Lifelong Learning: From Desirability to Feasibility

Wadi D. Haddad, Editor

Recent economic, social and technological developments have highlighted the urgent need for lifelong learning. How can lifelong learning for all, everywhere, and anytime, be achieved? Here learning technologies may provide their most valuable contribution.

Email to the Editor

Read what your colleagues have offered as feedback on previous issues of TechKnowLogia.

Lifelong Learning For the Third Age

Laurence Wolff, Inter-American Development Bank

The greatest social challenges of the 21st century will be the aging of human society. Lifelong learning for the "third age" will be an essential part of the new set of public policies and programs. The potential areas for learning to meet the evolving economic and social needs of an aging population are: (i) for individual health, (ii) to strengthen community and family, (iii) for productive employment, and (iv) for self enrichment.

Learning and the Marketplace

Frank Method, Director, UNESCO Washington Office

As boundaries between and among living, learning, working, consuming and investing are becoming blurred, the information environments are becoming more seamless. Technology is bringing information to the consumer, on demand, but often without a conscious effort on the part of the learner.
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15 Adult Education in the Americas: The Victory of Spontaneous Action
Claudio de Moura Castro, Chief Education Adviser, Inter-American Development Bank

Many complain against the “moribund nature of most traditional programs” of adult education. Are they indeed dead or are we looking for it at the wrong place? This article proposes that adult education is well, exploits the technologies of the day, and was reinvented on the go by people who never heard the term or read the books proposing it. In fact, it happened everywhere, except where it was supposed to happen, namely, the adult education centers of the governments.

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LiteracyLink is an initiative begun in 1996 in response to the growing US demand for basic education and skills training. Building on the existing telecommunications infrastructure of public television, LiteracyLink is creating an integrated instructional system of video and online computer technology to help adult students advance workplace skills and prepare them for a high school equivalency test, and offers professional development resources and training to literacy educators.

23 China: Lifelong Learning and the Use of New Technology
Xiao Caiwei, Deputy Director, International Department, China National Committee on Aging

With the increase of the elderly population and the compulsory retirement system in the last two decades, China has been facing a big challenge in meeting the needs of the elderly in learning. Universities of the Third Age (UTAs) have been the most successful means or promoting lifelong learning in China. The use of new technology such as remote teaching and the Internet have been explored in order to make learning accessible to more elderly.

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Lifelong learning can be an experience made of many lives, a movement toward economic independence and political participation for an entire population. This article relates such stories from Mexico, the Middle East and North Africa, and the Gobi Desert in Mongolia.
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Robert Savukinas and Gregg Jackson, George Washington University

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36 The Business of Borderless Education and Lifelong Learning

Yoni Ryan, Ph.D., Senior Lecturer in Higher Education, Queensland University of Technology, Australia

This article summarizes a market intelligence study on the activities of ‘corporate universities’, the training units of businesses whose primary activity was not education, but who were embedding education and training in their business and strategic plans; virtual universities, those operating distance programs mediated by the new technologies; and for-profit higher education providers. One of the many issues to emerge was how the concept of lifelong learning had transmuted to vocational and professional training.

40 Training Women for Leadership and Success in IT

Nancy Taggart and Chloe O’Gara, Academy for Educational Development

As the “digital divide” is fast becoming a household word, the importance of women’s access to information technologies (ITs) is emerging as a priority. This article reviews empirical studies of factors that may impact women’s access to and participation in technology training in developing countries. Reaching out to women through IT training, not only broadens their opportunities but also brings greater innovation and diversity to Internet societies of the future.

44 Promoting Virtual Collaboration Via the WWW

Joseph Slowinski

The increasing proliferation of computers and Internet access in schools and homes creates a potential for electronic or virtual collaboration. This article provides guidelines for a collaboration environment and an annotated list of free web-based communication and information tools.
Planning Education for an Aging Society
Sonia Jurich

The aging of the world population, economic changes and advances in medical sciences are contributing to a renewed discussion about older adults and their role in modern societies. Education is at the center of this discussion. This article explores the demographics of an aging society as well as the factors to consider when planning for their lifelong learning.

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Upcoming Events: Conference, Seminars, Exhibits, Training Courses, etc.

The Mouse…It's No Pesky Rodent
Sandra Semaan

This article presents a brief history of the mouse and what new innovations are being developed in mouse technologies as well as input devices to replace the mouse.

Interactive Museums: Learning Through Experience
Jelena Lewis

Museums are no longer somber places housing artifacts that cannot be touched. Instead, they are taking on a role of being entertaining as well as educational. Interactive and multimedia exhibits give visitors the ability to discover and learn at their own pace. This article describes worldwide examples of interactive museums.

WorthWhileWebs
Gregg Jackson, Vishnu Karki, and Robert Savukinas, George Washington University

An annotated list of several Web sites with useful resources on lifelong learning: some are for the professionals who are responsible for providing such learning opportunities and some others are for the learners.

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AED has been a leader in using information, education and communication technologies (IECTs) to extend learning opportunities and improve education systems. Included are a few examples of its work in this domain.

60 **From the Information Society to the Knowledge Society: Questions for International Co-operation**  
*Alexandra Draxler, Director, Task Force on Education for the Twenty-first Century, UNESCO*

There is abundant debate about the actual and forthcoming consequences of the development of information and communication technologies (ICTs) on education. When technology is part of the tool kit of reformers who try to focus on improving an aspect of the teaching/learning process, it can be a very powerful one. The aim of this article is to look at a few contemporary trends emerging from the ICT revolution and what this might mean for international co-operation in education.

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**Editorial Calendar for Years 2000 and 2001**

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Lifelong Learning:
From Desirability to Feasibility

A DESIRABLE OBJECTIVE

Lifelong learning has been, for many years, a permanent fixture in international education pronouncements and national policies and strategies. How can anyone disagree with the need for people to continue their learning in order to enjoy personal fulfillment, economic advancement, and social development? As early as 1972, one of the four basic assumptions that underpinned UNESCO's classic report, *Learning to Be*, was that:

> Only an over-all, lifelong education can produce the kind of complete man the need for whom is increasing with the continually more stringent constraints tearing the individual asunder. We should no longer assiduously acquire knowledge once and for all, but learn how to build up a continually evolving body of knowledge all through life—'learn to be'.

In 1990, participants in the Jomtien *World Conference on Education for All* gave a special focus to lifelong learning:

> Every person - child, youth and adult - shall be able to benefit from educational opportunities designed to meet their basic learning needs. These needs comprise both essential learning tools (such as literacy, oral expression, numeracy, and problem solving) and the basic learning content (such as knowledge, skills, values and attitudes) required by human beings to be able to survive, to develop their full capacities, to live and work in dignity, to participate fully in development, to improve the quality of their lives, to make informed decisions, and to continue learning.

Despite the radical pronouncements, investments, strategies and measures to make lifelong learning a reality have been static and marginal compared to the efforts made in expanding and improving schooling. Except for some targeted programs here and there, lifelong adult learning has been assigned as the personal responsibility of the individual – both organizationally and financially.

URGENT AND DIVERSE NEED

Recent economic, social and technological developments have highlighted the urgent need for lifelong learning. The fast changing technology-based economy requires from workers the flexibility to adjust to new demands and the ability to learn new skills. The increasing sophistication of modern societies demands constant updating of the knowledge and skills of their citizens. The escalating knowledge makes the “educated” obsolete unless they continuously upgrade their knowledge.

These needs give rise to a wide range of activities that come under the rubric of lifelong learning – some formal, some workplace related, some informal and some ad hoc and spontaneous. This is a nightmare for the “rational” planners. It is for this very reason that lifelong education cannot be considered another sub-sector of the educational system, subject to the same dynamics and modalities. The weak record of formal adult education attests to that.

The all-embracing nature of lifelong learning has many implications:

- Initial education is no more a preparation for life and career but a preparation, in terms of concepts, cognitive tools, attitudes and values, for a lifelong learning process.
- The learner and his/her needs are central, which puts the focus on the demand side of educational opportunities.
- Learning cannot be constrained by time and place; it must take place in all settings and any time.
- Lifelong education cannot be restricted to predetermined delivery systems, no matter how effective they are. Evolving needs and conditions should lead to new and innovative delivery systems.

Clearly, adult learning involves a large range of stakeholders and beneficiaries. Does that mean that there is no role for public policy and input? Not so fast! The strong economic and social rationale for lifelong learning justifies public involvement and support. Also leaving it totally to market forces creates obvious distortions that work against the poor,
the rural communities, the uneducated and the poorly equipped. Public policies and strategies must, therefore, redress these distortions and aim to ensure that lifelong educational opportunities are available for all and that conditions are in place to encourage and enable everyone to participate in them.

MORE FEASIBLE

How can lifelong learning for all, everywhere, and anytime, be achieved? Certainly, formal traditional systems cannot do it, even if they are well financed, run and maintained. The diversity of needs and settings requires a diversity of means. Here learning technologies may provide their most valuable contribution. They are flexible, unconstrained by time and place, can be used on demand and provide just-in-time education. They have the potential to offer synchronous as well as asynchronous learning opportunities. But above all, if well prepared, they can pack a wealth of expertise and experience in efficient packages that can be modified and updated all the time in response to feedback, new demands and varied contexts. This Issue of TechKnowLogia explores many such possibilities over a wide range of technologies including videos, correspondence, Internet, and e-learning superstructure.

Successful exploitation of technology for lifelong learning for all is, however, dependent on a number of factors:

- First, adults need to have a minimum level of basic education including literacy. Technology should not blind us to the fact that there are still millions of adults who cannot read or write and, because of that, they cannot use educational programs offered through information technologies, or even through classical correspondence.

- Second, schools should provide training in “learning skills” – how to search, assimilate, define problems, apply knowledge to problem solving, etc.

- Third, technology literacy - the ability to use technology hardware and software – should be part of basic education and a pre-requisite for adults to make good use of information technology.

This may be the first time in the history of the human race when lifelong learning is not only desirable and urgent, but also feasible.

Wadi D. Haddad
High Tech/Grassroots Education: Community Learning Centers (CLCs) for Skill Building
July/August 2000

I read her article "High Tech/Grassroots Education: Community Learning Centers (CLCs) for Skill Building," today in the current issue of *TechKnowLogia*. She did an excellent job summarizing the accomplishments and challenges for telecenters in Ghana.

Michael Leslie
Associate Professor, Telecommunication
University of Florida

General Feedback

I like your *TechKnowLogia* and found it's very informative.

Knowledge Coordinator
The World Bank, Washington, D.C.

I am a postgraduate student reading for a master degree in International Education at University of Sussex. I read *TechKnowLogia* regularly and find it very interesting and informative. Since my subject area is Information Technology in Education the journal has helped me immensely. Simple nature of expression and use of high quality language impresses me and helps to read with interest. It covers a wide area and tries to present in a jargon free language. I normally went through most of the material in Internet but did not find anything that is valuably as this.

Post Graduate Student
University of Sussex, United Kingdom

Thank you so much. I found 'TechKnowLogia' very interesting, informative and worth reading.

Senior Secretary
UNICEF, Thailand

Very good material. Thanks very much.

Manager
Guyana

I find the materials in your Journal quite interesting and useful.

Senior Economist
Inter-American Development Bank, United States

Thanks and your services and contents are greatly appreciated.

Procurement Engineer
UNESCO, France

Many thanks for your kind attention. The journal is doing a great job! I wish your journal prosperity!

Vice-President for Correspondence and Distance Education
Nizhny Novgorod Linguistic University, Russia

Thanks … for this helpful curtain raiser. I find the journal very useful. In addition to my reading I am also informing others in India and abroad for going through the articles. Thanks again for the useful update.

Senior Education Specialist,
World Bank, India

I have just been reading the latest edition of *TechKnowLogia* and I thought I would tell you that I really have enjoyed the last few editions. It has been quite a source of information for me. I am presently working on a piece for a client in East Asia and have found much of what is in the journal useful.

Economist
World Bank, United States
Lifelong Learning

For the Third Age*

Laurence Wolff
Inter-American Development Bank

"At dusk do not say it is too late; do say that there is sunshine all over the sky."

-Chinese Proverb

The Greatest Social Challenge of the 21st Century

The greatest social challenges of the 21st century will be the aging of human society. By the year 2025 the number of persons aged 60 and over (the “third age”) will increase from today’s 590 million to 1.2 billion. In Japan by 2020, over 25% of the population will be 60 or over. A few decades later nearly every country in the world, with the exception of sub-Saharan Africa (because of the AIDS epidemic), will have a similar percentage of the population aged 60-65 and over. The oldest old (over 80) are increasing the fastest; in very old age women outnumber men by 2:1. At the same time the percentage of the elderly who are chronically ill, at least in the developed world, is declining. In contrast to the developed countries, developing countries will become old before they become rich and the issue of the poverty of the elderly will be crucial. All countries will need to rethink public policy on pensions and on financing of health care and support services for the elderly, and come to grips with the reduction in the number of full time workers (aged 20-65) who in the past were expected to support the elderly and the young.

Why Lifelong Learning for the Third Age is Fundamental

Lifelong learning for the “third age” will be an essential part of the new set of public policies and programs. There are four potential areas for learning which will help to meet the evolving economic and social needs of an aging population: (i) for individual health, (ii) to strengthen community and family, (iii) for productive employment, and (iv) for self-enrichment.

Learning for individual health will help to reduce the human and financial burden of chronic health problems. For example, regular and appropriate checkups are needed to detect illnesses at an early stage. Diet, especially a low fat, low salt, is important to reduce heart disease and cancer. There is strong evidence that frequent physical exercise, even for the oldest, will reduce the possibility of illness. Finally, loneliness and a sense of lack of purpose can lead to mental illness, particularly depression, as well as physical health problems. The well educated understand the importance of these actions, but the poor do not. For a simple example, a study of the attitudes of elderly women in Barbados showed that the majority believed that even moderate exercise was dangerous to their health. Programs of information and education can change the elderly’s knowledge, attitudes, and action to help ensure a healthy and productive old age.

Learning can mobilize the elderly as a resource to strengthen communities and families and to enhance social cohesion. With increasing family mobility, a more competitive workplace, and both parents increasingly working, support systems are becoming more and more fragile and the risks of social disintegration are mounting. With both parents increasingly working, children are likely to be left in day-care centers of uncertain quality. Yet it is known that high quality developmentally oriented care of children aged 0-5 can have a profound impact on long-term achievement and even on a future adult’s emotional and social stability. The elderly can be encouraged and trained to serve their own families as well as to undertake voluntary activities in the community. In particular, they can be taught the fundamentals of developmentally-oriented childcare for their own grandchildren as well as others.

There will also be a continuing need to train the elderly for service towards the handicapped and the chronically ill. Overall, the wisdom of the elderly with regard to child rearing, ethical behavior, and family and community ties can be tapped to guide and benefit younger adults. The elderly can also act as watchdogs on political and social developments to which working families have little time to devote. Learning opportunities provided to the elderly can cover all these areas--training in developmental child care, developing com-
munity activities for elderly handicapped and chronically ill, supporting young families in trouble, and acting in the political arena.

**With the decreasing numbers of population aged 20-65, lifelong learning will help the elderly to increasingly remain in the work force, as a means of reducing poverty, increasing economic growth, and giving a stronger sense of self value to the elderly themselves.** While the elderly lose some skills, such as working in physically demanding and time-intensive jobs, overall they can continue to engage in occupations ranging from the most rudimentary to the most sophisticated. This is especially true if they can build on previous learned skills and do not need to work fulltime, and if the work environment can be adapted to their needs.

Public policy, including pension reforms, will need to encourage the elderly to remain in the labor force. While this is resisted today in some countries with current high unemployment rates, over the long run, retention of the elderly in the labor force will be essential for economic growth, since it will help to reduce the “dependency” ratio—the ratio of full time workers to the very young and very old who are outside the labor market. In many cases, the elderly will be able to use their existing skills. In other cases, they will require training in new skills, such as computer literacy. The elderly also can be trained in new productive roles in areas as varied as childcare, senior adult care, school assistance, security guarding, and conflict resolution. At the same time it will be important to re-educate employers on the value of older workers and on how to adjust the work environment for the elderly.

In developing countries, finding a productive role for the elderly will be more difficult, since for many years to come large proportions of the elderly will be illiterate. Developing countries will need to find cost-effective means of providing functional literacy for the elderly.

**Finally, learning for self-enrichment and empowerment of the elderly will clearly lead to better individual and social mental health.** Self-enrichment leads to increased interactions among the elderly and enriches the whole fabric of public life. Learning for self-enrichment can also be a path leading towards an increased role of the elderly in the community and the labor market.

**In short, there is a strong economic justification for a public investment in lifelong learning of the elderly.** Keeping the elderly healthy pays off in reduced costs for care of chronic illnesses. Keeping seniors in the labor force reduces poverty and the dependency ratio. Involving the elderly in the community and the family increases social cohesion. Even self-enrichment programs strengthen the productive role and health of the elderly.

While a public role in financing learning activities is well justified, the cost to Government must be kept low in part because of competing demands for government funds but also because the elderly also gain economically, socially, and in personal health from nearly all learning, especially those related to productive employment. The elderly should therefore pay for at least part of the cost of nearly all learning opportunities. To ensure flexibility and lower costs, private agencies and NGO’s rather than government should be the providers of learning for the elderly.

**Public Policy and the Elderly: Country Cases**

**SWEDEN** is typical of an advanced country with an aging population and a comprehensive policy for the aging, which includes adequate pensions, high quality health care, and well-equipped facilities and homes. Sweden is seeking to change its pension system to encourage the elderly to continue in working life. Sweden has begun to educate 40 year olds to prepare them for older life and is working to adapt the work environment to the elderly. Sweden has accepted the fact that lifelong learning is no longer a catchword—even in old age there is a need to change occupations. Sweden is building up centers for occupational health, educational systems for the elderly, and programs of information to change attitudes of employers. It is focusing on the concept that aging people are part of the solution—as the elderly work, they find a purpose and they meet social needs. In fact, the elderly in Sweden are now the backbone of public and community life.

Among developing countries **CHINA** has by far the largest program of learning for the elderly. The University of the Third Age (see "Life-long Learning and the Use of New Technology in China", *TechKnowLogia*, September/October 2000) has 15,000 campuses enrolling one million people (still a low number considering the many millions of the elderly). Hundreds of newspapers and periodicals are available for the elderly. The Government has an ongoing publicity campaign to retain traditional values, including the respect for the elderly, which is inherent in its culture. China is moving from a national-organization- and-enterprise base to a community-based system, from a wholly publicly financed system to a system encouraging mixed public and private financing. China is remarkable in its emphasis on the elderly because it is still a poor country but one which is in the midst of the profound demographic transition already affecting developed countries. Through its culture and its policy, the Chinese seek to put in practice the proverb: “At dusk do not say it is too late; do say that there is sunshine all over the sky.”

