Also, how will employers evaluate skills and credentials acquired in the virtual mode? (Barley, 1997).

Issues of accreditation and credentialing are problematic enough in the realm of traditional higher education. But the wide openness of the new technology invites educators, entrepreneurs, and students alike to cross national and other borders, adding a whole new dimension of complexity. Providers—traditional or nontraditional—have few regulatory barriers to entry.

The Council for Higher Education Accreditation (CHEA), a nongovernmental voluntary association concerned with standards of institutional quality in U.S. higher education, is currently looking into these issues of "gatekeeping" in the new world of distance education. Another voluntary organization, the Washington, D.C.-based Global Alliance for Transnational Education (GATE), has also been founded to grapple with these issues on an international level. Still, who ultimately will regulate a global market remains an open question.

How will students distinguish among providers of virtual training, and how will employers evaluate skills and credentials acquired in the virtual mode?

Will the New Technologies Save or Add to Educational Costs?

Part of the promise of virtual technology is to deliver instruction at reduced cost. But to do so it will have to break with history. Most educational technology introduced over the past 50 years has supplemented and often enhanced—not supplanted—traditional classroom instruction, thus *adding* to its cost, not reducing it. Cutting-edge information technology tends to be expensive and have a short half-life, straining education budgets, not relieving them.

Nonetheless, the vision of packaging courses with name instructors and mass marketing them around the world through the Internet is a powerful lure to providers, especially those that already have substantial investment in the necessary infrastructure. To the extent that students respond and enroll online, there will be money to be made. Companies may profit, and institutions of higher education may create new revenue streams. Some institutions, even if they do not have the electronic infrastructure and technical expertise to start with, want to position themselves in the potential market for distance education and have sought external grants for courseware development. They are likely to find, however, that online courses are works in progress, requiring ongoing outlays for maintenance, revamping, upgrading, and staff training (Green, 1997a).

Whether online instruction will produce savings for students is also unclear. Some institutions are actually charging more for online courses than for on-campus instruction. Students who enroll online, however, may face lower net costs because of savings in time and travel expenses (Baer, 1998).

Most educational technology introduced over the past 50 years has supplemented and often enhanced – not supplanted – traditional classroom instruction, thus adding to its cost, not reducing it.

Who Will Benefit?

Are students in fact flocking to online educational opportunities? The U.S. Department of Education reports that three quarters of a million U.S. students enrolled in more than 15,000 distance education courses in 1995 (U.S. Department of Education, 1997b). This estimate, however, includes all forms of distance education, not just online learning, and even such an inclusive estimate does not amount to a significant proportion of postsecondary enrollments.

In truth, we have very little information on how many students or employees are actually making use of online course offerings, and we know less about their characteristics. As Barley (1997) suggests, without such information we have no way of knowing whether virtual technology is reaching those who might not otherwise have access to higher education, or simply accommodating those who already take advantage of other educational opportunities.

Over the past couple of decades, there have been wonderful examples of distance education programs extending access to isolated populations. Contact North in Ontario, Canada, reaches remote villages and towns in the northern portion of the province. The British Open University has a distinguished record of making education accessible for those who are home- and work-bound, using a variety of distance learning technologies, recently including the Internet.

Internet-based technology can surely build on these earlier successes, but only if providers take care to build quality programs that include technical support and individualized attention to students, mentoring, and faculty-student exchanges. The Open University has attached great importance to such interactions, including face-to-face tutorials where possible. Sir John Daniel, vice chancellor of the Open University, warns:

> *Much of the commercial hype and hope about distance learning is based on a very unidirectional conception of instruction, where teaching is merely presentation and learning is merely absorption. The Open University's experience with two million students over 25 years suggests that such an impoverished notion of distance education will fail—or at least have massive drop-out problems (AAHE Bulletin, 1998, p. 11).*

A New Set of Barriers for the Traditionally Underrepresented in Higher Education?

The Web shatters geographical barriers to educational access, but it also may create new ones. Virtual universities will only help those who have the necessary equipment and experience to be comfortable with the technologies.