**BARBADOS** is a country that is far more typical of devel-
oping countries than China. About 80% of the elderly are illiterate. The role of the elderly in Barbados is deteriorating, as attitudes of respect especially towards the traditional “matriarch” decline. Older women are becoming isolated and impoverished and concerned about crime. They have outdated understandings about exercise and preventative health. There are almost no facilities specifically designed and made available to the elderly.

Most programs in middle income countries such as **Brazil and Argentina** are directed at the middle class and are small scale. Poverty is growing among the elderly who are not part of the public pension system. There is resistance in Argentina to encouraging the elderly to re-enter the labor market because of current high unemployment rates.

**Technology and Lifelong Learning for the Third Age**

Mass media, especially television, but also radio and newspapers, can be powerful tools for the delivery of learning opportunities to the elderly. They are not adequately used to date. A few of the elements for which the mass media are already used in the developed world are: campaigns for healthy living, self-help and enrichment programs, and television exercise classes. Several cable channels are explicitly designed with the elderly in mind, providing cultural and enrichment programs and advice for daily living.

Areas in which the mass media are so far rarely used for the elderly include training in childcare, literacy and caring for handicapped and chronically ill adults. The Internet is already serving the elderly to some extent in developed countries but too many of the elderly are not yet computer literate. The Internet will become important for training the elderly only over the next 5-20 years, much later in developing countries. The Internet is already being used on a pilot basis in a few places as a means of reducing the isolation of the home bound and disabled. The elderly can be used as volunteers or low-cost aides for a wide variety of media and technology-based programs. In particular the elderly with skills can teach the elderly lacking such skills. The elderly can also act as monitors and guides for television-based training programs.

In developing countries over the next decade, radio and television is expected to play a more important role than the Internet, which may be restricted to the middle class. China’s experience needs to be studied and replicated where appropriate. Of critical importance in the developing world is the need to find a cost-effective means of reducing the poverty of the elderly. The mass media can be part of this response through education and information programs leading to better health practices, to functional literacy, and to awareness of new opportunities in the work place.

A number of experimental uses of technology for the elderly are underway. Carlow International, a Human Factors Engineering and Ergonomics company that creates environments to enhance human use of technology, especially those of the elderly, is implementing several projects.

In Ennis, Ireland, more than 80% of the homes are wired for participation in a Local Area Network and 4,000 out of the 5,000 homes there have computers. Many of the Ennis seniors are participating in this "Information Age Town" and a local boys high school offers training to seniors to enable them to use the Internet. The oldest participant is 87 years old. Carlow's Electronic Friendly Home Project will examine prototype electronic technologies for use in the home by seniors. 35 seniors living in their own homes have been recruited to test electronic technologies in their homes.

In Fairfax County, Virginia, USA, a project hopes to develop a Local Area Network that will link frail elders and persons with disabilities who live alone to the County Department of Health, the Department of Social Services and to the Schools of the County. The goal is to use technology to reduce isolation, reduce hospitalization rates due to rapid response and continued communication, and increase access to information.

Lastly, LINC-21 seeks to link elders between two wired communities: Ennis, Ireland, and Blacksburg, Virginia. These two communities have committed to linking 25% of their frail elders. This project, through teleconferencing, chat rooms, and other forms, will offer elders the opportunity to meet others whom they may never have met as well as the chance to participate in their own communities.

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*This article is based on a meeting held in Washington, DC, June 1-2-, 2000, "Inter-Regional Consultation on Aging of the Population," hosted by the Inter-American Development Bank.

† For more information on Carlow International and the projects described, contact Michael Creedon, Director of Aging Research at macreddon@carlow.com.
Consumer Learning

Smart vegetables, talking cars, education - in the marketplace. No, the vegetables aren’t talking – but they are helping to educate their consumers. I now buy fruit with barcode stickers giving me the URLs for recipes and nutrition information. There are store displays and information cards telling me about the exotic new vegetables, where they come from, how to cook them and why they are good for me. If I need more, or want more, there is a touch screen. A natural food store, with homeopathic products accompanied by knowledgeable staff, books and guides to healthful living is now part of my neighborhood. Though it is new, it is not strange or out of place and fits well with the cyber-café across the street.

Something new appears to be happening in the information environment. As boundaries between and among living, learning, working, consuming and investing are becoming blurred, the information environments are becoming more seamless. Technology is bringing information to the consumer, on demand, but often without a conscious effort on the part of the learner. Continuing the food and nutrition metaphor, this is education and learning in bite-size pieces. It is an increasing part of the environment, embedded in product marketing, facilitated by information kiosks, help screens, recorded messages and video clips; products accompanied by stories of the people and places and cultures from which they come.

Part of this is customer service — customers demand more choices but need more information to make sense of all the choices. Part of this is the need of retailers to differentiate their product, or to associate their product with good environment practices, multicultural awareness or world issues. Part of this is the need of consumers to associate their buying with causes and issues of interest, or of concern — see http://www.realgoods.com/ and http://www.socialinvest.org. There is a kind of value-added by which the object or product comes with a story of people and places, thus implicit identity and values. This ranges from the selling of cars and clothing associated with aspired lifestyles to cultural products associated with vicarious heritage — see http://www.africancrafts.com/ and http://www.novica.com/ and http://www.onenest.com/.

Market researchers refer to the “cultural creatives,” consumers who actively pursue lifestyles that combine living and learning, and integrate their values with their consumption, healthcare, home, travel and investing decisions. The journal, National Business Communications, has labeled this the “Lifestyles of Health and Sustainability” or LOHAS market, which they estimate at $227 billion in the United States and $546 billion worldwide. Key segments are: sustainable economy; health and wellness; personal development; and ecological lifestyles. For ICT applications, two points are key. First, acquisitions of information and marketplace choices are part of the same process. Information needs to be in the same time and place, easily accessible. Second, these consumers are already knowledgeable. There is low tolerance for hype, pseudoscience, and inaccurate, incomplete or misleading information. Leading edge technology with fancy graphics, interactivity and multimedia can help but may not be necessary and cannot substitute for good content.

Kiosks and Museums

Information kiosks of various levels of sophistication and interactivity are being introduced in many contexts, including public spaces as well as shopping malls and commercial spaces. At some car dealers, customers not only can browse inventory without walking onto the lot, but also can pick out a car and its options, apply for credit with multiple lenders and get approval, all without talking to a salesman. Not only does the company save money on personnel, it may actually sell more. The customer may trust the technology to give better answers or at least the same answers as it gives to other people. It may relieve the perceived pressure car shoppers often feel as a result of salesmanship. One manager reports, “It adds credibility to the sales process. Customers typically don’t trust car salesmen.”
In another application, ServiceOntario is a system of automated self-service kiosks that allow people to obtain government services, information and products much as they would from automated bank machines. There are kiosks in government offices and major shopping centers across the province, with availability up to 7 days a week and up to the service hours of the centers. In the U.S. there are mixed results, with efforts to use such kiosks to extend information to targeted communities facing problems of low literacy and lack of familiarity with the technology. In the UK and elsewhere, there are coordinated efforts to rethink the urban environment using such technologies. See conference on ‘Learning Partnerships for Regeneration’, sponsored by the Department for Education and Employment (DfEE) March 2000: http://www.lifelonglearning.dfee.gov.uk/ and http://www.connect-training.co.uk/connect/web/index.html.

A substantial body of research and analysis on such adult and community learning is associated with museums and related information displays. (See “Interactive Museums: Learning Through Experience” in this Issue of TechKnowLogia) Much of this predates the advent of ICTs and networked systems, but the underlying learning theory and practice builds on a substantial body of research and experience on how much information the casual viewer will notice, respond to, and remember – and under what circumstances. Generally, less is more, patterns and associations matter more than terminology, and details aid in the memory of bigger concepts. The Museum Learning Collaborative, a worldwide network coordinated from the University of Pittsburgh has perhaps the most extensive annotated bibliography on the available research. See http://mlc.hrnc.pitt.edu/mlc/.

**Market Forces?**

There are at least four drivers for this emerging new emphasis on information and consumer learning in the marketplace:

- public interest advertising, consumer education and information outreach;
- the movements for more socially responsible investment, marketing and sustainable development practices;
- corporate marketing piggy-backing on the new social, environmental and issue concerns; and
- the substitution of information technologies for service workers providing access to information on demand as well as a wide range of design, assembly, analysis, diagnosis and other help functions.

There also appears to be a number of distinct communities of information and communications specialists working to refine such approaches:

- commercial advertisers and communications specialists
- social marketing specialists
- embedded technology specialists working on “smart” machines and “smart” environments
- specialists in interactive museums and related display and information kiosk technologies
- public information specialists
- environment and health educators

Curiously, I do not find an identifiable community of adult educators in this field, or a focus on such informal learning in the adult education literature and advocacy. Undoubtedly, I am overlooking some significant work and people. However, in discussions with a number of people I could not get agreement on a descriptor for this form of adult education. It is informal education, but somewhat less intentional than the term normally implies. It is community education, but less mediated by any community-based organization or civil society process. There are organizations and institutions, public and private, associated with such information systems, but it is only incidentally limited to the institutional or organizational space. It draws lessons from extension education, but most is not linked to extension services. There is no intention or expectation of any form of credentialing. It includes some interactive learning and simulation activities, but is too diverse and includes too much didactic and purposeful activity to be termed ludic or “playful” learning. There is some terminology on lifestyles education, but this does not cover most of the product marketing, and much of the social marketing does not use the vocabulary of educators.

Perhaps it doesn’t matter what we call it. What may matter more is that we realize that the information in the marketplace is reshaping the learning environment in important ways. The development of smart cities and active learning communities requires better understanding of how to do this well, and how to respond to the inevitable abuses of this seamless environment.
George W. Bush Proposes a $400 Million Dollar Plan to Use Technology to Improve Student Achievement

Governor George W. Bush, the Republican presidential nominee, on Monday unveiled a $400-million plan for using technology to improve student achievement in public schools. The five-year plan would funnel $65-million annually to universities and research institutions that would evaluate which education-technology programs are most successful at improving student performance. http://chronicle.com/free/2000/06/2000062001t.htm

U.K.'s Gordon Brown Pledges a Boost in Education Spending

The U.K.'s Chancellor of the Exchequer, Gordon Brown, pledged in July, to boost education spending by 12 billion pounds over three years. Brown is quoted as saying to Parliament, "The best education for all from early learning to life-long learning is not just a time honoured social ideal, it is an absolute economic necessity." Brown promised 500 million pounds more for the Sure Start program, which helps children in poverty receive help before starting school. He also pledged that by 2002, all 32,000 schools in Britain would be linked to the Internet with an additional 500,000 computers in schools by 2004. http://abcnews.go.com/wire/World/

Hewlett Packard Helping To Build "Digital Towns" In Central America

The Hewlett-Packard Company (HP) is helping empower people in several Central American countries with information technology. HP is providing the latest in computer technology in order to help construct "digital town centers." The project known as LINCOS is a joint effort of HP, the Costa Rica Foundation for Sustainable Development, the Massachusetts Institute of Technology (MIT) Media Labs, the Institute of Technology of Costa Rica, and the University of Rochester according to Ann Livermore, President of Enterprise and Commercial Business at HP. http://www.earthtimes.org/jul/socialdevelopmenthewletpackardjul11_00.htm

Northwestern University Wiring Its Dormitories

Morteza A.Rahimi, vice president of information technology at Northwestern University, says the institution is wiring its dormitory rooms to receive video instruction over the Internet, which he believes will be the next hot technology in higher education. http://chronicle.com/free/2000/06/2000062001u.htm

Multi-Million Dollar Advertising Campaign Seeks To Put Parents In Charge Of Their Children's Education

Ted Forstmann, founder and co-chairman of the Children's Scholarship Fund, announced, in July, the launch of a $20 million national advertising campaign that will focus attention on the need to put parents back in charge of their children's education. Campaign for America's Children will promote the development of alternatives to the current government-run public school system and will educate the public about the benefits of establishing an education system in which parents are free to choose from a variety of alternatives for their children. http://www.parentsincharge.org/press_july1100.html

Rising Demand for Higher Ed Sends India to the Internet

Without enough colleges to meet rising demand for higher education, India makes do with low-tech distance-education efforts, and makes plans for a future on the Internet. http://chronicle.com/free/v46/i45/45a04801.htm
Adult Education in the Americas: The Victory of Spontaneous Action

Claudio de Moura Castro

Many complain against the “moribund nature of most traditional programs” of adult education. Are they indeed dead or are we looking for it at the wrong place? This article proposes that adult education is well, exploits the technologies of the day, and was reinvented on the go by people who never heard the term or read the books proposing it. In fact, it happened everywhere, except where it was supposed to happen, namely, the adult education centers of the governments.

Where is lifelong education taking place?

Due to the scarcity of research and data, most evidence in this article comes from the United States and Brazil, countries with which the author is more familiar. But one would expect the situation of other countries not to be much different. It may be interesting to notice that by contrast to Europe, the United States and Latin America have two characteristics in common which are relevant to this article. They share systems of education that have flaws, are less integrated and less managed from the top (if not in theory, at least in practice, in the case of Latin America). They also have governments with more entropy and more ambiguities in the division of roles. In some respects, they have less powerful central governments than Europe does. Therefore, lifelong education compensates for these shortcomings.

1. When education takes too long, it becomes adult education

The poor quality of most education systems in Latin America results in frequent repetitions. Yet, increasingly students and their parents perceive that education is the passport to good jobs and modern society and they refuse to leave school. They become older and eventually reach adulthood. In Brazil, for instance, more than half of the secondary school students are technically adults. Also more than half of the secondary school students attends evening courses; often, they already have day jobs.

In the Brazilian case, adults can bypass regular secondary schools and take a compact version of primary or secondary education designed for adults and leads to public examinations that grant diplomas that are legally equivalent to primary and secondary certificates. This possibility has led a large number of private institutions to offer courses preparing for these examinations.

A very interesting development along these lines is the Telecurso 2000 (See “Brazil’s Telecurso 2000: The Flexible Solution for Secondary School Equivalency”, in TechKnowLogia, November/December 1999), a TV program to prepare students to take the examination. This innovative program is broadcast throughout the country and the written materials are sold in newsstands. Around seven million people watch the program for entertainment since it is lively and amusing. But in addition, enterprises, education authorities and other
organizations maintain classrooms with TV sets and instructors following the students. At present, close to half a million students are formally enrolled in these classrooms.

By the same token, higher education is essentially adult education. In the United States, the average age of students keeps increasing and in Brazil, the mean age of students is close to 30 years, and 70% work. The pattern of finishing secondary education, finding a job and subsequently returning to evening higher education has become the predominant path. Not surprisingly, most course offerings are in the evenings. A dramatic example is the Pacheco branch of the Argentinean Technological University. Being an industrial town, more than 95% of the students attend evening courses and work during the day.

The open universities, pioneered by the United Kingdom, have mushroomed around the world and Latin America is no exception, despite the strong objection of education lobbies in many countries. The United States has a wide range of initiatives. Colombia, Mexico and Venezuela have distance universities. Internet offers booming new avenues for distance education but the numbers are still modest.

The situation with post-graduate schools is even more skewed towards middle-age adults. Many students return to universities to take graduate degrees after several years of professional life. This is true in the United States, as well as in Latin America.

2. Extension courses: the official lifelong education

In the United States, the course catalogs for extension courses are several times thicker than those describing regular offerings. In some cases, these courses are considered a cash cow to cross-subsidize other levels of education. Many American community colleges enroll each year the equivalent of 20% of the population of the towns where they are located. Adult education is a booming business.

In Latin America, there is much going on. In fact, leading business schools have taken this route. IESA, in Venezuela has 300 post-graduate students, no under-graduates and 6000 extension students enrolled in its short management courses. Business schools in Peru and Costa Rica have taken the same route.

3. Training and retraining for jobs

There is a progressive shift in training programs, from youth to mature adults and from pre-employment to in-service training. In the United States, pre-employment training has been erratic and often inadequate. To compensate for this casual and heterogeneous system, the United States has a vast array of training programs geared to adults and young adults. High schools and Community Colleges offer many evening courses opened to local residents and focusing on a broad range of subjects. Many of them are in the traditional trades, such as auto-mechanics, welding, electricity, woodwork and construction trades. But in addition, office technology has become a popular area, with courses in computing, accounting, opening business, secretarial and so on. Equivalent offers come from municipalities and other government agencies. Immigrants are frequent clients of these courses.

Most Latin American countries have structured systems of training, run outside the regular education system, and are funded from a levy on the payroll. Over three fourths of the funds, if not more, are allocated to activities that could easily be considered adult education, since the clients are adults and take the courses while employed. In Brazil, every year, around three million people take courses in one of these institutions. One of the new agencies – in charge of training for the trucking industry – has rented time on a satellite and beams eight hours a day of courses to the employees of transportation firms. Reception is done at classrooms in transportation companies and presently reach more than 300,000 employees.

In the recent past, many ministries of labor have created training programs geared to young unemployed adults. In Chile, funded by an InterAmerican Development Bank (IDB) loan, the Projecto Joven pioneered a new model of contracting courses with private or public institutions, conditioning the contracts to the existence of jobs or internships at the end of the course. A similar program is in operation in Argentina and others are to follow. Brazil has a similar program sponsored by the Ministry of Labor, training more than 300,000 workers each year.

The budgets of the American armed forces for training has been estimated at thirty billion dollars and a large share of pilots, mechanics and electronic technicians in that country have received their training from the armed forces. In Brazil, most airplane mechanics received their training in the Air Force.

Countries like the United States have a thriving proprietary market for training. Hundreds of courses in any major city are offered in office technology, secretarial skills, computers and a multitude of short courses geared to the service sector. Exactly the same happens in Latin America where in any downtown city the signs for courses are as abundant as pharmacies or bars. In addition to the areas mentioned above, English language training is a popular subject. These are the typical second-floor schools in the downtown areas, with
signs outside, advertising their courses. As one could expect, the quality is varied, ranging from serious and decent, to fly-by-night operations, often closed down by the police. Be that as it may, they offer services that people are willing to purchase, year after year. It is unreasonable to expect that consumers - and they are adults - would take such courses if they were completely ineffective.

Major players in the proprietary training business are the correspondence schools. Some are local branches of American schools but the majority is local. They offer radio and TV repair, drafting, sewing, embroidery, electricity and more recently, computers. Like their second-floor counterparts, they have low status and deserve little respect from highbrow authors and public authorities - both in the United States and Latin America. Yet, they perform a social function, particularly for those who live far away from face-to-face programs. More than three million people have taken a course from the second largest Brazilian correspondence school. Research conducted by this author indicates that they are very cost-effective for the students who graduate. 3 (see "The Lowly Correspondence Courses for the Masses: Fraud or Redemption?", in TechKnowLogia, July/August 2000).