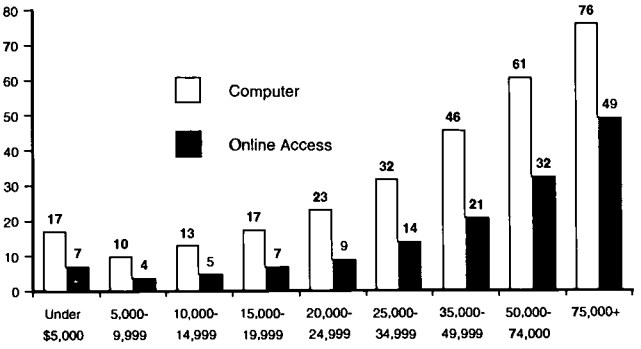
> *Not all students have equal access to computers and the Internet. In fact, there is evidence that students with the greatest need get the least access.*

While computers may seem ubiquitous in today's society, their distribution is highly stratified by socioeconomic class. Figures 1-3 illustrate, by income, race/ethnicity, and educational attainment, the wide disparities in access to computers as well as online services in the U.S. as of 1997. Three-quarters of households with incomes over $75,000 have a computer, compared to one-third of households with incomes between $25,000 and $35,000, and one-sixth with incomes below $15,000.

Online access is similarly stratified by income. And white households are twice as likely as black and Hispanic households to have access to computers and online services. Those with a B.A. degree or higher are about four times as likely as those with only a high school education to have online service.

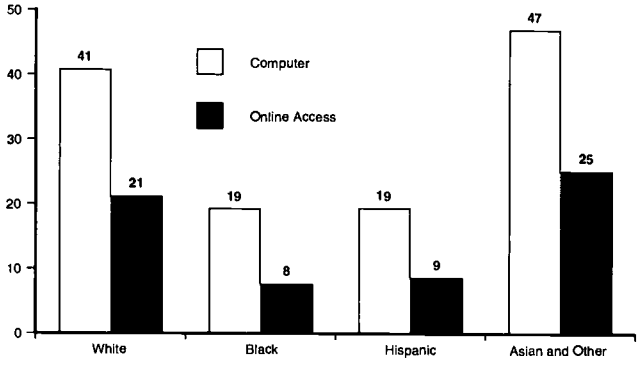
While technology has widely penetrated elementary and secondary schools, not all students have equal access to computers and the Internet at school. In fact, there is evidence that students with the greatest need get the least access. According to a 1997 study by the Educational Testing Service, the ratio of students to

Figure 1. Percentage of U.S. Households with a Computer and Online Service, by Household Income, 1997.



Source: *Falling Through the Net II*, National Telecommunications & Information Administration (NTIA), U.S. Department of Commerce, July 28, 1998.

Figure 2. Percentage of U.S. Households with a Computer and Online Service, by Race/Ethnicity, 1997.



Source: *Falling Through the Net II*, National Telecommunications & Information Administration (NTIA), U.S. Department of Commerce, July 28, 1998.

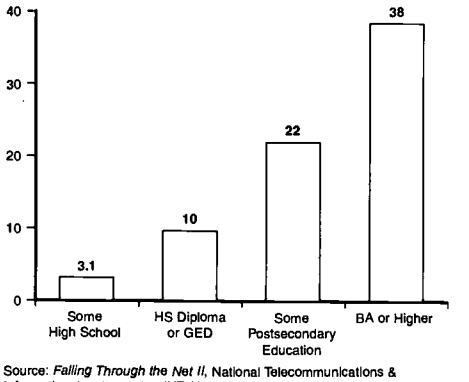
computers is highest in schools with the largest proportions of poor and minority students, and the availability of Internet access goes down as the percentage of such students increases (Coley, Cradler, & Engel, 1997).

More recent data from the National Center for Education Statistics indicate progress in closing such gaps and meeting the Clinton administration's goal of connecting every school to the Internet by the year 2000. Table 1 shows that 89 percent of public schools had access to the Internet in fall 1998, compared to only 35 percent four years earlier. But school access is not a good indicator of student access. In fact, one study suggests that half the schools that are linked to the Internet are connected only at the library/media center or principal's office (Quality Education Data, 1998).

A better indicator of penetration in the schools is percentage of classrooms connected to the Internet. Here the disparities remain significant. As indicated in Table 1, about 40 percent of classrooms in schools with the highest concentration of poor students (measured by percentage of students eligible for free or reduced-price lunch) have Internet access, compared to more than 60 percent of classrooms in schools with the lowest concentration of poor students. There are similarly wide gaps by race/ethnicity.

Figure 4 shows the average number of students per computer with Internet access in fall 1998. On average, there were 17 students per computer in schools with

Figure 3. Percentage of U.S. Households with Online Service, by Educational Attainment, 1997.

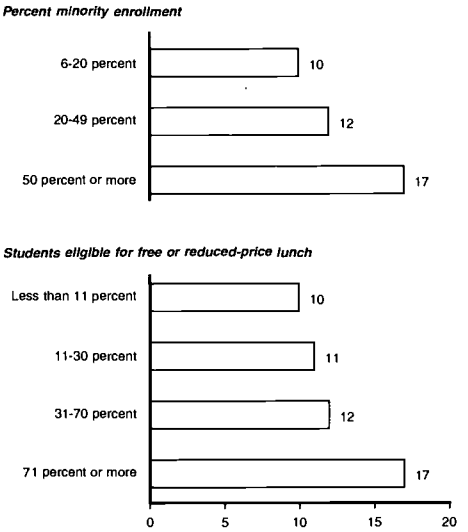


Source: *Falling Through the Net II*, National Telecommunications & Information Administration (NTIA), U.S. Department of Commerce, July 28, 1998.

the highest concentrations of poor students, compared to 10 in schools with the lowest concentration of such students. The same gap exists between schools with the lowest and highest concentrations of minority students.

Not surprisingly, differentials in experience with technology show up when students enter postsecondary education. UCLA's Higher Education Research Institute concludes from its most recent annual freshman survey: "Despite the overall high levels of computer and Internet use, not all students enter college with Internet savvy" (Higher Education Research Insti-

Figure 4. Ratio of Students per Instructional Computer with Internet Access, by School Characteristics, Fall 1998.



Source: U.S. Department of Education (1999). "Internet Access in Public Schools and Classrooms: 1994-98." *Issue Brief* (NCES 1999-017). Washington, DC: National Center for Education Statistics.

Table 1. Percentage of Public Schools and Instructional Rooms With Internet Access, by Selected School Characteristics: Fall 1994-98.

	Percentage of schools with Internet access					Percentage of instructional rooms with Internet access[1]				
School characteristics	1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Total	35	50	65	78	89	3	8	14	27	51
Level of school[2]										
Elementary	30	46	61	75	88	3	8	13	24	51
Secondary	49	65	77	89	94	4	8	16	32	52
Percentage of students eligible for free or reduced-price lunch										
Less than 11	—	62	78	88	87	—	9	18	36	62
11-30	—	59	72	83	94	—	10	16	32	53
31-70	—	47	58	78	91	—	7	14	27	52
71 or more	—	31	53	63	80	—	3	7	14	39
Percentage of minority students enrolled										
Less than 6	—	52	65	84	91	—	9	18	37	57
6-20	—	58	72	87	93	—	10	18	35	59
21-49	—	54	65	73	91	—	9	12	22	52
50 or more	—	40	56	63	82	—	3	5	13	37

— Indicates data not available.

SOURCE: U.S. Department of Education (1999). "Internet Access in Public Schools and Classrooms: 1994-98." *Issue Brief* (NCES 1999-017). Washington, DC: National Center for Education Statistics. "Internet Access in Public Schools." *Issue Brief* (NCES 98-031). Washington, DC: National Center for Education Statistics.

[1] *Based on the total number of instructional rooms in regular public schools.*

[2] *Data for combined schools are not reported as a separate level of school because there are too few sample observations for reliable estimates. Data for combined schools are included in the totals.*

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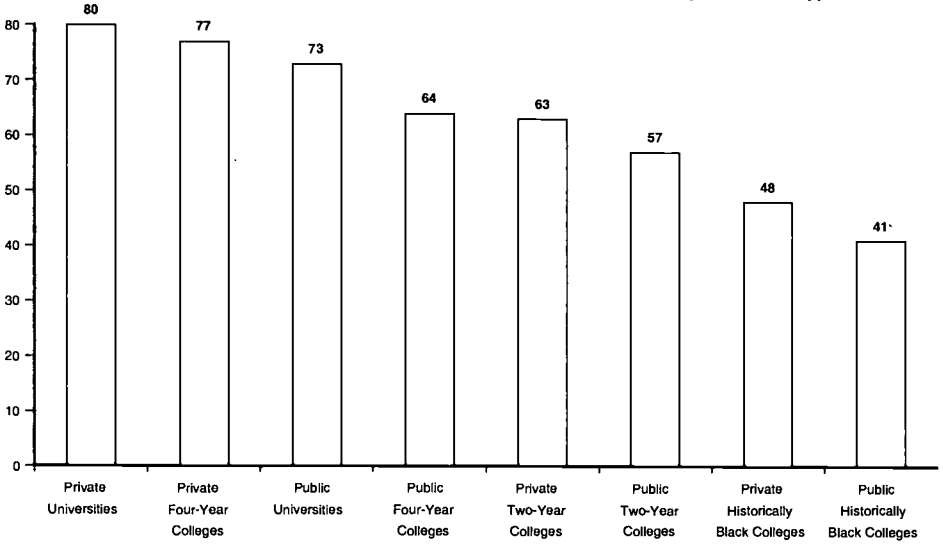
tute, 1999, p. 1). As illustrated in Figure 5, the percentage of students using e-mail varies widely by type of institution, with the greatest use among students enrolling in private universities and the lowest rates among students at public black colleges. Such disparities could preclude significant numbers of students from participating in the virtual university.