One would expect the Internet to become a major force in such training, stand-alone or in conjunction with printed materials or personal encounters. This is already happening in the United States and we should expect countries like Brazil, Mexico, Chile and Costa Rica to follow the same path.

4. Employer’s training

There is at least as much learning taking place at the work site as in regular schools. There is presently a strong tendency for firms to use information technology to deliver their training. From IBM’s two satellites beaming training around the world to its staff, to videotape in less formidable enterprises, it seems that the new media are taking over industry. Videos and CD-ROMs are becoming more common as a means to deliver training inside enterprises. Available evidence is scant but trade fairs suggest a vigorous production of training materials using the new media.

Probably the most spectacular development along these lines is the so-called Corporate Universities. Motorola University is well known, as is “Hamburger University” created by McDonalds and the graduate school of public policy created by the Rand Corporation. But several other large organizations have similar institutions. The total is getting close to one thousand. The oil company of Venezuela two years ago created a corporate university (CIED) along the lines of Motorola. Initial reports suggest that it is a well-run operation, running nine campuses and attracting professionals from other companies in the same industry.

5. Self learning and "edutainment"

A lot of learning takes place along the life of citizens who received some education. We can have an idea of the effort if we consider that a very significant part of the titles published in the United States are of the “do-it-yourself” or “how-to-do” category. In this respect, it is necessary to consider the role of the American public libraries that have unique institutions, even compared to rich European countries. Every little town and every corner of big towns have their own libraries with all the usual magazines, reference books, how-to-do books, classics, as well as helpful librarians. One could well imagine that everything else pales, compared to the self-learning effort in mature societies.

But there is a lot more that is not strictly self-learning. Television and computers have created a new category of activities sometimes called “edutainment” to connote the combination of education with entertainment. With the popularization of cable TV and satellites, the number of channels multiplies and allows for greater specialization and lower costs. Some channels specialized in this mixture of culture, education and entertainment. The Discovery Channel and The Learning Channel are typical examples of this new model. In general, these channels aim at a general audience that wants more intellectually sophisticated entertainment, such as archeology, history, geography, science and technology. Programs such as James Burke’s Connections offer an intriguing version of the history of science and technology. Documentaries about the petroleum industry or the theory of evolution are also in-between education and pure entertainment.

On a more pedestrian or practical vein, the cable channels have produced a large number of programs on cooking and on woodworking and household repairs. These have become genres on their own, with different characters and styles of presentation competing for the preference of the Saturday viewers.

The new satellite channels pave the way to dedicated education channels operated by commercial networks. This is a new chapter in edutainment TV. Venezuela, Brazil and other countries are just beginning to operate commercial TV channels entirely dedicated to education.

The other noteworthy trend is in computers and Internet. CD-ROMs and Internet are true learning tools and many people have understood it and use them intensely. Even in Latin America, the number of Internet connections grows at unimaginable speeds. The practical uses of Internet are not ig-
nored by a large proportion of subscribers, even though chat
rooms and e-mail remain the most widespread use.

More than we thought;
not where we thought

All these developments are path-breaking advances in life-
long education. They have an incredible penetration in soci-
ety and offer endless possibilities. By using direct interviews
with adults, Paul Belanger found that in the United States
about 40% of the adult population is attending some form of
education or training program (the figure reaches 50% for
Sweden). The same survey also found that there are more
adult learners than there are children in school in several
OECD countries (this does not take into account the intensity
of the effort of youth compared to adults). 4

Adult education for lifetime is taking place where it is not
expected to and it is failing where it is supposed to happen.
None of the programs discussed above are considered official
“adult education”. And yet these are the people who have
made lifelong education stronger and more meshed in our
life than anybody could have imagined, even in their most
utopian dreams. This effort is not coordinated and defies
coordination. There is no planning, no blueprint, and no gov-
ernance. It is a form of anarchy, perhaps an “organized anar-
chy” as Martin Trow suggested. The systems adjust and re-
adjust by the force of markets, quasi-markets and random
events. There is little if any quality control.

The traditional adult literacy has failed, to a large extent.
What is blooming is a lifelong education for the affluent, for
the modest and for the almost poor. Charity and equity
failed. The markets won and we are far better off than we
would have been without it. But the poor remain illiterate
and unable to find the lifelong education promised by the
different international initiatives. The use of media such as
radio and television allows for very low cost programs with
proven effectiveness and reaching numbers that are many
times larger than the conventional methods. Helping the
barely literate poor with some of these programs seems more
promising than the efforts at the traditional versions of basic
adult literacy.

1The author is the Chief Educational Advisor of the Inter American Development Bank. His colleagues Larry Wolff and J. C.
Navarro offered useful suggestions. Yet, the opinions expressed here do not necessarily reflect their perspectives or an official
position of the Bank.
2Forty-two percent of the higher education students are between ages 24 and 64.
3Lucia Guaranys and Claudio de Moura Castro, Ensino por Correspondência: Uma estratégia de desenvolvimento educacional
no Brasil (Rio de Janeiro, IPEA, 1979).
4Paul Bélanger and Albert Tuijnman, New Patterns of Adult Learning: a Six Country Comparative Study (Amsderdam: El-
sevier/Pergamon, 1997).

Grants for research to support international digital libraries

The National Science Foundation of the United States is accepting grant proposals for research to support international
digital libraries. The goal is to help users to gain access to and exploit information in new ways.

Who is eligible: American academic and nonprofit organizations in collaboration with at least one research team in an-
other country.

Deadline for letters of intent to apply: one month prior to proposal submission. Proposals are due January 15, annually.

Total amount to be awarded and number of awards: $1-million, annually, for an unspecified number of awards.

Amount of individual awards: up to $165,000 per year for up to three years of research.

For more information visit the web site:
Helping Adults Build Their Personal Success

John Sabatini, Ph.D.
Senior Researcher and Instructional Designer for LiteracyLink

The Need and the Response
In the USA, a large number of students drop out from secondary school before completing the requirements for the high school diploma. Later in life, many of those dropouts enroll in special programs to prepare them for a high school equivalency test called the General Educational Development (GED) test. Every year more than 800,000 adults take the GED to earn their high school diplomas.

It is also estimated that millions of adults in America read at no better than a sixth- to eighth-grade level. This is a problem across the country, as adults with limited literacy skills are unable to find and keep decent-paying jobs. It is necessary to provide and build workplace essential skills of underemployed or unemployed adults who are ready to find and keep a job as a stepping stone to a better life.

LiteracyLink is a joint initiative begun in July 1996 in response to the growing nationwide demand for basic education and skills training. Building on the existing telecommunications infrastructure of public television and funded by a five-year $15 million grant from the U.S. Department of Education Star Schools Project, LiteracyLink is creating an integrated instructional system of video and online computer technology to help adult students advance their GED and workplace skills, and is working to improve the quality of instruction provided to adult students by offering professional development resources and training to literacy educators.

LiteracyLink’s products and services are being field-tested by 25 “innovation sites” linked to five public television stations around the nation. The stations are Iowa Public Television, KCET-Los Angeles, KET-Kentucky, KNPB-Reno, and WNED-Buffalo. The innovation sites include schools, libraries, colleges, business, and community-based organizations.

LiteracyLink consists of three major components: LitHelper™, LitLearner™, and LitTeacher™.

LitHelper
- An online diagnostic tool designed to identify the skills of individual learners, and then craft tailored learning plans for each learner.
- An assessment tool generates an Individual Education Plan (IEP) that provides learners with information about appropriate literacy programs and resources in their area.
- Other components offer instruments for on-going assessment of the learner’s progress, facilitating periodic revisions of the IEP. These assessment tools will use an icon-driven software interface specially designed for adult learners with limited literacy skills.

LitLearner
- Interactive, multimedia modules tailored to meet the needs of adult learners. The modules consist of instructional video programs, supplemented by online and print materials.
- The Workplace Essential Skills (WES) module consists of one orientation video program, 24 instructional video and online programs and four workbooks. Each of the videos and online units focuses on a different aspect of literacy and communication in the workplace. Topics include: applying for jobs, interviewing, workplace safety, learning at work, the language of work, communicating with coworkers and supervisors, teamwork, writing memos and letters, following directions, reading reports and manuals, and solving mathematics problems at work. WES was launched in September of 1999, and airs on public television stations around the nation.
- Modules are being created for GED Skills, and pre-GED Skills.
- The GED module assists adults prepare for the revised GED exam. The video and online programs are organized around the five test areas covered in the new exam: Writing Skills, Social Studies, Science, Literature & the Arts, and Mathematics. Each program has two components — lessons and assessments — and consists of interactive tutorials and/or simulations.
LitTeacher

- An online “virtual” resource center designed to enhance the knowledge and professional skills of adult literacy educators and administrators, and serve as a resource center for instructional materials.
- LitTeacher contains PeerLit, an index of literacy websites that have been ranked and evaluated by adult literacy educators.
- It offers educators continuing education classes and training in technology, program management, and technical assistance. LitTeacher classes ensure opportunities for professional development through constant interaction with instructors and other course participants through email, bulletin boards, online chats, and videoconferencing.

Partners

LiteracyLink is a joint project of the Public Broadcasting System (PBS), the National Center on Adult Literacy of the University of Pennsylvania, the Kentucky Network and the Kentucky Department of Education. Each partner brings unique talents and responsibilities to the project.

- **PBS Adult Learning Service** manages the project, coordinates the partners’ activities and operates the online instructional service on the Internet.
- **National Center on Adult Literacy (NCAL)** of the University of Pennsylvania develops all online materials for teachers and learners with easy-to-use, icon-driven menus and audio instruction.
- **Kentucky Educational Television** is producing two series for LiteracyLink: Workplace Essential Skills and the LitLearner GED series.
- **The Kentucky Department of Education** is providing curriculum guidance and support.

How LiteracyLink connects to lifelong learning

The literature on adult learning and development points to four general principles relevant to learning and instruction with technology. These principles can be summarized as a call to: a) plan for learning across the life span; b) identify distinctive characteristics of adult learners, b) emphasize the goals of adults, and c) create adult-situated contexts for learning.

In considering how to translate these principles into an instructional design delivered via a multi-media system, foremost must be considerations of the strengths each medium affords. With respect to information communication technology (ICT), a distinction needs to be made between computers as stand-alone instructional tools and computers used in connection with communications technologies such as the Internet. At its present stage of development, the LiteracyLink online system is a hybrid of classroom-based and individual tutorial instruction. That is, although learners work one at a time on online activities and save their results to a personal electronic file, teachers are provided with lesson plans that engage groups of learners in before, during, and after discussions and activities. At present, there are limited opportunities for learners to share and communicate with others online, though tools to facilitate this communication are planned for the future. In the absence of online communication tools, the group-based activity approach is the primary strategy to facilitate social learning and communication, and to benefit from group instruction skills of a knowledgeable instructor.

The computer/web-based instructional environment does take advantage of the data processing, storage, and retrieval capabilities of the computer media. In addition, the Internet provides a context to supplement both general features of classrooms and computers and adds several unique features that go beyond. It provides access to vast amounts of information and resources that are otherwise unattainable in a single instructional setting. In the future, the Internet will also provide opportunities to connect people across time, space, class, and culture that are unimaginable in single settings. In doing so, it provides the opportunity for synchronous and asynchronous communication that breaks down structural barriers facing learners, educators, and programs.

Progress to date

I. Develop online Pre-GED and GED lessons and practice exam using existing materials.

LiteracyLink project staff at NCAL completed the online instructional units of the Workplace Essential Skills series that were publicly released for the broadcast launch of the WES series in September 1999. Twenty-four online instructional units are available to learners and educators. NCAL is continuing the development of the LitLearner GED instructional units. As with WES, the GED online materials will integrate with the video and print aspects of LiteracyLink, enabling adult learners and educators to access a complete multimedia learning environment.
Although the primary purpose of LitLearner is to prepare adult learners for the workplace and for the GED, the ultimate goal is to promote lifelong learning and to enable adults to fulfill their roles as workers, citizens, and family members. To do this, LitLearner is organized around the WES and GED content areas and crosswalks with more universal learning themes that enable adult learners to apply academic skills, knowledge, and abilities in contexts that relate to their life experiences and goals. Comprised of three instructional components — learning modules, Internet activities, and video activities — the LitLearner online instructional system can be organized into a personalized learning plan that enables adult learners to generate a learning path that meets their individual goals, interests, learning styles, and academic needs.

<table>
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<tr>
<th>Item</th>
<th>Activities</th>
<th>Accomplishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WES Online Instructional Activities</td>
<td>The WES online instructional activities were completed and opened to the public in September 1999. Include 24 instructional units, each containing two interactive activities.</td>
</tr>
<tr>
<td>2</td>
<td>WES CD-ROM</td>
<td>CD-ROM containing video clips used in online instruction produced for anticipated distribution to LiteracyLink users.</td>
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<tr>
<td>3</td>
<td>GED Online Practice Questions and Database</td>
<td>Over 400 items have been developed by NCAL research staff, SRI staff, and University of Delaware staff. Further item development continues across the test content areas. Additional 100 items are being provided by GED Testing Service, with GEDTS review of selected items. Online databases and tools in development to support practice question infrastructure.</td>
</tr>
<tr>
<td>4</td>
<td>GED Learning Modules</td>
<td>Preliminary English &amp; Language Arts modules complete; other four GED content area modules in development. Modules to reflect proposed GED exam for 2002.</td>
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</tbody>
</table>

II. Design and develop software interface for adult learners.

The LiteracyLink software interface is intended to provide a user-friendly and easily navigable way for learners and teachers to access the online resources. The supporting software system design provides flexibility for ongoing growth of the project, customization of instruction for learners, and built-in support through audio and visual navigation. Driven by icons, the software system supports a dynamic instructional environment that allows learners to interact with online resources within and beyond LiteracyLink in a scaffolded manner.

The Virtual Classroom online management system was established during this project year, in an effort to provide practitioners, programs, and state agencies with a systematic way to manage learner data and track learner performance and participation within LiteracyLink. The system includes an interface that enables teachers to establish a virtual link to the learners in their class/program, respond to learner portfolios online, and organize coursework.

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<tr>
<th>Item</th>
<th>Activities</th>
<th>Accomplishments</th>
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<tbody>
<tr>
<td>1</td>
<td>Front pages</td>
<td>Revised design completed for WES public launch</td>
</tr>
<tr>
<td>2</td>
<td>Learner and Teacher Homespaces</td>
<td>A personalized, password-protected interface specific to learners and teachers completed and fully functional.</td>
</tr>
<tr>
<td>3</td>
<td>Virtual Classroom</td>
<td>A Virtual Classroom management system, enabling online teacher and learner interface, teacher management of learner data, and data reporting, was prototyped. Fully functional system underway, with estimated completion in the new project year.</td>
</tr>
</tbody>
</table>
III. Create online intake and diagnostic instruments.

LitHelper has the following primary components: Tours, Goals Planner, Learning Plan, Portfolio, and GED Practice System.

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<tr>
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<th>Activities</th>
<th>Accomplishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tours</td>
<td>Welcome tours are available for LitLearner and LitTeacher online paths. Enhancements are in progress for GED launch.</td>
</tr>
<tr>
<td>2</td>
<td>Goals Planner</td>
<td>Series of instructional activities, that produce a learner Life Story, Objectives, and Goal Statements. Prototype complete; goals Planner Tour complete. Fully functional planner will be available in final project year.</td>
</tr>
<tr>
<td>3</td>
<td>Learning Plan</td>
<td>Static Learning Plan corresponding to WES curriculum completed. Enhancements underway for GED launch.</td>
</tr>
<tr>
<td>4</td>
<td>Portfolio</td>
<td>Expanded portfolio providing management tools for collection, selection, and reflection on learner instructional activities completed.</td>
</tr>
<tr>
<td>5</td>
<td>GED Practice System</td>
<td>GED practice test system prototype item bank in development. Over 400 practice items completed and reviewed. Sample practice test and item validation continues with local innovation sites.</td>
</tr>
</tbody>
</table>

IV. Create an accessible technology based resource center for literacy teachers and service providers.

The LitTeacher instructional system offers continuing education training courses and certificate programs for professional development. The Internet-based course system offers adult educators a new opportunity to continue their professional education with quality instruction available on a flexible schedule and in a readily accessible format. LiteracyLink has established a fee-based schedule for the provision of the LitTeacher online courses, in order to create a self-sustaining, high quality continuing education system.

<table>
<thead>
<tr>
<th>Item</th>
<th>Activities</th>
<th>Accomplishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Online Course: Creating a Technology Plan</td>
<td>Final version of course completed. Offered to 70 participants from Connecticut literacy programs.</td>
</tr>
<tr>
<td>2</td>
<td>Online Course: Integrating Software into the ABE/GED Curriculum</td>
<td>Final version of course completed. Anticipated offering to Connecticut participants in June 2000.</td>
</tr>
<tr>
<td>3</td>
<td>Online Course: Integrating the Internet into ABE/GED Curriculum</td>
<td>Final version of course completed. Anticipated offering to Connecticut participants in June 2000.</td>
</tr>
<tr>
<td>5</td>
<td>LitTeacher Marketing and Instructional Video</td>
<td>10-minute video produced and ready for distribution via PBS.</td>
</tr>
</tbody>
</table>

Conclusion

After four years of the project, the daily logs of teacher and learner logins show a steady increase in users across the country. When the GED learning materials are launched next year, we are anticipating even greater participation. Many lessons were learned along the way by the design team and partners. A formative study conducted by the Institute for Social Research confirmed that teachers and learners could implement the three media (video, print, and online) in a classroom setting, though the designers underestimated the amount of time classroom teachers thought necessary to spend on each instructional unit. The formative study also revealed several important factors that could be improved and these changes have been incorporated into the design of the GED series. A summative evaluation will be conducted in the coming months to test the effectiveness of the WES program in promoting learning.

For further information on LiteracyLink, visit the website at: [http://www.PBS.org/literacy](http://www.PBS.org/literacy).
Introduction
Learning is a lifelong process that is mutually important for senior people as for youth. With the increase of the elderly population and the compulsory retirement system in China in the last two decades, China has been facing a big challenge in meeting the needs of the elderly in learning. Various forms of education and learning programs have been developed for seniors all over the country. However, the University of the Third Age (UTA) has been the most successful program in promoting lifelong learning in China.

With the strong voice and demands for learning by the increasing number of the elderly population, the existing UTAs can hardly meet the evolving needs. The use of new technology such as remote teaching and the Internet have been explored in order to make learning accessible to more elderly.