The most advantaged citizens—and schools—are most able to benefit from cutting-edge technologies. Advantage magnifies advantage.

In the final analysis, data probably cannot capture the full story here. While education is the great equalizer, technology appears to be a new engine of inequality. Access to technology is not only about hardware and software. It is about effective use, teacher training, and careful integration of technology into the curriculum. The most advantaged citizens—and schools—are most able to benefit from cutting-edge technologies. Advantage magnifies advantage. Those who use computers on a regular basis are more apt to use them routinely in problem solving and critical thinking. They use computers as past generations used pen and paper. Those with limited computer experience will be handicapped in their ability to access knowledge and avail themselves of the ever increasing variety of learning experiences.

Figure 5. Percentage of Freshmen Using E-mail During the Last Year, by Institution Type, 1998.



Source: Higher Education Research Institute (1999). "Freshman Embrace the Internet as an Educational Tool." *The American Freshman: National Norms for Fall 1998.* Los Angeles, CA: UCLA.

Even when computers are available, technological problems—equipment malfunctioning, Internet congestion and delay—can interfere with online learning and lead to frustration for students and teachers. Internet users know that ability to "surf" the Web is tied to the speed and reliability of the Internet provider, CPU, and modem speed, and ultimately to the costs of these services and equipment. Technical difficulties can befall anyone in cyberspace, and usually do at one time or another, but they disproportionately affect those who have the least ability to pay.

Access to Technology

Until every child has a computer in the classroom and the skills to use it...until every student can tap the enormous resources of the Internet...until every high-tech company can find skilled workers to fill its high-wage jobs...America will miss the full promise of the Information Age.

President Clinton
June 5, 1998

The Clinton Administration's principal initiative to equalize access to technology is the "E-rate" program authorized by the Telecommunications Act of 1996. The act builds on federal law of 60 years ago to guarantee all Americans affordable telephone service. In 1996, Congress expanded this universal-service concept to ensure that all libraries and schools would be able to afford "advanced telecommunications and information services."

In 1997, the Federal Communications Commission (FCC) created the Schools and Library Corporation to offer education-rate discounts on telecommunications services, including Internet access charges, with discounts ranging between 20 and 90 percent depending on regional economic indicators. During the first round of applications, more than 30,000 schools and libraries responded, and the first wave of grant notifications were mailed in the fall of 1998.

But the financing of the E-rate program has been contentious. To pay the cost, the FCC levied a universal-service fee on telecommunications companies. The industry has gone to court to fight the FCC's action as an illegal tax, and last summer AT&T, MCI, and Sprint announced that they would pass the cost on to the consumer. In the political firestorm that ensued, the FCC scaled back its commitment to the E-rate program, promising to give out $1.9 billion over an 18-month period, rather than the previously agreed upon $2.25 billion over 12 months. At the time of this printing, the E-rate program was receiving a second round of applications.

The Public Policy Challenge

The good news in the U.S. is that more people are attaining higher levels of education and filling millions of skilled, high-paying jobs in a strong economy. The bad news is that the least educated and skilled are getting a smaller piece of the pie and wealth disparities have reached unprecedented extremes. Narrowing this gap is surely one of the greatest challenges facing our country.

The virtual campus may widen opportunities for some, but not by and large for those at the low end of the socioeconomic scale, who have traditionally been underrepresented in higher education. Virtual space is infinite, but it does not promise universality or equity, nor is it appropriate for many students whose experience with technology is limited—and who might benefit far more from traditional delivery systems.

Computers and the Internet are nonetheless changing the world as we speak. Fast and reliable access to technology increasingly drives our economy and is key to individual opportunity in today's world. Special efforts must be made to equalize technology's availability and expand opportunity for all.

New sources of philanthropy, generated in particular by the computer and related industries, are beginning to focus on this problem. For example, Microsoft Chairman Bill Gates and his wife Melinda have endowed a foundation with over $1 billion dollars dedicated to making "sure everyone has the ability to have Internet access, regardless of where they live or how much money they have" (Hafner, 1999, p. 18). The foundation is donating computers, along with technical training and support, to libraries across the country; schools and community centers will be targeted next.

But private philanthropy alone—much less the marketplace by itself—cannot fix the problem of access. Government must play a part.