The Development of UTAs in China
The first UTA in China was established in Shangdong Province in 1983. Since then, the idea and concept of UTA has been widely accepted and the UTAs have spread all over China. Statistics show that the number of UTAs in China has reached 16,676 by the end of 1999, and the number of seniors studying at the UTAs is more than 1.38 million.

The programs for lifelong learning, especially the development of UTAs, have been supported and encouraged by the Chinese government. The Law of the People's Republic of China on Protection of the Legal Rights and Interests of the Elderly, which was passed by the Chinese National People's Congress in 1996, stipulates that the elderly have the rights for continuing education and the State will develop the education of the elderly and encourage the establishment and operation of various kinds of UTAs. In 1994, 10 of the ministries of the Chinese central government jointly worked out the National Seven Year Development Plan of the Work on Aging, which mobilizes and requires the local governments at all levels to work out a development plan for the education of the elderly.

In order to promote the development of the UTAs in China, the China Association of Universities for the Aged (CAUA) was established in 1988. It is a network organization of the UTAs in China. It now has 207 member UTAs. CAUA publishes a magazine on lifelong learning, which provides guidance to the UTAs of China. CAUA has set up a group for research on the development of textbooks for UTAs.

Now, the majority of the UTAs are established, financed and operated by government and some are set up by the private sector. For instance, of the 207 members of CAUA, 26 are set up by the private sector. Some of the privately operated UTAs also receive financial assistance from the government. Normally, a UTA is different and separate from an ordinary university. It has its own classrooms. The courses offered are designed according to the interests and demands of the senior students. The popular courses are calligraphy, painting, literature, cooking, gardening, healthcare, music, dancing and computers. In the rural areas, the courses are mainly related to the technology needed in agriculture.

The Use of New Technology in Lifelong Learning
With the increase in the elderly population, it is quite difficult to meet the generated demand for lifelong learning by the conventional methods of UTAs. In this regard, some areas of China have tried to use new and modern technologies to promote lifelong learning in China.

In 1998, a TV UTA was opened in Zhe Jiang Province under the joint efforts of the Committee on Aging, the Personnel Department, the Trade Union, the Financial Department, the Labor Department and the Administrative Department on Radio and TV of Zhe Jiang Province. Zhe Jiang TV UTA has more than 10 courses such as Medicine, Health Care, Calligraphy, Painting, Literature, History, Psychology and Science & Technology. The courses could be added or adjusted according to the interests and demands of the elderly. The TV UTA program is offered from 8:30 to 9:20 a.m. every Friday; there are altogether 2 classes with 25 minutes each. The same TV UTA program is re-broadcasted every Saturday. The examination is conducted in the form of a written test or by discussion among the students. Diplomas are issued after completing every 8 courses. Zhe Jiang TV UTA has branches in 22 cities and counties within the province where the elderly could register.

With the fast development of the Internet, in 1999 Shanghai TV UTA opened an online UTA in cooperation with the Shanghai TV Station. Although it is the only online UTA in China, and although the majority of the elderly people do not have access to the Internet, it represents the new development trend. It is expected that this new technology will make lifelong learning more easily accessible and would enroll more elderly people in lifelong learning. For more on Shanghai online UTA see: www.ol.com.cn or www.shtvu.edu.cn.
Why I Love (GOOD) Training Videos

I Am a Convert

During a powerful storm, waters migrating from the ceiling invaded my living room. Something wrong with the roofing, was an easy conclusion. Visiting the Home Depot store, a home improvement store in the U.S., I found a video explaining how to repair asphalt roofs. It was free if I also bought the shingles for the repair. I saw the video twice and considered myself ready to climb to the roof and start yanking the old shingles and revealing the rotten plywood underneath. At this moment, a friend arrived to spend the weekend - an old school colleague, turned venture capitalist. I offered him a tool and we both proceeded to discover that the damage was much worse than expected. We spent the entire weekend on the roof but managed to fix it. Why this poor fellow remained my friend still baffles me. But coming from countries in which asphalt shingles are unknown objects, the video taught me how to do a credible repair on a leaky roof.

When the time came to install ceramic tiles in the kitchen, another video gave me the courage and the know-how. Lots of work but quite a success. The same with laminate flooring in the family room. Changing a toilet was also preceded by a video. Gluing wallpaper was the same thing.

Altogether, videos allow me to successfully tackle tasks that I would not have dared otherwise. And they truly show how to do things in a way that books cannot. Think of the words and drawing required to explain how to unfold the wallpaper on a table, spread glue, fold it, carry to the right place the entire gooey mess, line up with the previous sheet, hold it with one hand, squeegee with the other, trim the edges and so on. Minutes of video tell it all.

Recently, I bought from Taunton Press a video showing thirteen different ways to do mortises and tenons. I am presently looking for some task where a mortise and tenon are vitally needed.

Several years ago, I had to visit a dentistry school where I was shown videotape of a gory surgery of the upper jaw. I hated every minute of the projection. But I had to agree with the dentist-cinematographer that I could see the surgery in the video much better than if I were a spectator trying to see something from behind the shoulders of the surgeon and the nurses (a completely unlikely event but a reasonable hypothesis).

Seeing a video of arc welding, one can see a competent welder run a perfect bead of metal on the two surfaces being joined. This is much better than real life attempts to see the same bead, with sparks flying and burning holes on your pants and having to stay much farther away than the camera image brings us.

Thus, I am a convert. Videos are a powerful tool to learn practical things, tasks where words are weak or confusing. Videos are cheap. The ones I mentioned cost US$ 10 and still are profitable to the producer. There is an endless supply of such videos in industrialized countries. Tool vendors add them to their products. (My new Ryobi table saw has a nice video on how to assemble the machine and use it in typical conditions).

There are thousands of videos on how to do every possible task on the face of the earth, from Tai Chi to embroidery. They are so ubiquitous and unassuming that we tend to look down on them. But no high tech gimmick, no flickering Internet video clip can achieve the same training feats. To teach such practical endeavors, the Internet is a glorified farce. No other technology can beat a good how-to-do video; often, not even a live teacher.
Good Videos and Bad Videos?

Having praised training videos (and by extension its former incarnation which are films), let me now add some qualifications to my infatuation. Surely, not all videos are good. In fact, most videos are plain bad and mostly useless.

How many silly sunsets have we had to endure before anything interesting happens? How many images of flowers and grass leaves waving in the wind? How many teachers preaching to idiot-looking students? How many images of busy students sitting in front of computers? How many robots, crowded downtown streets or highway interchanges? Unfortunately, too many. The average video is slow, takes too long to deliver the message, uses the media poorly and fails to serve any practical purpose. My daughter wrote to several New England preparatory schools asking for information and just about all of them also sent a video. They were all slick, full of pretty fall scenery and utterly unin-formation and just about all of them also sent a video. They were all slick, full of pretty fall scenery and utterly unin-formation - a complete waste of time.

The first case is when they are a means to transmit human two cases in which they are particularly useful. Rummaging through mountains of videos, we can identify the same, mostly because it takes longer to listen than to read.

The second case is more difficult to explain but no less important. Let us think of two real videos.

- The first video demonstrates how to remove the bones from a trout. The maître d’hôtel, in formal dress, tackles the fish as a performing actor in front of a full theater. His movements are swift and precise, no reluctance, not one second wasted. In no time, the bones are extracted and the fish is reassembled as if by magic.
- The second video is Julia Child, the upper-class American converted into French chef. She searches for the right word, stops to ponder what she is going to do next, fumbles with the knife, drops the food, looks for a towel to clean the hands, discusses alternatives and looks a bit worried about the results when removing the ready dish from the oven.

The first is a dead end as an instructional video. No student can relate to that perfection, no student can hope even to get close. The video hides the difficulties and the path to learn the tricks of the trade. It is pure theater in an area where something else is needed. By contrast, Julia Child created a new video/TV language. She was asked to do one or two programs in a Boston education TV in the early sixties, when all television was live. Once the cameras were on, no matter what, they were not turned off until the end of the program. She had to talk and cook, at the same time. That exposed the viewers to all the real life difficulties and accidents. She explained, improvised, fixed the mistakes, elaborated on how to deal with the everyday problems of a kitchen. Not being a professional cook who has spent thousands of hours of repeating the same gestures, she fumbled more than a full time chef would.

Without suspecting that she was creating a style, Julia Child truly found a very important space between the theory and the practice. To remain with culinary examples, Elisabeth David reproduced a letter of Mère Poulard the owner of a restaurant at the Mont Saint Michel. Her omelets were famous in France and someone asked for the recipe:

“Here is the recipe for my omelette: I break some good eggs in a bowl, beat them well and put a good chunk of butter in the frying pan. Then I throw the eggs in the pan and stir. I will be most happy if this recipe pleases you.”

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Therefore, comes the next question: What makes for a good video? We need to understand the language or the languages of video. We take for granted that the printed paper is used for bibles, pornography, novels, newspapers, scientific journals, advertising, and so on. Why would videos have one single specific language or style? In fact, they don’t. There are many video languages, some better than others, depending on the use. A dull speaker - a talking head - in a video is worse than a paper saying the same, mostly because it takes longer to listen than to read.

Rummaging through mountains of videos, we can identify two cases in which they are particularly useful.

The first case is when they are a means to transmit human charisma or magnetism. Some people are endowed with the power to teach, to persuade, to convey ideas. They are the super teachers. With one of those rare people in front of the camera, the bells and whistles of TV production are not truly necessary. The super-teachers are a show by themselves. Tom Rollins, founder of The Teaching Company hit a winning formula along these lines. He finds the most persuasive teachers in American universities and invites them to give a series of lectures on the topics in which they excel. Producing is plain and unsophisticated to an extreme. But the personality and charm of the super-teachers is what matters.

The second case is more difficult to explain but no less important. Let us think of two real videos.

- The first video demonstrates how to remove the bones from a trout. The maître d’hôtel, in formal dress, tackles the fish as a performing actor in front of a full theater. His movements are swift and precise, no reluctance, not one second wasted. In no time, the bones are extracted and the fish is reassembled as if by magic.
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This is a perfect example of the theory that does not help because it is too far from the practice. What makes Mère Poulard’s omelets famous is exactly what is missing from the description. The secret lies in the details that were omitted, just like in the trout video.

**The Theory of the Practice**

There is a “theory of the practice” that is missing from both the trout and the omelet descriptions. Donald Schon in a fascinating book, *The reflective practitioner*, 2 discusses this intermediate space between the theory and the practice. Practitioners master a large repertoire of skills and strategies that are strictly required to perform a task. But these skills are usually not verbalized and even less are they explained in formal situations. Sometimes there is not even full consciousness of the techniques, they are performed but are not brought to the level of conceptualization and description with formal words. This is the “knowing in action” mentioned by Schon.

Learning a trade means learning this “theory of the practice,” usually with the help of someone who is a master of that trade – but not necessarily able to verbalize this in-between knowledge. This is what is not in the books, because it is not part of the official “theory.” Mère Poulard gave all the theory there is to make world-famous omelets, but she did not give the “theory of the practice” for making them. And she probably could not do it in letters, even if she tried.

This is what Julia Child brings to the art of making videos. She probably would not have invented the style, had she started with videos, rather than with live television where one cannot stop the camera and start again. But once invented, her spontaneous, somewhat fumbling style became popular and was imitated worldwide. Being a highly educated woman, capable of expressing with words what most cooks omit, she explored the “theory of the practice.” She also made a point of showing details often omitted, such as how to hold the knife, which fingers go where. She was able to bring to her cooking classes what was omitted from the run-of-the-mill cooking lesson, where great cooks showed off their skills but failed to delve into this fuzzy and evanescent space in between the cold descriptions of procedures and the well-rehearsed gestures. As a side comment, in a recent cooking series with Jacques Pepin, a true restaurant chef, one feels Julia Child much closer to the spectators than her utterly perfect partner. But no matter what, her style was emulated by all the TV cooks of today, to the benefit of all those who expect to learn from television something about cooking.

Hence, good videos on training are those that explore this uncharted territory of the little details, the feeling for the job, the in-between knowledge. They give the plain vanilla instructions, à la Mère Poulard. But they also show the details that she omitted in the letter (for instance, how do we know the butter is hot enough, but not too hot). The above examples focus on a hobby – cooking – but the ideas apply as well to other areas where the theory of the practice is important.

**Foregone Media in Less Developed Countries?**

Videos reach lower layers of society more than computers and the Internet. It is a pity that they have not been used more extensively in poorer countries. While VCRs are found in very modest households from very modest countries, the availability of practical, how-to-do videos remains quite limited. Arnold Schwartztenegger is easy to find. How to unclag a pipe or how to hang a door is not.

The problem is simple but misleading. Developing countries are not well endowed with cinematographers who like or respect manual or technical work. Hence, the tendency is to sneer at such applications and produce philosophical discourses on the ethics of work. How to guide the piece of wood to the circular saw is too trite a subject for all but those who have lost their fingers in this operation.

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Generally, the term lifelong learning conjures images of individual trajectories - human beings in search of a knowledge that was not provided in their precarious schooling, of new skills that bring a promise of a better future, or of answers to the thousand questions of an inquisitive mind. The journey, either alone or in groups, is essentially individual and the learning is his or hers to acquire. This may be true for a large number, or even the majority of learners, but is not the only image that the concept should elicit. Indeed, lifelong learning can be an experience made of many lives, a movement toward economic independence and political participation for an entire population, such as the stories below.

From Candle Light to Flash Light

The Chiapas Media Project is sponsored by a group of foundations and individual contributions. The project grew from discussions that occurred in 1997 between North-American volunteers and the community leaders of the indigenous population of the state of Chiapas. This region, located near the southern border of Mexico, is mostly an area of subsistence farming with a large native population. It has been the stage of armed conflict between guerillas and the government and indigenous rights have been at the center of these conflicts.

During the discussions, the community leaders emphasized the importance of documenting their struggle toward political and economic development. Video seemed a perfect technology to give faces and voices to that struggle. The originality of the project though, was that it moved away from the creation of passive documentaries to form a local workforce competent in technology and that is active producers of information. In February 1998, the first cameras and editing equipment were delivered to the population, and a group of six local inhabitants were instructed in basic camera usage. Within a little more than one year, more than 100 youth were being instructed in video and computer technology. Some students are now learning editing techniques and are beginning to produce their own tapes. In addition, advanced students are holding their own workshops in outlying communities. Forty cameras have been distributed throughout Chiapas and five computers are functioning in key communities.

This past year the project held the first women’s video and computer workshop with six women from four communities. This fact is quite remarkable, since these are strongly patriarchal cultures, where women do not usually have access to education, much less modern technology. Two of the women came from communities without electricity and, initially, they were afraid to even touch the cameras. One of them learned so quickly that she was soon moved to an advanced workshop organized solely for her. All the other women were able to complete their five-day workshop and their final exercise - short videos of foreign human rights observers who live in the community.

The project also participates in the development of a Community Human Rights Defenders Network, which trains human rights observers across the state. The project provides each team with a computer and video equipment. In addition, the staff is trained in basic camera usage, interviewing techniques, and documentation skills (including shooting under difficult circumstances). The observers use the documentation to halt police abuses against the populations. The project is also planning to hook communities into the Internet using portable computers and satellite modems so that they can download information on short notice.

Through a communal lifelong learning project, the indigenous, subsistence farmers of Chiapas are quickly moving from candle light into video shooting and high speed Internet. “This is a new kind of struggle that melds traditional values like dignity, democracy and autonomy with modern
technologies that enable the voiceless to be heard.” The Chiapas Media Project (http://www.chiapasmediaproject.org/)

**Preservation and Integration**

The Virtual Souk is a World Bank-supported project involving craftsmen from the Middle East and North Africa regions. These regions are characterized by beautiful and complex artisan work that, through generations, was the foundation for the economic and cultural survival of local populations. In past years, this artisan culture has been threatened from disappearance due to shrinking local markets and market control by intermediaries who are geared toward the tourism industry and unconcerned with quality and tradition. Distance, lack of information, and intermediaries have cut the contact between artisans and clients, and limited their access to market feedback about demand and new trends. In consequence, artisans are being pressured to standardize and degrade their techniques only to see their profits reduced under the weight of intermediation costs. In many cases, those who produce the most authentic crafts may have the least access to markets and the least income.

The goal of the project is to help artisans save their high-quality techniques, improve their income, and encourage them to organize in order to meet market demand. To attain these goals, the project utilizes modern, Internet-based technology. The Virtual Souk is an e-commerce operation that aims at financial sustainability and local control. It relies on non-governmental organizations (NGOs) that are already assisting local communities. Among the project activities are the development of: (1) a user-friendly and multi-lingual Web database catalogue of local products and artisans (http://www.elsouk.com); and (2) a series of adapted guides, training modules, and training workshops to build local capacity on small-business administration and the use of Internet-related technologies. In addition, the project supports participation in events such as fairs and forums, and regional conferences that increase local knowledge about best practices and offer opportunities to share experiences. Another important goal of the project is to raise politicians’ awareness about the benefits of e-commerce to create more supportive regulatory frameworks and policy environments.

E-commerce opens more lucrative, international markets to artisans at a relatively low marginal cost. It also increases local access to information about market trends and good business practices. As part of the capacity building component of the project, the NGOs’ provide artisans with training on management skills, promote exchange visits among artisans to enhance their technical skills, promote cross-fertilization, and encourage collaboration. A secondary gain of the project is to familiarize the local population with modern technology and speed the integration of the region into the global economy, while preserving their cultural heritage.

A pilot phase began in January 1998 in Sub-Saharan Africa (Morocco and Tunisia) and extended later to Lebanon. With the help of experts in regional crafts, a group of ten artisans were chosen based on the quality of their work. The artisans began to collaborate with each other to define criteria for the selection of the work to be included in the website catalog. When the catalog was decided, the local NGO1 was trained on Internet use and scanning. In addition, a commercial network was established involving three regions: Fez, High Atlas and Casablanca. The network receives orders from the site and contacts the artisans. It is also in charge of quality control and of packing and shipping the orders to the clients. Within one year of operation, the original NGO has signed agreements with eleven other community organizations to include their crafts in the web site. Currently, the Virtual Souk involves 50 artisans in Morocco, 25 in Tunisia and over 700 in Lebanon. Egypt, Jordan and Palestine are planning to join the network this year.

More than a tool for the economic survival of a population, this project is a tool for their cultural survival and their integration in the modern world (To know more about this project, see “The Virtual Souk, E-commerce for unprivileged artisans,” by Maurice Hazan at http://www.iicd.org/base/show_story?id=3903).