The Clinton administration has placed a high priority on educational technology and narrowing the "digital divide" between whites and minorities, the wealthy and the less advantaged. With Vice President Gore in the lead on this issue, the administration has called for computers, quality software, well-trained teachers, and affordable advanced telecommunications services in every classroom in the country (see page 21). But the source of revenue to support such an effort has divided the Congress, and the future of government intervention, like the future of these learning technologies, remains unclear.

Recommendations

To cap this monograph, we do not pretend to offer grand solutions. The issues are complex and the pace of technological change is overwhelming. With no claim to originality, we offer the following broad prescriptions to increase learning opportunities for all.

For those who may be designing virtual campuses and programs:

Place access at the core of system design. Access and inclusion should be the principal values inspiring the use of new technologies to deliver or enhance instruction.

Keep the promise of technology in perspective. The allure of technology can become a drain on human and fiscal resources that can impede the mission of institutions and their capacity to meet the needs of all students. Institutions should aim to strike a balance between traditional and technology-based delivery, and be prepared to alter the balance over time as the expectations and needs of students change.

Learn from the distance-learning pioneers. Those aiming to "go virtual" can benefit from the experience of others in the careful integration of technology and traditional modes of instruction. It is no surprise, for example, that WGU and other recent ventures have chosen to team up with Britain's Open University, drawing on its quarter century of success in distance education.

For the communications industry, including both the makers and providers of technology:

Consider broad access in the development of products and the expansion of markets. More lucrative, high-end products and users are the driving force behind the Internet's frenetic expansion. But the communications industry must step up to the plate of social responsibility, which means at times looking beyond bottom line, short-term interests, and toward longer-term, societal interests. Over the long haul, increased access to technology for lower-income, less-advantaged citizens will benefit both society and industry.

For public policymakers:

Take action to narrow the digital divide. The marketplace by itself will not ensure access to technology. Government must intervene to ensure a level playing field via industry incentives and safety-net programs designed to broaden access. Postsecondary students will only benefit from virtual instruction if they have had the experience and exposure to technology earlier in their development.

Monitor progress toward equal access. The government must continue to generate research and indicators on the social impact of the Internet. While current data illustrate gaps in ownership of computers and online access, tomorrow's research should probe the actual use of technology and how it impacts learning opportunities for all citizens.

Virtual space is infinite, but it does not promise universality or equity, nor is it appropriate for many students whose experience with technology is limited.

Appendix A: Among the Leaders

Western Governors University (www.wgu.edu)
Western Governors University (WGU) currently provides three degree and certificate programs, with 15 additional programs expected in 1999. WGU has established collaborative agreements with the Open University in Great Britain; the Open Learning Agency in British Columbia, Canada; the Tokai University Educational System in Japan; and the Universidad Virtual del Instituto Tecnologico y de Estudios Superiores de Monterrey (ITESM) in Mexico.

The Open University (www.open.ac.uk)
Established by a Royal Charter in 1969, the Open University of Great Britain has served over two million people in England and around the world and awarded more than 200,000 Bachelor's degrees. In 1998 alone, OU enrolled over 200,000 students, 10 percent of whom reside outside of the UK. The average age of undergraduates is 37, with an average tuition cost of £3,500. OU employs approximately 3,750 full-time staff and 7,000 part-time associate lecturers. Most new courses have their own dedicated Web sites and online conferencing facilities, with trained tutors and staff assistance.

The California Virtual University (www.california.edu)
The California Virtual University was established in 1996 shortly after California opted out of the Western Governors University. That decision was predicated on the fact that California has invested heavily in its own, highly respected public system of higher education. Planners hope that CVU will provide increased access for the deluge of students—more than 500,000—expected to enroll in California postsecondary education within the next decade. CVU is in essence a broker and does not grant degrees or certificates. Rather, it "serves as a gateway to technology-mediated distance learning courses and programs from California institutions." CVU sponsors include Cisco Systems, International Thomson Publishing, Oracle Corporation, Pacific Bell, Alfred P. Sloan Foundation, and Sun Microsystems, Inc.

JONES EDUCATION COMPANY COLLEGE CONNECTION ONLINE (www.jec.edu/cc/map.html)
Formerly the Mind Extension Network, JEC College Connection is a partnership of colleges and universities from around the nation, including the George Washington University, the University of Colorado, and the University of Delaware. Ten degree programs and two certificate programs are currently available in the areas of educational technology, business administration, communications, nursing, and hotel management. Instruction is provided via videotape and satellite feed, with Internet and email support.

THE UNIVERSITY OF PHOENIX (www.uophx.edu)
Accredited in 1978, the University of Phoenix now serves more than 56,000 students, almost all of whom earned degrees prior to admission. While UP has become widely identified with the "virtual" trend, in fact less than 5 percent of its enrollment is instructed online. The University of Phoenix system includes 74 campuses and learning centers in 13 states and the Commonwealth of Puerto Rico. "Our approach is based on openness and accessibility—not distance and isolation," according to UP's Web site.

REAL EDUCATION (rs.realeducation.com)
Developing online, virtual instruction requires both technology and content. While the former requires a major investment in campus infrastructure, the latter is, in actuality, the most expensive and substantial barrier to institutions that consider "going virtual." Real Education is one among several companies that now help campuses develop and deliver courseware. In 1998, Real Education signed more than 60 colleges and universities, including the University of Pennsylvania, Seton Hall University, and the University of Colorado. Microsoft, WebCT, Pearson Education, and SkillSoft are listed as strategic partners. In January 1999, Real Education announced $15 million in private equity financing to support further development and growth.

BLACKBOARD, INC. (www.blackboardllc.com)
Like its competitor Real Education, Blackboard Inc. supports teaching and learning over the Internet. Cornell University, Georgetown University, Tufts University, Northwestern University, the College of William and Mary, and the University of Tennessee at Knoxville utilize Blackboard, Inc.'s services. Strategic Partners include KPMG Peat Marwick LLP, International Thomson Publishing, W.W. Norton Publishing Inc., Sylvan Learning Systems, EDUCAUSE IMS Project, GEO Interactive, and Microsoft.

Appendix B: Web Site Listing

Web Sites Providing Courseware or Information on Distance Learning

TRADITIONAL INSTITUTIONS OF HIGHER EDUCATION

Argentina

Universidad Nacional de San Luis
http://inter2.unsl.edu.ar/~cead

Australia

Edith Cowan University
http://www.echidna.stu.cowan.edu.au/VC/

Monash University
http://www.dec.monash.edu.au/

University of Asia
http://www.uniasia.edu

University of Southern Queensland
http://www.usq.edu.au/dec

Belize

Belize Institute of Technology
http://www.clarence.com/home/bit

Brazil

Faculdade Carioca
http://www.carioca.br

Instituto Nacional de Educacão a Distância
http://www.intelecto.net/textos1.htm

Canada

Athabasca University
http://www.athabascau.ca/

Queen's University
http://www.queensu.ca/pts

Simon Fraser University
http://www.sfu.ca/cde

Université Laval - Alérion
http://www.ulaval.ca/dgfc/distance/index.html

University of British Columbia
http://det.cstudies.ubc.ca

University College Cape Breton
http://www.uccb.ns.ca/eca

University College of the Fraser Valley
http://www.ucfv.bc.ca/online

Costa Rica

University of San José
http://www.usj.edu

Hong Kong

Center for Educational Development
http://www.ced.com.hk

The Netherlands

Open University of the Netherlands
http://www.ouh.nl

New Zealand

Massey University
http://www.massey.ac.nz/~wwcues/about/about.htm
http://its-www3.massey.ac.nz

Iceland

Reykjavik Institute of Education
http://www.rvik.edu

Spain

Centro de Enseñanza a Distancia
http://www.ceac.com

Universitat Oberta de Catalunya
http://www.uoc.es/

South Africa

INTEC College – Southern Africa
http://www.intec.edu.za

Sri Lanka

Open University of Sri Lanka
http://www.ou.ac.lk

United Kingdom

The Open University
http://www.open.ac.uk/

Sheffield University
http://www.shef.ac.uk/uni/services/dlu/dluweb/dluhome.html

University of London
http://www.lon.ac.uk/external

United States

Boston University
http://bumetb.bu.edu/

Carnegie Mellon University
http://www.cmu.edu/home/education/education_distance.html

Central Michigan University
http://www.cel.cmich.edu

Chapman University
http://www.chapman.edu/oei

Christopher Newport University
http://www.cnuonline.edu/

Drexel University
http://www.drexel.edu/distance

Florida Gulf Coast University
http://itech.fgcu.edu/distance

Florida State University
http://idl.fsu.edu/

The George Washington University
http://www.gwu.edu/~distance

Golden Gate University
http://cybercampus.ggu.edu

Idaho State University
http://wapi.isu.edu/

Louisiana College
http://lconline.lacollege.edu

Louisiana State University
http://ls.lsu.edu

Michigan State University
http://www.vu.msu.edu

Minnesota's Virtual University
http://www.mnvu.extension.umn.edu/

The New School University
http://www.dialnsa.edu/

New York University
http://www.sce.nyu.edu/virtual

Nova Southeastern University
http://www.nova.edu

Old Dominion University
http://web.odu.edu/webroot/FrontEnd.nsf/pages/distlrn

Penn State World Campus
http://www.worldcampus.psu.edu/

Purdue University
http://info.aes.purdue.edu/acs/disted.html

Rochester Institute of Technology
http://distancelearning.rit.edu/

Stanford University
http://stanford-online.stanford.edu/

SUNY Empire State College
http://www.esc.edu/

University of California at Berkeley
http://www.unex.berkeley.edu:4243/

University of California at Los Angeles
http://www.unex.ucla.edu/

University of Hawaii
http://www.hawaii.edu/dlit/

University of Houston
http://www.uh.edu/uhdistance

University of Maryland, University College
http://www.umuc.edu/distance/index.html