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**A Voice in the Wilderness**

The purpose of The Gobi Women’s Project was to ease the transition into a free-market economy for nomadic women of the Gobi Desert, Mongolia. This is a region of harsh climate and few natural resources, occupied by nomadic shepherds who live in widely scattered settlements. From the early 1920s to 1990, the region was under a com-
nominist economy where the government handled the trade and ensured 30 percent of the families’ income, regardless of market conditions. In 1990, the fall of the Soviet Union brought a free-market economy into Mongolia. The responsibility for trade and income suddenly reverted to the nomads while the country struggled with a severe economic crisis. The closure of the previous network of social services forced the families to procure new forms of income production to survive. With the men trying to find more profitable occupations, the women had to assume the management and selling of the livestock, tasks for which they were not prepared.

The Gobi Women’s Project began in 1992, as a three-way partnership among the Danish International Development Assistance (DANIDA), UNESCO and the Mongolian government. The project had to face enormous challenges that included: a population scattered over large distances, lack of roads and other means of communication, harsh and long winters, lack of schools, scarcity of educational materials and the need to create a curriculum that would be appropriate to the local lifestyles and cultures. To answer these challenges, a decision was made to employ distance education using print materials and radio. Before the start of the project, a needs assessment study was carried out in three Gobi provinces. The women expressed interest in learning livestock rearing techniques and more effective forms of family care, upgrading their literacy skills, and acquiring income-generating skills that utilized available raw materials.

The pilot phase of the project began in 1995, with a three-day course that congregated in district centers 1,500 nomadic women from 10 districts. During this period, the women received learning materials and were introduced to visiting teachers. They received radios, batteries and booklets with learning activities on health, survival and income generation, business, and literacy. For five months, the teachers visited the women once or twice a month to provide assistance, answer questions and check the activities. The teachers’ feedback was used to make improvements in the structure of the project and its curriculum.

The main phase, from January to December of 1996, involved 15,000 women in all 62 Gobi districts. During this period, three local stations and the capital broadcasted weekly radio programs related to the lessons on the booklets. The instructors were local experts, such as doctors, veterinarians, and teachers. In addition to the booklets, the women received newsletters, demonstration materials, and information sheets. The print material was sent from the capital to the districts, an operation that could take seven weeks. The women gathered occasionally with the visiting teacher for group meetings, demonstrations and teaching sessions. In addition, the teachers visited them at home to check their progress and provide assistance.

The project proved successful in many ways. The women learned valuable skills that helped them generate income for their families and had opportunities for social interaction and exchange of ideas and experience. Their husbands and children also profited from the lessons and materials. Many husbands attended the demonstrations and teaching sessions and were involved in the learning activities. The districts enjoyed an increase in social activities and outcomes included the implementation of information centers, the organization of local markets and exhibitions, and collaboration between neighboring districts. A follow-up project for family-based and youth education spanned from the success of the Women’s Project. At the international level, the project is being used as a model for informal education in rural areas. For more information, see Nonformal Distance Education: the Gobi Women’s Project, Mongolia at http://www.literacyonline.org/explorer/gobi_back.html

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...lifelong learning can be an experience made of many lives, a movement toward economic independence and political participation for an entire population...

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1 The Aik Iktel NGO is composed of all the village population (including women). The administrative office, composed mostly of young people, works together with the jmââ (the traditional assembly of heads of the families). Its goal is to improve the living conditions of the community in a broad variety of aspects, such as electrification, health, education and working capital.
AARP commissioned Harris Interactive Inc. to conduct a survey of 1,019 people age 50 and older to explore how and why people over 50 learn about new things. The final weighted sample included 508 interviewed by telephone and 511 (weighted down from 2,556) surveyed online. (See Appendix B for detailed methodology.) This research explores typical learning methods, learning motivations, learning interests, and the life-event contexts in which learning takes place. Key Findings in these important areas are detailed below.

How Adults Typically Learn

Newspapers, magazines, books, and journals are the tools used for learning most of the time by adults age 50 and older regardless of age, gender, income, or education.

- On the whole, over six in ten adults in this age group (64%) always or most of the time use newspapers, magazines, books, and journals when they want to learn.
- Women (66%); men (62%); and people of different ages (57% - 70%), economic (63% - 66%), and educational (61% - 73%) backgrounds use these tools always or most of the time in greater proportions than all other learning methods.

Not surprisingly, more respondents interviewed online typically use online techniques than those interviewed by telephone.

- Over half of adults 50 and older (56%) interviewed online search the Internet always or most of the time to learn about something they want or need to know compared to 14% of respondents interviewed by telephone.

Best Ways to Learn

Reflective and hands-on approaches are among the best ways for older adults to learn. (see Exhibit below)

- Nine of ten adults 50 and older (90%) agree that they learn best by watching or listening and then thinking.
- The same proportion (90%) agree that they learn best by putting their hands on something and manipulating it or figuring it out.

Why Older Adults Want to Learn

Older adults are interested in learning so that they can keep in touch with themselves, their community, and the world.

- Over nine of ten adults age 50 and older agree that they want to learn:
  - To keep up with what's going on in the world (93%)
  - For their own spiritual or personal growth (92%)
  - For the simple joy of learning something new (91%)
- This level of agreement is seen across most demographic subgroups including education, income, gender, and age.

Interest in Various Subjects

Adults 50 and older are most interested in learning about subjects that would improve the quality of their lives, build upon a current skill, or enable them to take better care of their health. Six topics generate the greatest interest:

- Learning more about a favorite hobby or pastime (62% extremely or very interested)
- Learning more about advanced skills (52% extremely or very interested)
- Getting more enjoyment or pleasure out of life (51% extremely or very interested)
- Having a healthy diet and nutrition (49% extremely or very interested)
- Measuring personal health status (48% extremely or very interested)
- Managing stress (46% extremely or very interested)
Preferred Learning Formats

Older adults' preferred learning formats vary according to the topic under study. However, for 11 of the 17 topics about which they were asked, respondents express preferences for three of eight formats: learning in loosely-structured groups, in workshop settings, or by teaching themselves.

Degree of Investment

Adults 50 and older are eager to use what they learn, want to have at least some control over the learning process, and are typically willing to spend modest sums of money to learn.

- Roughly half of adults 50 and older want to use what they learn immediately (55%). They are also willing to spend some time learning if they have control over when and how much time is spent (47%).
- Three in ten are willing to wait until some time in the future to use their new skills (28%) and are willing to spend all the time it takes to learn about something they really want to know (30%).
- On average, respondents are willing to spend a maximum of $101.

Incidence and Impact of Events

Older adult learners experience different life events at different ages. Respondents between 50 and 59 are somewhat more likely than older ones to have experienced these family-related events or new accomplishments:

- Become a caregiver for a child or grandchild (19% of those age 50 - 59 versus 14% of those age 60 - 74)
- Had a child go to college (18% of those age 50 - 59 versus 10% of those age 60 - 74 and 5% of those 75 or older)
- Had their last child move out of their home (15% of those age 50 - 59 versus 10% of those 60 - 74 and 7% of those 75 or older)
- Had an adult child move back into their home (15% of those age 50 - 59 versus 9% of those age 60 - 74 and 6% of those age 75 or older)
Over half of adult learners surveyed (53%) say they experienced at least one event with a major impact in their life in the past 12 months. Of those experiencing a major event, health-related and caregiving events had the greatest reported impact on their everyday lives:

- Having a major personal illness (61%)
- Having a major illness in the family (56%)
- Having a death in the family (56%)
- Becoming a caregiver to a parent or other elderly family member (50%)

Conclusions

Lifelong learning experiences that would likely hold the most appeal for mature adults include subjects that are personally meaningful, taught in environments that provide a direct learning experience, allow adults control over all aspects of the learning process, and are not too expensive. Adults age 50 and older learn for the simple joy of learning, to enhance their spiritual or personal growth, and to keep up with what is going on in the world. These reasons are rather universal-large proportions of men, women, those from different economic and educational backgrounds, and from different age groups express agreement with these reasons for learning.

Mature adults prefer learning methods that are easy to access, that require small investments of time and money to get started, and that allow learning to begin immediately. Print media such as books, magazines, newspapers, and journals are the learning tools used most frequently by adults regardless of differences in age, income, education, or gender. Not surprisingly, adults interviewed via the Internet are more likely than those interviewed by telephone to search the Internet or use computer-based learning programs as a learning method.

The least common methods used to aid learning include techniques that require greater investments of time, money, and effort as they serve to delay the learning process. Over half of adults 50 and older report they never learn by buying or borrowing computer-based teaching programs, or audio or video tapes, finding a tutor or professional, enrolling in a college or community college class, or by getting involved in a community group or volunteer organization.

The best way most older adults report they learn is through a direct, hands-on experience. The two most common, best-learning methods engage three of the five senses-seeing, hearing, and touching. Nearly all middle-age and older adults say they learn best by putting their hands on something, playing with it, listening to it, watching it, and finally thinking about it.

Adults 50 and older are interested in learning most about things that enrich their lives, that help them stay healthy, and that bring them more enjoyment. Roughly half of adults are interested in learning about favorite hobbies or pastimes, new advanced skills, how to get more enjoyment out of life, and having a healthy diet and nutrition.

Mature adult learners (despite some differences in age, gender, income, and education) prefer some type of group learning environment when it comes to such topics as understanding others better, getting involved in their community, or finding out about educational travel opportunities. However, these adults prefer some type of individual setting to learn about topics that are of direct personal benefit. These topics include all the health-related subjects and learning more about a favorite hobby or pastime.

A number of important factors should be considered when creating learning programs for adults age 50 and over. These include the degree to which adult learners have control over the learning process, how soon they can put into practice their new skills and ideas, and not surprisingly, how much the programs cost. Adults are typically willing to spend up to $101 to learn about something they always wanted to know about. Most adults 50+ want to use what they have learned right away or in the near future; very few are willing to wait longer. While about half are willing to devote at least some time to developing their new skills (if they can control when and how much), one-third are willing to take all the time it takes to master their new ability.

* An Executive Summary of an AARP Survey on Lifelong Learning conducted for AARP by Harris Interactive Inc.

For more information, contact:
Constance Swank, Ph.D., AARP Research Group, 202-434-6173
Albert R. Hollenbeck, Ph.D., AARP Research Group, 202-434-6280
Teresa Keenan, Ph.D., AARP Research Group, 202-434-6274
Linda Fisher, Ph.D., AARP Research Group, 202-434-6304
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AARP, Research Group, 601 E Street, NW, Washington, DC 20049

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Open Universities:  
A Revolution in Lifelong Learning

Robert Savukinas and Gregg Jackson

“Learning can no longer be viewed as a ritual that one engages in during only the early part of one’s life.” [1]  
-UNESCO 20 December 1999

Anytime, Anywhere

During the latter half of the 20th century, “open universities” have revolutionized lifelong learning in many countries of the world. These institutions were inspired by democratization, growing demands for tertiary education, technological developments well suited to mass education, and the human resource needs of modernizing societies. 2

At most open universities, a substantial portion of the students are seeking regular university degrees and another significant portion are engaged in lifelong learning, advancing their knowledge and skills for occupational, family, and personal purposes. Open universities are generally distinguished from traditional universities in at least three ways:

1. Open to a broad segment of the population; usually serving those from social groups that previously had not access to higher education and sometimes admitting students regardless of their prior educational credentials;
2. Open in the courses they offer, usually including traditional college courses, career-development courses, and personal growth courses;
3. Open to different times and places of study; sometimes the time and place is determined entirely by the student. [3]

Open universities have based their instruction on self-study printed materials, often called “correspondence materials” because they are sent through the mail system. They include texts, study guides, and workbooks. These printed materials are often supplemented with small laboratory kits for science courses, periodic face-to-face instruction in geographically dispersed study centers, and some course delivery and instructor-student communication through telecommunications technologies--radio, telephone, television, and video. [4] The Internet and the World Wide Web are now being adopted by some for instructional and promotional purposes, but access by these means is still impossible for most citizens in developing countries.

Open universities have been a great success, by several indicators, in most countries where they have been established. More than a dozen have total enrollments in excess of 100,000 students. Their costs are generally one-half to one-third those of the traditional universities in the same country. Several have evidence of high quality instruction. [4]

Examples of Open Universities

The following are examples of the lifelong education programs provided by open universities. The information is taken from Sir John Daniel’s “Mega Universities & Knowledge Media” and Keith Harry’s (editor) “Higher Education Through Open and Distance Learning,” unless otherwise indicated. [2, 4]

China TV University

is the largest university in the world, with a total enrollment of 850,000 in 1994. The system includes a central unit that develops and produces course materials, 44 provincial units that also develop and produce such materials, 1,550 Education Centers at the county or company level, and 30,000 tutorial groups. The Education Centers have pressurized the system to provide more job training, courses of local interest, and continuing education. Although China TV University mostly serves urban residents, there are plans to broadcast some of its programs more widely, and twenty million farmers reportedly already have received “intermediate education of a practical interest” through an associated unit. (http://www.crtvu.edu.cn)
Indira Gandhi National Open University: India has the second-largest higher education system in the world. By 1980, 20 Indian universities offered correspondence courses, but most were considered of low quality. Indira Ghandi University was established to provide high quality distance education and coordinate standards for tertiary distance education throughout India. From the beginning, it was planned that only 1/3 of the students would be in degree programs and the rest would be in shorter programs directly related to employment. The programs of study include computer education, nursing, agriculture, food and nutrition, creative writing, and childcare. The university has been able to secure only 90 minutes of nationally broadcast television each week and no radio coverage; so instruction is mostly by printed materials and required periodic attendance in 229 study centers located mostly in urban areas. Despite those constraints, and competition from seven other state open universities, Indira Ghandi University had 162,540 registered students 1998. In the late 1990s, the University began establishing high-capacity telecommunications links with 16 regional centers and later some of the study centers. Satellite communications systems are also now in use. (http://www.ignou.org/index.htm)

Sukhothai Thammanthirat Open University (Thailand) is committed to lifelong education, the expansion of educational opportunities for secondary school graduates and personnel development. It provides academic degree programs, short training programs, and individual courses. About 300,000 students are enrolled in the non-degree programs. Three-fourths are from rural areas. The university combines printed materials with 1,100 30-minute television broadcasts annually and 150 20-minute radio programs each week. It also makes extensive use of physical facilities scattered throughout the country. It operates 87 Regional and Provincial Study Centers for the orientation of new students, tutorials, and examinations. It has Special Study Centers in government agencies such as hospitals, regional agricultural offices, and government offices that have laboratory and other facilities needed for the study. It also has eighty Corners located in provincial libraries that provide library and educational media support for students. Telephone communication between students and instructors are common. The University hopes to expand its services with cable television and satellite television broadcasts accompanied by two-way audio links. (www.stou.ac.th/eng)

Universidad Nacional Abierta (Venezuela) was Venezuela’s answer to the rising social demand for higher education and the scarcity of study opportunities for adults. It is to focus on providing high quality education and serving working individuals. It is also to spur innovation in individualized and self-directed learning. The programs are organized into five sections: Introductory Courses, General Studies, Professional Studies, Postgraduate Studies, and Continuing Education. The goal of the continuing education section is to elevate the level of knowledge of the general population in specific disciplines of science, technology and culture. Instruction is by printed correspondence materials, audiovisual media, and face-to-face instruction at 21 regional study centers. (www.una.edu.ve)

University of South Africa was open to all races from before and throughout the Apartheid era. In 1995 it had 130,000 students, with 47 percent black and 40 percent white. More than 80 percent are employed and the average age is 31. Almost 1/3 of the students are schoolteachers. Applicants who have not completed high school are admitted conditionally and restricted in the number of courses that they can take during the first year. There are more than 2,000 course modules. Most are developed by the individual instructors, but some courses are now being developed by teams. Instruction is primarily by texts and printed study guides, but sometimes supplemented by audio–cassettes and some radio broadcasts. Instructors and students communicate by mail and telephone. A limited number of face-to-face tutorials, staffed by part-timers, are being expanded. The University of South Africa’s most famous graduate is Nelson Mandela, who studied while jailed. (www.unisa.ac.za)

The Future: Promise and Pitfalls

Worldwide, the need for accessible lifelong formal education is swelling. That is a result of population growth and modernization. Open universities have several advantages in meeting these needs.

1. They have a broader reach through their respective countries and any other institution of higher education.
2. Many of their degree courses can serve double-duty as lifelong learning for adults who have not earned a university degree, and as a way to broaden or update expertise for those who have such a degree.
3. By the very fact that they are universities, they convey status to the students, including those who are not en-
gaged in degree programs. It has been noted that adult formal education is often undertaken partly to gain self-esteem and impress others. [5]

4. Open universities’ costs are generally modest for the level and quality of training that is provided.

What will the future bring? The following are four scenarios by which spreading computer and telecommunications technologies may affect open universities and their lifelong learners. None of them is assured, but all are within the realm of possibility.

Scenario 1: Open universities’ growing use of telecommunications networks to deliver course content and communicate with students improves the quality and timeliness of the instruction. The instruction will be more graphic, engaging, up-to-date, and interactive. The open universities will thrive and grow. Popular sentiment will require continuing print materials for those without access to telephone systems, but those materials will suffer from neglect and the digital divide will temporarily widen. Then probably before 2010, satellite wireless Web and $200 solar powered downlink/uplink computers will bring access to the remotest villages of developing countries. Each will have at least one shared station. Open universities will use the graphics and audio capabilities of the Web to create some courses for those without literacy skills.

Scenario 2: Open universities will increasingly put some of their courses, particularly those aimed at professionals on the World Wide Web. Citizens in one country will occasionally enroll in a course from another country. Initially, the languages that they read limit their options, but within a decade automatic translators will probably overcome that barrier. This will be a boom for individual learners, enhance knowledge transfer between countries, and foster international understanding. It will also be an opportunity for enterprises to expand their services and earn foreign revenues, as the UK Open University is attempting with its entry into European and U.S. markets. Conversely, it might mean the death of some open universities that fail to compete successfully for students.

Scenario 3: Artificial intelligence is used to create computerized adaptive tutors, that optimize instruction for each individual learner, taking into account his or her interests, learning styles, prior knowledge, and progress through the course content. These tutors could enhance the progress of non-traditional learners and those with learning disabilities, while simultaneously reducing the costs of instruction.

Scenario 4: An enemy nation, inspired by the example of United States .com corporations, offers highly attractive and entirely free lifelong learning opportunities to a target country citizens through the satellite wireless Web, with the intent of gently brainwashing the learners to undermine their patriotism, values, and resolve. The enemy even funds NGOs to provide free solar-powered downlink/uplink computers to the poorest people who have not yet been able to afford them. When the target nation’s open university counters with improved courses and instruction, the enemy nation again follows the lead of the .coms by paying people in the target country to take their courses.