University of Massachusetts at Dartmouth
http://www3.umassd.edu/

University of Missouri at Columbia
http://indepstudy.ext.missouri.edu

University of Missouri at Kansas City
http://vu.umkc.edu

University of Nebraska at Lincoln
http://www.unl.edu/ExtendEd

University of Nebraska at Omaha
http://www.ccs.unomaha.edu

University of North Carolina at Chapel Hill
http://www.unc.edu/cit

University of Texas
http://www.utsystem.edu

University of Wisconsin
http://www.uwex.edu/

Virginia Polytechnic Institute & State University
http://vto.vt.edu

Washington State University
http://www.wsu.edu/vwsu

Webster University
http://www.websteruniv.edu/

Western International University
http://www.wintu.edu/

COMMUNITY COLLEGES

Canada

George Brown – The City College
http://www.gbrownc.on.ca

United States

Bellevue Community College
http://online.bcc.ctc.edu

Brevard Community College
http://www.brevard.cc.fl.us/distlrn/

Chemetka Community College
http://bbs.chemek.cc.or.us/public/default.htm

Clackamas Community College
http://dl.clackamas.cc.or.us

Colorado Community College
http://www.ccconline.org

Edmonds Community College
http://web.cce.edcc.edu/cce/edol.htm

Fayetteville Technical Community College
http://www.faytech.cc.nc.us/infodesk/vcampus/vcampus.html

Front Range Community College
http://frcc.cc.co.us/distance/intro.html

Greenville Tech
http://www.college-online.com

Honolulu Community College
http://www.hcc.hawaii.edu/distlearn

Iowa Central Community College
http://ictn.iccc.cc.ia.us/distanceed

Ivy Tech State College
http://207.115.178.3/distance-education

Lansing Community College
http://www.lansing.cc.mi.us/executive/extension

Laramie County Community College
http://www.lcc.whecn.edu/disted/disted.html

NorthWest Arkansas Community College
http://labs.nwacc.cc.ar.us/disted

Pikes Peak Community College
http://www.ppcc.cccoes.edu/distanceed/default.html

Pima Community College
http://community.cc.pima.edu/cc/webclass.html

Pitt Community College
http://sphynx.pitt.cc.nc.us/des/des.htm

Rio Hondo College
http://www.rh.cc.ca.us/online

Rio Salado College
http://www.rio.maricopa.edu/

Seattle Central Community College
http://seaccd.sccd.ctc.edu/sccde

Trinidad State Junior College
http://www.tsjc.cccoes.edu/

Yavapai College
http://www.yavapai.cc.az.us/ychome.nsf/?open

PROFESSIONAL ASSOCIATIONS

United States

ADEC Distance Education Consortium
http://www.adec.edu

Council for Higher Education Accreditation
http://www.chea.org

The Distance Education and Training Council
http://www.detc.org

Global Alliance for Transnational Education
http://www.edugate.org/

United States Distance Learning Association
http://www.usdla.org/

CONSORTIA OR COOPERATIVES

Canada

Contact South
http://www.contactsouth.org

Ghana

Ghana Distance Education Project
http://www.projectscope.org

United States

Accredited College Degrees by Correspondence
http://www.collegeathome.com

California Virtual University
http://www.california.edu/

Michigan Virtual Automotive College
http://www.mvac.org/

National Technological University
http://www.ntu.edu/

National Universities Degree Consortium
http://www.sc.edu.deis/NUDC

Oregon Community College Distance Education Consortium
http://www.lbcc.cc.or.us/occdec/chart.html