Conclusion

Open universities will probably go down in the history books as one of the most important educational innovations of the 20th century. They have provided unprecedented access to a broad range degree programs and lifelong learning opportunities. They have instilled hope and brought it to reality. They have helped preserve national cultures and introduced progress. They have served noble purposes and become popular national resources.

In all likelihood, rapidly spreading computer and telecommunications technologies will further expand open universities’ capabilities to provide lifelong learning opportunities. [6] But some institutions may be undermined by the technology, and some people may try to use it for sinister purposes.

References


* Robert Savukinas is a doctoral student in the Higher Education Administration program at The George Washington University. Gregg Jackson is Coordinator of the Education Policy Program at the same university.
The Business of Borderless Education And Lifelong Learning

Yoni Ryan, Ph.D.
Senior Lecturer in Higher Education
Queensland University of Technology
Australia

Introduction

In 1997, the Australian federal Department of Education, responsible for funding and policy oversight of all public universities in Australia, commissioned a study on the potential entry of global media and telecommunications companies into the higher education ‘market’ in Australia. This was, and remains, a tightly regulated market, which prohibits the use of the term 'university' except to describe a government- accredited institution, and which has few private universities.

The concern about predatory action by media companies was not confined to Australia, a country with a mere 19 million population and therefore susceptible to fears of ‘Internet invasion.’ Indeed California State University’s then President, Barry Munitz, spoke of his personal nightmare that Microsoft, Sun and AT&T would make a combined bid to the State Governor to provide a more efficient and cost-effective electronically-based university system.¹

Lifelong Learning as A Concept

The subsequent report of the study, New Media and Borderless Education,² concluded that while media conglomerates (broadly defined) were more interested in carriage than content, publishing companies (which already owned a good deal of ‘content’) were the most likely players in any global education activity, particularly through alliances and partnerships with specialist education providers. A significant finding was that corporations and professional associations were enthusiastically embracing the concept of lifelong learning to describe their internal training and Continuing Professional Education (CPE) activities.

The concept of lifelong learning had until the 90s been largely confined to the hortatory publications of UNESCO and OECD, and its evolving meaning is of interest as we chart the potential of the new technologies in globalizing education.

In 1972, UNESCO’s manifesto Learning to Be espoused the purpose of education as personal and social development; paid employment was to be interspersed with continuous ‘learning episodes’; economic development would naturally accompany individual fulfillment. By 1988, OECD’s Lifelong Learning for All recast lifelong learning as continual education with the individual/student personally responsible for constant updating of his/her own employment skills. This marked a shift away from encouraging higher levels of education participation as a social policy goal, to encouraging work-related learning as a means of enhancing individual success and national competitiveness. This paradigm shift in the meaning of lifelong learning...
learning was linked with the obvious potential of Communication and Information Technologies (CITs) to deliver Just-In-Time training, the growing importance of ‘speed to market’ in new technological products and consequent training of employees, and the knowledge explosion itself, which has seen exponential growth in specialized and increasingly large bodies of knowledge in established disciplines, and the emergence of new knowledge domains.

With a growing apprehension in the early 90s that it was no longer possible to ‘know everything’, even in one discipline, the implication for educators was that the aim of education must be shifted from ‘content’ to ‘process’, ‘learning how to learn.’ Education could no longer be envisaged simply as a preparatory phase for life and career, but must be considered a lifelong activity. Trends in the 80s to labor flexibility and downsizing led some to posit the notion of ‘portfolio careers’; workers would trade job security for learning, to ensure lifetime employability rather than lifetime employment.5

New Media and Borderless Education suggested that much of the rhetoric surrounding lifelong learning was beginning to translate into practice, and was occurring outside traditional education institutions.

**A “Market Intelligence” Study**

The same research team, based at the Queensland University of Technology in Brisbane, was subsequently commissioned to undertake a second study, conceived in the form of ‘market intelligence’ on the activities of ‘corporate universities’, the training units of businesses whose primary activity was not education, but who were embedding education and training in their business and strategic plans; virtual universities, those operating distance programs mediated by the new technologies; and for-profit higher education providers. The latter are rare in Australia at the baccalaureate level.

Although the main objective of the study, titled *The Business of Borderless Education*,7 was to examine the pedagogic approaches, technologies, curricula, and employment practices of these non-traditional education providers, one of the many issues to emerge was how the concept of lifelong learning had transmuted to vocational and professional training.

The investigation phase involved depth interviews with key personnel, staff and students in nine exemplar institutions in the US, chosen for their global workforce, their success in the adult education market, their pioneering use of new technologies, and their commitment to providing education and training to their workforce. The organizations studied in depth were McDonalds, Arthur Andersen, Ford, and Microsoft (as examples of corporate universities), Sylvan/Caliber, De Vry Institute/Keller Graduate School of Management, and the University of Phoenix (for-profit providers targeting the adult market), and the US Army and US Air Force (both in the early stages of a massive shift to CITs in delivering training). We also interviewed in less depth, staff in virtual universities such as Jones International, Western Governors, and National Technological University, as well as government officials and labor organizations.

Although there was some variation in the degree to which employers espoused lifelong learning as a core value underpinning their education and training activities, without exception, they were adamant that it was critical to business success. Ford’s Larry Conley, Manager of FORDSTAR, the motor company’s satellite training operations, said:

"We were faced with the introduction of a lot of new model vehicles, one every 90-100 days, and the technology was dramatically different from what it had been. We had a mechanical workforce and our cars were becoming moving computers. We were faced with a dramatic change in the way we did our training."

*(The Business of Borderless Education, p.187)*

Ford already had access to a satellite network used for sales data transmission. It ‘piggybacked’ its video training onto this network, and began tying warranty payments to completion of training, so that there was a financial incentive for dealers and their staff to engage in company programs. Arthur Andersen, as a global consultancy firm, relies on leading edge knowledge and current market intelligence for its position as one of the ‘big five.’ Although its staff is already degree-educated, it spends an astonishing 6 percent of payroll on their continuous training, where top companies typically spend 3.9 percent.6 Andersen’s staff are high achievers, well-motivated and disposed to further learning; the company had an Intranet used for internal communications, and felt that it could leverage this facility for education. Continuous education and training has clearly become vital to business competitiveness across both manufacturing and ‘knowledge’ sectors.

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**OECD ... recast lifelong learning as continual education with the individual/student personally responsible for constant updating of his/her own employment skills.**
The case studies and surveys detailed in the report illustrate the many variations and combinations of CITs used for education and training, as well as the range of drivers of CIT usage in different sectors. For example, McDonalds, with its diverse workforce across the world, and even within the US, cannot presume high computer literacy skills in its employees. Further, much of its operator training is on the job, in breaks between busy periods. Its unique selling point is consistency of product and service. Hence it prefers videotape and simple graphic wall posters as delivery media. In contrast, Arthur Andersen’s staff are desk workers, computer literate and text oriented. Andersen expects to deliver much more of its training via Intranet and Internet in future.

Some general observations that emerged from the study are pertinent to the wider issues of lifelong learning, the globalization of education, and vocational education.

The Business of Education

In the growth areas of telecommunications and computing (and their convergence), new product lines necessitate constant re-training of sales and support staff. Often training is required as a result of culture change or “re-engineering” consequent on the “merger mania” of the last two decades. It is therefore best conducted from within the organization. Such industries are global in their distribution, and since their “business” is telecommunications, Internet-based education is an obvious choice of delivery. But these companies have been forced to develop their own education programs, partly in frustration at the ‘lag-time’ of university curricula in incorporating rapidly moving changes in operating system standards, but also because they demand product-specific expertise. Hence Microsoft, Sun and Cisco have developed their own certification; they sell their training packages, and rigorously test attainment. It has been argued, as a result, that the Microsoft Certified Professional Engineer certificate is more portable than a degree in a global labor market for computing professionals. In the same way, professional associations, also disenchanted with the supposed theoretical emphasis in university-based Business programs, have increasingly developed their own postgraduate programs, and have gained accreditation for these.

The students interviewed in the study repeatedly argued that they had decided on the for-profits, University of Phoenix (UoP) or Keller Graduate School of Management, because the courses offered immediate application: “learn tonight, apply tomorrow”. UoP only admits working adults, and for these students, the real attraction was relevance to their day job and their future career; they rejected the “fluff”, as one student said, that went with a university degree. Students at Hamburger University in Chicago equally preferred the direct applicability of their course to their job, and to an improved income.

Employers were also driving the move to relevance and application. In a budget-driven business, training had to deliver bottom-line results: employers were increasingly reluctant to fund the more general education characteristic of university programs.

As corporations were developing their internal education and training programs, universities recognized the commercial potential of their own “product”, and the opportunity to provide at least some of the education and training demanded by large corporations and professional associations. They also began to focus on developing courses to cater for “ready-to-work” graduates, courses that had vocational application. Some institutions, such as the National Technological University, had been established purely for the corporate education market; others, such as NYUOnline, are commercial offshoots of traditional universities, pitched at the CPE needs of the real estate fraternity. Yet other traditional providers, such as the University of Chicago and Johns Hopkins, have formed consortia and partnered with commercial vendors, to develop corporate education programs. Almost all of these are using or intend to use the Internet for delivery, because its capacity for asynchronous delivery makes it the ideal medium for mobile professionals in global companies, who need “anywhere, anytime, anyplace” education. Almost all want to make money from their investment; the fees for reputable programs are high.

Continuous learning has thus become a requirement of corporate employment, and with the trend to mega-corporations, education of their workforce looks set to become increasingly “virtual”, “global”, and to become a “business”.

During the US investigation, the research team thus became convinced that lifelong learning could as well be termed vocational education; so close was the alignment of interest and motivation between employers, students and educators.

Learning for Personal Fulfillment

The secondary phase of the investigation involved a desk search of education-related sites, again mainly based in the US. The team “trawled” through portals such as hungryminds.com, subscription online bulletins such as Online
Learning (http://stayonline.8m.com/learnonline.html) and Virtual University Gazette as well as generalist portals such as Yahoo!.

The Internet, it is often argued, is an anarchic, subversive medium. ...Learning becomes an individual gratification, a pursuit of personal interests. Here, lifelong learning assumed another dimension, one more akin to that espoused in the Learning to Be report of the 70s. For those with access to the Internet (and it is acknowledged this remains largely confined to the developed world, or to small elite in the developing world), the Internet offers a cornucopia of free or low-cost “courses” in every conceivable sphere of personal, social or academic interest, from Bible study (http://www.gospelway.com/courses), to Astrology for Magicians and Metaphysicists (http://www.magitech.com/~astrology/Astcrs00.html), to Dancing with the Wind (http://www.angelfire.com/ia/stburst/seminar.html) to Families Connect: An Introduction to the Internet (http://www.ala.org/ICONN/fc-course.html), to Fundraising (http://www.thenonprofitgroup.org/ceu/#desc).7

Unfortunately, there is no possible way of collecting data on the learning that occurs through participation in such courses. Counting “site hits” cannot do it, and cannot even discriminate between accidental browsing and genuine intention to engage in a learning experience, much less any knowledge, skills, or dispositional change gained from the site.

Because many of these courses have been devised by enthusiastic “amateur educators”, or by professional educators who simply want to share their passions, they are rarely evaluated, either by their “students” or by any professional body. Commercial interests have also entered this general education “space” with courses constructed around self-improvement or hobby activities. Publishers in particular, are building study guides around books that are needed to complete the course; the “education” comes free with a text purchase, although purchase is “optional” (see Barnes and Noble’s online programs).

The Internet is rich in such informal learning opportunities. Their existence undercuts what appears to be the prevailing ideology in the formal education and training sector, and in business and among many students, in which lifelong learning is synonymous with vocational education. The vision of the 70s, that learning throughout life is properly concerned with the whole development of the individual, and not simply with the individual as an economic unit, may be one of the great contributions of the new technologies.

1 Keynote speech, 18th ICDE Conference, Pennsylvania State University, 1997.
7 All referenced by Online Courses Newsletter, #19, October 1, 1999.
Training Women for Leadership and Success in I.T.

Nancy Taggart
Chloe O’Gara
Academy for Educational Development*

As the “digital divide” is fast becoming a household word, the importance of women’s access to information technologies (ITs) is emerging as a priority. The Internet economy’s ever-increasing demand for skilled workers and innovators holds great potential to positively impact women’s well being, if they gain access and relevant skills. Women in developing countries face particularly severe obstacles to access and use. Low literacy and education levels, lack of economic resources, and socio-cultural norms that discourage girls from pursuing nontraditional careers and professions hinder women’s participation and leadership in the fast growing IT field.

Gender Differences in IT Access and Use

In most cultures women are regarded as skilled communicators. True to this profile, women are embracing the web quickly as they gain access. See chart below.1

Although women are an increasingly large proportion of Internet and IT users, they are underrepresented among designers, leaders, and managers in the IT world. Women with the necessary skills training and education for IT employment and careers, with open doors for advancement, are a minority, and the few data available suggest that this pattern is not improving. Lessons from past development projects demonstrate that when women and other marginalized groups fail to gain key skills related to a new technology,
they become further disenfranchised economically and politically.

These trends suggest that access and use of IT are not sufficient indicators for women’s equitable participation in the new economy. Rather, how women use the Internet and in turn, with what skills they are equipped, determine the role women play.

A training institution in Brazil offers a typical scenario. Large numbers of women attend. However, female trainees are primarily enrolled in word processing courses gearing them for support and secretarial positions, rather than the networking or programming courses that equip their male colleagues for higher-paying jobs and a variety of challenging and remunerative career tracks.

A similar phenomenon is observable in the U.S. Female representation in mid-to-upper-level IT-related jobs is still quite low. Only 9 percent of engineers, 28.5 percent of computer programmers, and 26.9 percent of systems analysts in the U.S. are women. Only among data entry workers do women make up the majority at 85 percent.2

In order for women to reap the benefits of the new economy and overcome economic and political marginalization, they must be equipped for careers at all levels of the IT sector, from entry to the design of software and management of networks, to IT entrepreneurship. When we consider how the Internet can benefit women economically, we must think beyond women using the web to market their craft goods, to women marketing their skills as website designers, network managers, and consultants to clients overseas or locally. These IT vocations offer women higher-paying and more economically sustainable livelihoods, which contribute to healthier women and families.

Understandingly, network managers or software designers may not be appropriate employment or income-generation options for the many women in the developing world who lack basic literacy and numeracy. Basic education is still vital. However, efforts to improve basic education should not preclude envisioning opportunities for women as leaders and creators. Moreover, training women in developing economies as IT producers and innovators will create a market for an educated labor force.

Therefore, when looking at how to increase women’s participation in the Internet economy, we should focus on expanding women’s opportunities as leaders and wealth-creators in IT and look closely at how IT training can prepare women for these roles.

**Expanding the IT Pipeline**

Attracting and retaining women in IT training and education is a significant obstacle in both industrialized and developing countries. The case examples of Cisco’s international networker training program and findings from American Association for University Women (AAUW) and Carnegie Mellon University reveal some factors that may impact women’s access to and participation in technology training in developing countries.

Cisco Systems Inc.’s Networking Academy Program (CNAP) is an international training program that teaches students to design, build, and maintain computer networks. The CNAP curriculum is offered in over 70 countries and taught through web-based modules facilitated by on-site instructors in secondary schools, technical colleges, universities, and non-governmental organizations. Minimum education requirements are an eighth grade reading and math level.

Recent data indicate that overall, 22% of CNAP students in emerging market countries are female.4 As a result of Cisco’s interest in expanding the number of women in CNAP, the Academy for Educational Development is conducting research on enrollment in CNAP in order to help develop strategies for increasing female enrollment.5

Students and instructors in Cisco’s program voice a common message that once women are in the program, they excel, and in fact perform better than male students.6 One CNAP instructor voiced the need to address what he called “external factors” referring to the socio-cultural norms that determine whether or not girls and women enter engineering and technology-related academic and career tracks in the first place.7

Addressing the pipeline of girls and women into IT education and training programs may involve integrating computers and the Internet into curricula at earlier stages of schooling or raising awareness among families and educators that girls should be encouraged to study science and math. But, U.S.-based research suggests that a major factor may be girl’s perception of the fields of science and technology as unappealing. While little work has been done on this in developing countries, research in the U.S. may offer some guidance on how to address this in an international setting. According to findings from a study by the AAUW, girls and young women find technology-related careers unappealing because they associate them with jobs that are “solitary,” “passive,” and “sedentary.”8 Greater awareness among girls and women of how IT skills apply to a wide range of careers may help to attract more women to these careers and to IT training which will give them a more diverse set of career options. More research is needed to explore the different factors within developing countries that impact girls and women’s education and career decisions. For example, women in the...
Middle East, may be more attracted to IT-related careers because of the opportunities for creativity and interaction through the virtual community, which cultural norms make less possible in traditional “public spheres.”

Additionally, research by Carnegie Mellon University (CMU) in the U.S. indicates that adapting science and technology curricula may change women’s perceptions of IT programs and consequently, attract more girls and women to this field. For example, CMU’s research showed that female computer-science students were more interested than male students in the “context” of computing. “44% of women interviewed vs. 9% of the men students, link their interest in computers to other arenas.” 9 They emphasized the importance of ‘doing something’ with their skills and “to connect computer science to ‘real-world problems.’” 10 Other U.S.-based research has similar findings, drawing the conclusion that “insuring science and technology are considered in their social context…may be the most important change that can be made in science teaching for all people, both male and female.” 11 As a result of their research, CMU has adapted their curriculum by, among other strategies, integrating non-science disciplines into their computer-science program and offering a computer science course in which students work with community non-profits to apply their skills to community issues. After 4 years, the number of females enrolled in the computer-science program at CMU increased from 8% in 1995 to 37% in 1999. 12 This idea is not new. Experiential education theory has familiarized us with the notion that learners may respond more favorably to a subject when it is taught with practical application to the ‘real world’ context. Yet when applied to IT training, these findings offer some new strategies for expanding the number of girls and young women pursuing science and technology education and careers.

**IT Training Features That Exclude Women**

Findings from Cisco’s training program suggest that where IT training is held influences women’s participation. In emerging market countries, for example, Cisco’s training program is often offered at technical colleges whose courses of study focus on science and technology or at universities within engineering departments. Cisco Academy instructors from these institutions note that fewer women attend because the institutions are known as technical schools and socio-cultural norms make women less likely to study science and technology fields. 13 Similarly, offering the Cisco training program only to engineering students at a multi-disciplinary school attracts predominantly male engineering students, and filters out non-engineering students, who are unaware of the course being offered or may be unable to take it because they are not in the engineering department. When the CNAP courses are offered in the 3rd or 4th years of a four-year university program, it may give students the impression that it is an advanced course with many pre-requisites, and thus may discourage their participation.