PBS Adult Learning Service Online
http://www.pbs.org/adultlearning/als/

Southern Regional Electronic Campus
http://www.srec.sreb.org/

University Alliance
http://www.universityalliance.com

Western Governors University
http://www.wgu.edu/wgu/index.html

CORPORATE COLLEGES AND UNIVERSITIES

United States

IBM Corporation
http://www.ibm.com/

Lotus Education
http://www.lotus.com/

Motorola, Inc.
http://www.mot.com/

Multiservice Networks Division
http://www.mot.com/networking

Oracle Corporation
http://education.oracle.com

Sun Microsystems
http://wwwseast2.vsec.sun.com/

FOR-PROFIT AND NOT-FOR-PROFIT COMPANIES

Africa

The African Virtual University
http://www.worldbank.org

Australia

The VETTWeb Building
http://www.vettweb.net.au/

Canada

TVOntario
http://www.tvo.org/eng/default.html

Denmark

The Virtual Oresund University
http://www.uni.oresund.org

Germany

Virtual University of Berlin
http://wwwpc.prz.tu-berlin.de/prz/english/b/learning/indes4i.htm

Israel

Interactive Distance Education And Learning (IDEAL) System, Arel Communications and Software, Ltd.
http://www.arel.co.il/

Mexico

Universidad Virtual del Sistema Tecnológico de Monterrey
http://www.ruv.itesm.mx/

United States

Apollo Group, Inc.
http://www.apollogrp.com/

College for Financial Planning
http://www.fp.edu/

Institute for Professional Development
http://www.ipd.org/

University of Phoenix
http://www.uophx.edu/

Asymetrix Learning Systems, Inc.
http://www.asymetrix.com/

Athena University
http://www.athena.edu

Blackboard, Inc.
http://www.blackboardllc.com

Caliber Learning Network: The Distance Learning Solution for Working Professionals
http://www.caliberlearning.com/

Cisco Connection Online by Cisco Systems, Inc.
http://www.cisco.com/

Coalition for Networked Information
http://www.cni.org/

College of the Menominee National Virtual University
http://www.menominee.com/cmn/programs/home.htm

Collegis, Inc.
http://www.collegis.com/home/

Convene International, Inc.
http://www.convene.com/

DeVry Inc.
http://www.devry.com/

Keller Graduate School of Management
http://www.keller.edu/

Diversity University
http://www.du.org

Durand Communications, Inc.
http://www.durand.com/

Education Communications (EduCom)
http://www.educom.com/welcome.html

Instructional Management Systems Project
http://imsproject.org/

Education Management Corporation
http://www.edumgt.com/

ERASMUS Virtual University
http://136.201.8.7/vuniv/ERAShome.htm

The Fielding Institute
http://www.fielding.edu/

The Globewide Network Academy
http://www.gnacademy.org/

Harcourt Brace & Company
http://www.harcourtbrace.com

California College for Health Sciences
http://cchs.edu/

ICS Learning Systems (includes Business and Industrial Training Division)
http://www.icslearn.com/

The English Language Institute of America
http://www.ELILearn.com/contents.htm

Knowledge Online (Jones Education Company)
http://www.jec.edu

Jones International University
http://www.international.edu/

Lyceum: The Virtual Campus
http://www.interlabs.bradley.edu/lyceum2/

Magellan University
http://www.magellan.edu

McGraw-Hill OnLine Learning
http://www.mhonlinelearning.com/

National Computer Systems, Inc.
http://www.ncs.com/

Virtual University Enterprise
http://www.vue.com/

New Horizons Computer Learning Centers
http://www.newhorizons.com/

New Promise
http://www.caso.com/

The Pangaea Network
http://www.pangaeanetwork.com/

PricewaterhouseCoopers Virtual University
http://www.vu.pw.com/

Real Education
http://rs.realeducation.com/

Spacenet
http://www.ge.com/capital/spacenet/index2.htm

Spectrum Virtual University
http://www.vu.org/campus.html

Sylvan Learning Systems, Inc.
http://www.educate.com/

TeleVideo Global, Inc.
http://www.televid.com/

Toner Cable Equipment, Inc.
http://www.tonercable.com/

The University of the United States
http://www.uus.edu

The Virtual Classroom List
http://ull.chemistry.uakron.edu/classroom.html

Walden University
http://www.waldenu.edu

The World Lecture Hall
http://www.utexas.edu/world/lecture/index.html

Worldspace
http://www.worldspace.com/homepage.htm

ZD University
http://www.zdu.com/home.asp

MISCELLANEOUS

United States

Project SCOPE
http://www.projectscope.org

General Distance Learning Information
http://www.yahoo.com/education/
distance_learning

Lifelong Learning (database of institutions
offering distance learning)
http://www.lifelonglearning.com

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Green, Kenneth C. (1997b). "High Tech vs. High Touch: The Potential Promise and Probable Limits of Technology-Based Education and Training in Higher Education." Working paper prepared for the workshop on Competence Without Credentials held September 19, 1997 in Washington, D.C., sponsored by the U.S. Department of Education and The World Bank.

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