Training can be offered in systems that are culturally acceptable to make women’s attendance possible. One Cisco academy at a university in the Middle East boasts a majority of female students because the local university is one of the few culturally acceptable higher-education options for women. Women are not supported to go abroad for their studies, as men are encouraged to do. Moreover, in more conservative societies where women are less mobile in public, offering training in a structured environment like a university, where women live on campus, are able to easily access facilities, and are relatively protected from contact with outsiders and men, is an effective strategy.

**Timing of training** is another key issue. Evening classes can prevent women’s attendance in more conservative cultures where women’s mobility is restricted or where violence against women is prevalent. One technical college in an urban area in Latin America altered its science/engineering class schedule to make classes end earlier in the evening, because safety was a concern for women returning home late after class.

The cost of IT training and education is a determining factor in who participates. Instructors at private schools and schools where the Cisco course is more expensive than other courses claim that the fees were an obstacle to female and lower-income students’ participation in the program.

**Reaching lower-income women** in developing countries with high-tech IT skills training presents very significant challenges. In the case of Cisco’s program and presumably other technical training programs, training tends to be offered in universities or technical institutes because they have the necessary facilities for high-tech training, such as a networked computer lab with numerous computers and even additional classrooms for hands-on application curriculum components. Working through women’s organizations or community-based organizations with outreach into poorer, rural communities is a logical choice for reaching women, but is not one that is generally considered feasible. Poor resources and inadequate facilities make high-tech training difficult to administer in many social outreach organizations.

**The Challenge At Hand**

Women’s participation as leaders and innovators in IT is pivotal to their future economic and political advancement. IT training must meet this challenge by equipping women with the needed skills for leadership roles. Training activities should be developed that position women at all education levels.
levels for a variety of roles in IT, including leadership, entrepreneurship, and hardware design. When designing training programs, attention should be given to the gender balance of systems and environments in which training is conducted and how these may encourage or discourage women’s participation.

IT training curricula can include modules that link IT skills to the social context where they are applied and to the problems which they help to solve, in order to better engage female students. Additionally, IT training programs can adopt the known gender strategies used in girls’ education, such as mentoring, use of role models, support and interest groups, internships, incentives for enrollment and performance, and ensuring a physically safe learning environment (protection from harassment and assault).

By reaching out to women through IT training, we not only broaden women’s opportunities but also bring greater innovation and diversity to Internet societies of the future.

* Nancy Taggart is Project Associate at AED. Chloe O’Gara is Vice President and Director of the Ready to Learn Center, AED. They manage the “Support for Gender Strategies for the CNAP” Project at AED.

References


3 “IT pipeline” here refers to the number of girls and women pursuing science and technology degrees and careers.

4 AED’s research on Cisco’s program is ongoing. The data are from May 2000 and do not include all students, due to some academies not reporting gender. For the purpose of the research, emerging market countries were CNAP is operating included: Brazil, Venezuela, Mexico, Argentina, Costa Rica, Mongolia, Philippines, India, Thailand, China, Indonesia, Jordan, UAE, South Africa, Romania, Hungary, Slovakia, Ukraine, Russian Federation, Turkey, and Kazakhstan.

5 The Academy for Educational Development’s “Support for Gender Strategies in the CNAP” is a one-year project funded by the Cisco Learning Institute from 2000-2001.

6 Interviews with Cisco instructors, 2000.

7 Ibid


10 Ibid

11 Sue Rosser, Female Friendly Science, 1990.


13 Interviews with Cisco instructors, 2000.
Promoting Virtual Collaboration Via the WWW

Joseph Slowinski*

With the increasing proliferation of computers and Internet access in schools as well as in the home, the potential for engaging in electronic or virtual collaboration activities becomes opportune for those who desire to expand their collegial discourse. Virtual collaboration is the process of communicating via the Internet and other web-based tools: e-mail, text and verbal chat, database, bulletin board, etc. For example, computer mediated communication tools are normally employed to support communication across distance or to promote and extend communication outside of normal business hours. These tools enable synchronous interactions (participants on-line utilizing tools to communicate at the same time and place), asynchronous communication (using tools to communicate at different times when an individual user is available to go on-line), or a combination of both. Yet, there is more to electronic collaboration than simply having access to tools and the willingness to engage in such activities.

Guidelines for Electronic Collaboration

According to "Electronic Collaboration: A Practical Guide for Educators," several systemic variables should be considered prior to commencing electronic collaboration.

1. Virtual collaboration is best suited for a group who has an established history of sharing and working together prior to introducing computer mediated communication tools (i.e., pre-existing collaboration is a preferred prerequisite). In other words, as a standard measure of practice with technology, always consider utilizing technology to meet human needs first.

2. An objective for collaboration should be clearly defined and articulated for all participants. When participants are aware of the objective, their role becomes more relevant and meaningful - a basic adult need.

3. Prior to beginning to collaborate electronically, participants should be skilled and comfortable with technology. More importantly, if the tool chosen for collaboration is new, time should be spent on becoming acquainted with it before the collaboration activities are facilitated.

4. Community building can be difficult in cyberspace since it is an artificial environment. If possible, have the group meet physically face-to-face at the beginning of the endeavor. If this is not possible, include opportunities for participants to be social with one another during synchronous meetings. Communication and interaction is a social activity and the beginning is a process of getting to know others in the group. Allow for this naturally occurring phenomenon.

5. A moderator should be skilled in technology as well as knowledgeable about the content. These skills will offer both content direction and technical support to the group. In addition, the moderator should be flexible and allow for the group to take a "natural" path to achieve the desired outcomes of the collaboration.

6. In addition to these general considerations, it is recommended that the group have access to: a public area, private area, database, search engine, site map, document sharing capabilities, and synchronous conferencing capabilities.

Free Web-Based Communication and Information Tools

With the above recommendations in mind, here are some free tools available on the WWW that can be utilized in virtual collaboration activities aligned with these recommendations.

*WebEx (http://www.webex.com)*

For registered members, WebEx offers free web conferencing for up to 4 people. With WebEx, each user has a virtual office and can share and view documents on-line while engaging in an audio conference via the phone. Web conference tools include chat, white board, and document sharing (limited to 10 minutes).

*Zkey (http://www.zkey.com/)*

With Zkey, users are provided with 50 megabytes of virtual drive space, a searchable and sortable e-mail account, a calendar with pop-up reminders. With group sharing and electronic collaboration, you can invite participation for asynchronous collaboration and sharing or host a synchronous
real-time meeting that can be recorded and preserved for later review. A new function also allows registered users the ability to access your address book, to-do list, and calendar via a WAP phone. Zkey also offers document sharing and the ability to control who sees which of 12 categories of your personal information (e.g., office contact info, home contact info, favorite web sites, education, and even gift preferences).

**TalkMe** ([http://www.talkme.com/](http://www.talkme.com/))

With the use of a microphone and speakers, users can utilize the TalkMe plug-in to enable verbal chat, enabling a more natural communication to occur.

**Evoke** ([http://www.evoke.com](http://www.evoke.com))

Evoke offers two free communication tools. First, similar to TalkMe, Evoke offers a free on-line verbal chat to registered users. Second, Evoke also offers the ability to send free voice e-mail.

**Free Disk Space** ([http://www.freediskspace.com](http://www.freediskspace.com))

Free Disk Space offers 300 megabytes of storage on the Internet and allows multiple users to share documents virtually on the WWW. The site also has MAC, MP3, Linux, PDA and PC format storage.

**AppBlast** ([http://appblast.com](http://appblast.com))

"With AppBlast, users can log onto this service and build surveys, polls, directories, and online databases quickly and easily with absolutely no programming. For people who have wanted to add a survey to their site, or have a web-based employee directory, or create a place to store their MP3's, it is now simple and easy with AppBlast."

**Gooey** ([http://www.getgooey.com](http://www.getgooey.com))

Gooey allows users who are simultaneously viewing the same web page to communicate via chat (instant messenger).

**Third Voice** ([http://www.thirdvoice.com](http://www.thirdvoice.com))

"Third Voice is a free browser companion that allows you to post notes that fuse your own ideas with Web content -- adding perspective and stimulating discussion. Notes can be posted to any page on the Web and be public, shared with a group or kept private."

**Babylon** ([http://www.babylon.com/](http://www.babylon.com/))

Allows instantaneous translation of any word in e-mail, word-processing documents, on the Internet, etc., and is currently available from English to and one of the following languages: English, Spanish, German, Portuguese, French, Italian, Dutch, Japanese, Hebrew, and now Chinese. In addition, the latest version allows text to speech technology. Another added function includes the ability to convert currency, time and measurement from around the world.

**FreeTranslation** ([http://www.freetranslation.com/](http://www.freetranslation.com/))

Offers translations of web pages as well as entered text to and from six languages: English, French, German, Spanish, Italian & Portuguese.

**Alta Vista Babelfish** ([http://babelfish.altavista.com](http://babelfish.altavista.com))

Offers translations of web pages as well as entered text to & from six languages: English, French, German, Spanish, Italian & Portuguese.

**GuruNet** ([http://www.gurunet.com](http://www.gurunet.com))

"GuruNet is a free instant lookup service. GuruNet uses patent-pending technology to analyze the context of any word on your screen and choose the closest match from a huge selection of concepts. The GuruNet window opens automatically, displaying information about the concept. Choose from various information tabs to view different kinds of information about the word.

Depending on the word you clicked (ALT + Click), you'll get reference (e.g. dictionary, encyclopedia) and/or real-time information (e.g. news, sports, stock quotes)."

**Alta Vista Discovery** ([http://discovery.altavista.com](http://discovery.altavista.com))

"AltaVista Discovery attaches to your browser to search the Web and your computer. Find e-mail, documents, presentations and more! Search has never been so easy!"

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* Joseph Slowinski is a research specialist at Co-nect and is ABD at Indiana University in Education Policy with a focus on International & Comparative Education. He also serves on the editorial board of *Information Technology, Education & Society*, a peer reviewed journal.

Planning Education for an Aging Society

By Sonia Jurich

“You can’t teach an old dog new tricks” is an old English proverb that applies very well to . . . dogs. Using the proverb in relation to human beings is incorrect, if not plainly offensive. It also disregards the fact that, for some time, growing numbers of adults, aged 50 and older, are entering or re-entering formal education to do exactly what the proverb assumes they cannot do, to learn new skills. The aging of the world population, economic changes and advances in medical sciences are contributing to a renewed discussion about older adults and their role in modern societies. Education is at the center of this discussion.

If we define learning as what happens when an individual confronts something new, we must agree that learning has occurred in all ages throughout history. What seems different now is the formalization of learning in older ages - what I am calling here “education,” for lack of a better name. Older adults are returning to classrooms in search of new information and new careers. Data on how many are returning and in what types of programs they are enrolling is scarce, but colleges and community centers, particularly in industrialized countries, can attest that their numbers are increasing. Rather than strangers amidst a young population, older students, for some educational institutions, have become cherished customers who deserve special attention and marketing strategies.

Why educate our elders?
Throughout the Twentieth Century, advances in medical science, sanitation, and nutrition have extended the chances of human survival. The initial impact of these innovations was the decline in infant mortality rates with an increase in the younger segments of the world’s population. By the 1970s, the median population age was about 22 years old. This youthful trend changed in the last two decades. While life expectancy has increased, fertility rates are declining even in developing countries. Slowly, but steadily, the median age of the world’s population is rising. If fertility rates stabilize at current levels, it is estimated that by 2050 the median age of the world population will be 36.5 years, rising to 42.9 years in 2150. Among the elderly, the older sub-set (those 80 years and older) will increase more rapidly. Between 1995 and 2050, their numbers are expected to grow from 61 million to 320 million, reaching 1,055 million by 2150. As shown in the table below, this aging process is occurring in all regions and in both industrialized and developing countries.

Table 1: Median population age by world regions (in years)

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<td>25.4</td>
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<tr>
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<tr>
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<td>28.0</td>
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<td>Australia</td>
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<td>Europe</td>
<td>29.2</td>
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<td>36.0</td>
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As the proportion of the population in older age groups increases, the development of new technologies has set in motion economic and social changes that are rapidly displacing traditional knowledge and skills. The stereotype of the old wise man is being replaced by a new truism - the very young computer whiz. In a survey conducted in the United States for the American Association of Retired Persons (AARP), 2,032 adults were asked what image comes to their mind when they think of a person as “old”. The respondents listed physical or mental limitations (35%), appearance (19%) and attitude (18%). The images related to a person “young” were active or busy life (36%), positive attitude (31%) and youthful appearance (12%). In other words, an active life is a major factor in the social acceptance of older adults.

Maintaining an active life, however, is becoming a challenge for the older segments of society. While traditional jobs are lost, the jobs created by the new economic order (the “economy”) require skills that are unfamiliar to an older population. Trapped by unwanted skills and outdated views of the world, older adults run the risk of being left at the margins of society, unable to share in its progress. In almost all countries, older adults already form the poorest segments of society. Without governmental supports, and in many cases despite them, individuals aged 60 and older must remain economically active to survive. Another essential role for older adults, mostly older women, is that of primary caretakers of children. This role is particularly important in African countries devastated by the AIDS epidemic. On their older shoulders lies the enormous responsibility of helping the new generations to take the route of progress, a progress that requires such a profound shift in the ways they see the world: from rural villages to global markets, from plows and hoes to wireless communication. Within this perspective, the education of our elders becomes a public policy concern.

The aging brain: is learning possible?

Despite advances in cognitive research, we know very little about how the human brain acts in the learning process, and most of what we know is related to youth. It is generally believed that memory - an essential element in the learning process - declines with age, but research has found that the influence of aging on memory is far from simple. The aging process seems to affect some types of memory, such as free and cued recall, while having little influence on others, such as implicit memory and measures of verbal ability. In addition, some of the age-related declines occur only under conditions of “high load working memory task,” and do not appear in less stressful situations. Research done at the Cognitive Neuroscience Laboratory, University of Southampton, England, reveals a complex picture of the aging brain. For instance, research on mental imagery shows a decline in the ability to maintain visual mental images, but no changes in the ability to compose and scan these images. Similarly, risk-taking decision making processes were found to be unaffected by age. Since aging has some reductive effects on types of memory, we may hypothesize that teaching strategies based on problem-solving and critical thinking better suit older adults. Indeed, these strategies are already being considered preferable to memorization even for younger students.

Many other fields related to learning and aging merit further research, such as motivation, persistence, and the relationship between experience and learning. Do older adults rely on previous experience as a tool for learning? Does experience facilitate the learning of new skills? What motivates older adults to learn? Which learning environments fit them better? AARP tried to answer some of these questions with a survey of 1,019 adults, age 50 and older, in the United States. (See summary of survey results in this Issue of TechKnowLogia: “The Why and How of Adult Learning”)

McClusky proposes that educational initiatives for older adults should respond to five basic needs: (1) coping needs - to address the decline in individual and social power that occurs with age, including loss of income, loss of status, and the feeling of physical decline; (2) expressive needs - help older adults to maintain a pursuit of enjoyment and personal expression; (3) influence needs - encourage older adults to stay socially active and influence society; (4) contributive needs - integrate older adults’ experience and knowledge in the teaching-learning process; (5) transcendence need - the need to have a more philosophical approach to life, transcend the losses that occur with age and maintain a sense of personal value.

Policy on Aging: Is there a role for education?

“The most productive investment will be linked to the best educated and best trained workforces, and the most effective way of getting and keeping a job will be to have the skills needed by employers.” (The Learning Age: Renaissance for a New Britain, 1998, online: http://www.lifelonglearning.co.uk/greenpaper/ch0001.htm)

It may seem strange to be concerned with workforce and employment when the subject of discussion is older adults, that is, individuals near or at the age of retirement. The truth, though, is that our ideas about workforce, and our limits, on when someone can be economically active, may have to change. First, if the aging of the world’s population is a long-term trend, societies will have to rely on older workers to maintain growth. Second, science is arguing that an active life is the best prevention of the ills that used to be attributed to “old age.” There’s nothing more active (and economically rewarding) than a job. In countries without retirement systems, older adults are already working, even if in unpaid po-
sitions, such as family caretakers, or in informal sectors of the economy, where gains tend to be minimal. As The Ageing & Development Report emphasizes, “the capacity of older people to work, often in spite of physical frailty, needs to be recognized and supported.”

This aging of the workforce may require changes in the workplace, such as increased flexibility of schedule and more consideration for proved abilities and experience, with less concern for youthful appearance. It also requires changes in education policies with greater investments on re-training programs for older workers that take into account their potential and limitations, and uses research findings to dismiss stereotypes on the ability of older people to learn and grow.

Technology and the Education of Older Adults

The use of modern technology in education programs for older adults has many advantages. Distance education courses enable more flexible schedules and more individual and small group learning, that seem to better match the learning needs of older students. In addition, distance education courses reduce the need for traveling, an important consideration for less mobile students, those living in hard-to-reach places, and those who have to care for children and for the sick. In addition, these courses expose older students to technologies that are becoming essential in the workplace and everywhere. Indeed, the use of modern technology in courses for older adults help to bridge the divide between a generation raised under the industrial revolution and their grandchildren, born under the Internet revolution.

We may be unable to teach new tricks to old dogs, but human beings are a different kind of animal, and continuous learning appears to be part of our makeup. Educational policies that help older adults remain as active participants of society represent a sound preventive measure for a better future.

Endnotes


10. According to the Ageing & Development Report, older adults in developing countries live in rural areas.
SEPTEMBER 6 - 9, 2000
"Keeping pace with development information..." The 25th Anniversary Meeting of EADI's Information Management Working Group
Bergen, Norway
http://www.eadi.org
http://www.eadi.org/html/information_management.html

SEPTEMBER 9 - 10, 2000
International Seminar Series on Education & Training 2000 - Shaping Education & Training in the New Century: Role of Information & Communications Technology
Kuala Lumpur, Malaysia
http://www.unitar.edu.my/

SEPTEMBER 9 - 24, 2000
China International Higher Education Exhibition Tour 2000
Guangzhou, Nanjing, Hangzhou, Tianjin and Dalian, China
http://www.edunet.com/events/event_detail.cfm?EventID=235

SEPTEMBER 10 - 13, 2000
"Distance Education An Open Question?" Conference
Adelaide, Australia

SEPTEMBER 12-14, 2000
LAUNCHING & CREATING LEARNING PORTALS
The Next Wave in Web-Based Distance Learning
Chicago, Illinois, USA
http://www.iqpc.com/INHP-X/create-portals

SEPTEMBER 15 - 17, 2000
Voices for Change
Cambridge, UK
http://www.ccc-worldwide.com/voice4change.htm

SEPTEMBER 23 - 25, 2000
The 28th Research Conference on Communication, Information and Internet Policy
Alexandria, Virginia, USA
http://www.tprc.org/

SEPTEMBER 25 - 27, 2000
OnLine Learning 2000
Denver, Colorado, USA
http://www.performancesupport.com/

SEPTEMBER 27 - 29, 2000
Distance Learning in the New Millennium
Jekyll Island, Georgia, USA
http://www2.gasou.edu/distance_learning/GDLA/gdla2000.html

SEPTEMBER 27 - 30, 2000
Learning 2000: Reassessing the Virtual University
Roanoke, Virginia, USA
http://www.cddc.vt.edu/learning/

SEPTEMBER 29 - OCTOBER 01, 2000
KIEV World of Education Fair
Kiev, Ukraine
http://www.edunet.com/events/event_detail.cfm?EventID=286

OCTOBER 2- 4, 2000
eSchool Technology Conference & Exposition
Orlando, Florida, USA
http://www.eschoolnews.org/estc/

OCTOBER 2- 4, 2000
GATE 2000: Delivery & Evaluation of Transnational Education: Challenges & Rewards
Colorado Springs, Colorado, USA
http://www.edugate.org/conferences.html
OCTOBER 3 - 5, 2000
EDTEC 2000 - Education Technology Expo & Conference
Indianapolis, Indiana, USA
http://www.emcshows.com/edtec/

OCTOBER 14 - 17, 2000
Association for Continuing Higher Education 62nd Annual Conference
Myrtle Beach, South Carolina, USA
http://www.coastal.edu/learn/ache/

OCTOBER 15 - 18, 2000
TELELEARNING 2000
Atlantic City, New Jersey, USA
http://www.itcnetwork.org/telelearning.htm

OCT 18 - 21, 2000
New Approaches in Higher Education: The University College Conference
Bermuda College, Bermuda
http://www.bercol.bm/w/uchome/uchome1/index.html

OCT 25 -28, 2000
14th Annual Technology + Learning Conference
Denver, Colorado, USA
http://www.nsba.org/T%2bL/

OCT. 30 - NOV. 4, 2000
WebNet 2000: World Conference on the WWW and Internet
San Antonio, Texas, USA
http://www.aace.org/conf/webnet/

NOVEMBER 3 - 5, 2000
6th International Conference on Asynchronous Learning Networks
University of Maryland, Adelphi, Maryland, USA
http://www.aln.org/alnconf2000/

NOVEMBER 8 - 11, 2000
Nat'l Assoc. for the Education of Young Children
Atlanta, Georgia, USA
http://www.naeyc.org/conferences/annual/2000/zocalo.htm

NOVEMBER 9 - 11, 2000
Fall 2000 Computer Using Educators Conference: "Bridging the Digital Divide"
Sacramento, California, USA
http://www.cue.org/

NOVEMBER 12 - 15, 2000
TechLearn 2000
Orlando, Florida, USA

NOVEMBER 18 - 21, 2000
TIES (Technology & Information Educational Services) Conference
Minneapolis, Minnesota, USA
http://www.ties.k12.mn.us/ties2000/

NOVEMBER 29 - DECEMBER 1, 2000
Online Educa Berlin 2000 - 6th International Conference And Exhibition On Technology Supported Learning And Training
Berlin, Germany
http://www.online-educa.com/

DECEMBER 4 - 6, 2000
Palmerston North, New Zealand
http://ittf.ieee.org/iwalt2000/

DECEMBER 12 - 15, 2000
Session on: "Reusability in web-based educational systems" in the International ICSC Congress on INTELLIGENT SYSTEMS & APPLICATIONS (ISA’2000) Symposium on INTERACTIVE & COLLABORATIVE COMPUTING (ICC’2000)
University of Wollongong, NSW Australia

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When the personal computer was first developed, the interaction between it and the user was limited to input via the keyboard or through computer code such as DOS. Some people are of the opinion that without the mouse, the computer revolution would not have happened. Think about it. Without the mouse, the concept of the point-and-click may never have evolved. The two largest computer operating systems, Microsoft Windows and Apple Macintosh were built on the point-and-click concept.

Thirty-two years ago, Douglas Englebart, a scientist working for the Stanford Research Institute invented the mouse. It was a simple wooden box with wheels placed at right angles to track cursor movement when rolled over a flat surface. This invention prompted Steve Jobs and Steve Wozniak of Apple Computers to develop the now popular Graphic User Interface, also known as GUI. Microsoft's Bill Gates also used the mouse as the basis for Windows, which really can only be navigated via the mouse.

Since the first mouse, ways of interacting with the computer have taken many forms. The mouse itself has evolved many times over. The basic mouse that the majority of us use today has a roller ball inside that protrudes from the bottom and buttons to click with. Friction causes the ball to move at a rate proportional to the movement of the mouse. Sensors sense the direction and rate of the movement of the ball, which are then converted into electric signals that are interpreted by the computer and converted into movements on the screen.

The optical mouse uses an LED (light emitting diode), a light sensor, and a special mouse pad that has a reflective surface with horizontal and vertical lines. The light from the LED reflects off the pad to the sensor and when a line is crossed, the reflected light darkens a bit. The pulses of light are what determine the direction and rate of movement. The new generation of optical mice will get rid of the pad by using cameras inside the mouse. The light shines on the surface below, just as before, but the camera will take continuous pictures. A processor in the mouse analyzes the pictures and compares them to see in which direction the mouse is moving. The information is then transmitted to the computer, which then moves the cursor on the screen.

Another mouse concept is the infrared mouse, also called a cordless mouse or a remote mouse. This mouse totally eliminates the pad as well as the cord. The infrared mouse is not connected to the computer via a cable. Rather it transmits an infrared beam to a receiver located adjacent to the computer. The receiver is oriented so that it is able to pick up the mouse's signal from almost anywhere in the classroom. However, anything in the "line of sight" between the mouse and its receiver can block the mouse's transmitted signal thus preventing it from reaching the receiver.

Other new developments in mouse technology include the "force-feedback" mouse that allows your hand to feel what your eyes see. If you scroll over a hypertext link on the Internet, the mouse will vibrate. The hope is that with so many people shopping on the Internet, these touchy-feely mice will allow shoppers to feel textures as they shop, thus enhancing the experience.

Laptops have incorporated multiple forms of the mouse as a way for the user to interface with the computer, from the same roller ball concept, to the "eraser head", to the touchpad.

Analysts in the mouse industry see the mouse as an endangered species. Already we can see that by the use of touch screen technology. When you order your drinks and food in a restaurant, it is rare that you find a computer with a mouse attached. Most often, the server enters your order by touching the screen here and there, and presto! Your order shows up a little while longer. What about the stylus pen that accompanies the ever-popular PDAs (personal digital assistants)? An Italian company called Discovogue has developed a product called MindDrive that works on bio-electric signals. You basically slip the gadget over your finger and your bio-electric signals act as the force that tells the computer what to do.

Despite these alternative "input devices," with the string of new "mouse" innovations, it will be a long while before the mouse is extinct.


Hands-on:

Museums are no longer somber places housing artifacts that cannot be touched or where monotone, guided tours are organized and pre-determined for you. Instead, they are taking on a role of being entertaining as well as educational. Interactive and multimedia exhibits give visitors the ability to discover and learn at their own pace, plus, they engage individuals, keeping them interested as they experience the museum’s various themes on a tangible level. This type of exhibition works on the premise that the act of participating in activities that exercise not only our listening and reading skills, but our motor skills, critical analysis, and physical skills, enhance the brain’s power in understanding and interpreting information.

“Interactive” is not new to museums; in fact, they were among the first organizations to utilize interactive multimedia and technology as a means of facilitating public interest and participation in the learning environment. Now days, most museums, world wide, are using the interactive approach in order to enhance the experiences of their visitors. The use of multimedia applications in museums ranges from museum databases and catalogs to orientation and interpretive guides and, of course, exhibits designed to be “used” by the visitor. These designs allow the public more access to information within the museum, as well as more control over their museum experience. They are able to further explore topics that interest them and engage in activities that will allow them to learn more. In other words, interactivity in museums allows for a more personalized visit…a museum tailored to the individual.

Multimedia provides patrons with greater access to museum collections. Things such as multimedia databases, which offer digitized information and videodisc images about all of the museum exhibits, can be used at terminals within the museum and are open to all visitors. These databases go beyond being merely a catalogue. Rather, they are more like an interactive encyclopedia providing detailed pictures and facts. Patrons can choose to learn more about a particular exhibit just by using a touch-screen. A multimedia guide works in much the same manner. It takes things a step further by assessing what patrons are interested in and then it gives them information on related topics or exhibits in the museum that they might find interesting. Such guides usually provide information in multiple languages and can even display directions to specific areas of the museum.

These tools are useful as far as exploring the museum as a whole but individual, interactive exhibits are what make museums entertaining and fun for children and adults as well. Not only do they allow for an enhanced exploration of things like natural history artifacts and artwork, but also interactive museums allow visitors to work hands-on with scientific and technological exhibits. Patrons engage in activities that range from producing their own video to building their own robot. Visitors participate in group or individualized experiments and are able to handle equipment themselves. They can push buttons, pull levers, create things and test them, and they can watch live demonstrations or take part in them. This gives people the opportunity to explore and discover the nature of things rather than just reading about it or being told.

This exciting way of enticing everyday citizens to learn has made its mark worldwide. Interactive, technological museums can be found in many different countries covering every region of the globe. This just goes to show that the idea of making learning fun for everyone is a universal one.

Sciencentre:

The Queensland Sciencentre (www.sciencentre.qld.gov.au) in Australia offers games, activities, and interactive exhibits meant to appeal to all community members, young and old. From earth and environmental science, to chemistry and physics, the Sciencentre has over 170 hands-on exhibits that allow visitors to mix fluids, bend light, build bridges, and experiment with geometric principles. One such exhibit, “Slippery Air”, allow individuals to experiment with the mechanics of a hovercraft. The exhibit simulates the lift of a hovercraft vehicle and shows the influence of an air cushion on reducing friction.

As you move through the exhibit areas, volunteers (mostly young adults) who are known as Explainers are available to assist visitors in interacting and understanding the science behind the exhibits. The Sciencentre also has interactive shows that deal with many themes from collisions to using liquid nitrogen. There are regular teacher workshops and the center even offers support materials to instructors in order to aid them with lessons and activities to do outside the museum or in a classroom setting.
on the campus of the University of Pretoria. Their SET
South Africa has its own version of the Exploratorium right
webcasts of scientific demonstrations of body imaging tech-
are at their disposal. The Exploratorium even provides
digital images of cross sections from an actual human body
veiling Bodies”. This exhibit incorporates science, art, and
health, fitness, and human perception, and houses over 650 exhibits that
allow for interaction with the museum’s visitors. Like the
Queensland Science Centre, the Exploratorium employs and trains high school students and young adults as Explainers
who help visitors use the various exhibits. As new exhibits are built and older ones repaired, visitors can actually watch the process as the carpentry, machine, and electronic shops are visible. Individuals can experiment with mirrors, lenses, filters, magnets and electricity. They can explore musical
instruments, wheels, and pendulums among other things.

The Yokohama Science Center is also equipped with a computerized planetarium that is officially called the “Space Simulator”. It accurately depicts the amount of stars an astronaut may observe from outer space. The planetarium is
unique because not only can individuals observe stars seen from earth but they can also observe earth and other planets seen from different locations in space.

Espacodata:
The Espacodata (www.mnit.org.br/home-i.htm) is Brazil’s future National Museum of Information Technology and Telecommunications. It intends to inform visitors of the past, present, and future of these technologies, their applications and impact on society. This museum is expected to function on a very practical level in the sense that the museum will demonstrate how computers and telecommunications directly affect everyday people’s lives. The ESPACODATA will be equipped with what are known as “Discovery Rooms”. In these rooms, visitors of all ages will have the opportunity to utilize the museum’s various tools and research techniques.

The National Museum of Information Technology and Telecommunications is being designed with interactivity in mind. Individuals will have the ability to operate ESPACODATA’s equipment and participate in workshops or small groups in order to learn how to better use current, state-of-the-art standards in computer and telecommunications technology and explore what’s to come.

The Future:
As technology advances, more and more museums will be incorporating hands-on activities or interactive exploration demonstrations into their programs. Soon, museum visitors will be able to try out more advanced equipment such as simulators and “Virtual Reality” applications once they are introduced. Air and Space museum visitors will be able to “fly” a spacecraft rather than just look at one, and art fans may be able to explore a DaVinci painting from the “inside” with the help of virtual reality. The options are limitless. Still, the key concern will always be giving the community, adults and children alike, access to the museums’ knowledge and learning tools. Attracting the audiences through using methods that are exciting, challenging, and fun, not only benefits the museums, but aids in keeping communities educated, up to speed, and in constant interaction with the world around them.
The following are several Web sites with useful resources on lifelong learning. Some are for the professionals who are responsible for providing such learning opportunities and some are for the learners.

Selected by Gregg Jackson, Vishnu Karki, and Robert Savukinas*

UNESCO’s Learning Without Frontiers
http://www.unesco.org/education/lwf
This Web site indicates UNESCO’s strategy to foster the learning of individuals and communities in ways that contribute to the resolution of social and political problems, particularly in developing countries.

International Association for Continuing Education and Training
http://www.iacet.org/
Despite the name, this is mainly an U.S. organization, but its work should be of wider interest because it has spearheaded efforts to establish standards of quality and certification of learning in continuing education. It also has published “A Practical Handbook for Assessing Learning Outcomes in Continuing Education and Training.”

International Federation of Workers’ Education Associations (IFWEA)
http://www.ifwea.org
This is an organization of trade union educational units, associations for workers’ education, and groups involved in vocational education. The organization promotes free, voluntary education “according to the principles of solidarity and cooperation, justice and equality, democracy and freedom.” IFWEA conducts in-person study circles, holds conferences, and produces publications. Some parts of the site are available in Dutch, French, Spanish or Portuguese.

American Association for Adult and Continuing Education (AAACE)
http://www.cdlr.tamu.edu/tcall/aaace/
This organization has members from the secondary education sector, tertiary institutions, businesses, labor organizations, NGO’s and government agencies from 40 countries. It holds conferences, prepares reports, and publishes three journals.
Adult Learning Information Centre Europe (ALICE):  
Non-Formal Adult Education in Europe  
http://www.kaapeli.fi/~vsy/alice/cou/index.html

This site provides good descriptions of how each of fifteen European countries organizes and delivers non-formal continuing education. Most of the descriptions are in English, but a few are in the national language.

California Distance Learning Project  
http://www.otan.dni.us/cdlp

The “Lifelong Learning” link is a good example of an instructional site for adults. It provides brief instruction on numerous topics, and then offers interactive quizzes to allow the users to test their understanding.

Fathom  
http://www.fathom.com

This is to be a learning site operated by some of the best known intellectual organizations in the world: Columbia University, London School of Economics and Political Science, British Museum, Smithsonian Museum, Cambridge Press, and New York Public Library. It will offer “thousands of online courses”; online discussions with prominent scholars, curators, and thinkers; and a large database and search engine. The services are currently under development; only a skeleton Web site was available in early August, 2000.

ESCALATE  
http://www.escalate.ac.uk

The site is operated by three British universities and will provide assistance to continuing learning educators throughout Great Britain. It will commission and distribute the development of widely needed curriculum materials, share existing materials, develop training for continuing educators, and organize various events for them. This site is under development; only a skeleton site was available in early August, 2000.

The Center for Teaching and Learning  
http://www.center.iupui.edu/teaching_learning_resources.html#sigs

The site is operated by Indiana University-Purdue University Indianapolis and provides an annotated list (with links) to a wide variety of journals, articles and opportunities in the area of continuing education.

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

This is a multipurpose site: instructional in assisting adults prepare for the secondary school equivalency test, as well as basic workplace skills; informative in helping locate courses and distance degree opportunities; developmental in providing training and support for educators and institutions in the field of lifelong learning.

* Gregg Jackson is Coordinator of the Education Policy Program at The George Washington University. Vishnu Karki and Robert Savukinas are doctoral students at the same university.
Think About It! and Control Your World

Sandra Semaan

While many activities around us are becoming less passive and more interactive, such as hands-on learning, as described in the article on Interactive Museums in this issue of TechKnowLogia, other activities are less and less interactive. Remember the days when a person had to get up off the couch to turn the TV on or off, or to change the channel? Now there's every couch potato's dream - the remote control. Remember the days when a person had to drive or walk to the grocery store to buy the day's goods? Now one can shop on the Internet and have food delivered right to the doorstep. Remember the days when people actually played sports - outdoors, in the heat, getting sweaty and dirty? Today, just pop software into your computer and you can play football, basketball or any sport in the comfort of your own living room.

It may appear that our lives are becoming more sedentary with each click of the remote, but there are those who are forced to rely on such "conveniences" because of particular circumstances. In the not too distant future, those people, and perhaps all of us, will be able to control the environment around us just by thinking it.

ABC News reported that a new way to read key brain signals has been developed by researchers at the University of Rochester, New York. In 1965, it was discovered that when the brain thinks yes to a yes or no choice, it responds with a large number of neurons firing all at once. With brain sensors, this response appears as a positive bump about 300 milliseconds after the stimulus. Thus, it was given the name P300. What is so astonishing is that until now, researchers have not been able to isolate the P300 from other electric noise. Jessica Bayliss, a computer science graduate student has developed the system that can, and has proven it in her lab. As reported by ABC News, "With 27 EEG sensors, which are commonly used to measure brain activity, placed on a test subject’s head, the person simply thinks. The brain sends pulses of electricity from one brain cell, or neuron, to another. Sensors pick up these signals and send them to the computer, which processes them in a fairly basic computer program."

In the lab, sensors are applied on a test subject's head, after which the subject is fitted with virtual reality goggles that provide a view of a three-dimensional world where the subject sees a room with a lamp, TV and stereo. Yes and no choices are prompted by a light that flashes on and off near a particular item. If the subject wants to turn on that particular item, the brain automatically sends out a P300 signal. Bayliss's system picks up the signal as described above, and the item is turned on. Tests in the lab have achieved 85 percent accuracy.

What is different with this system from other biofeedback systems is that the P300 signal happens automatically and all the time. The brain does not have to be trained to think in a certain way.

Bayliss created the system "...not for the lazy, but for people who are locked-in with extreme paralysis, for instance. It's these people whom Bayliss sees using the system to communicate with others and regain some control of their surroundings." The system may also be used to aid communication. In another test conducted in Western Germany, using the yes and no approach, a paraplegic wrote out an invitation to his birthday party in 16 hours. As quoted by ABC News, "...although it took him all day to write that letter, it was obvious he was delighted to do so."

http://www.cs.rochester.edu/u/www/u/bayliss/research/bci.html

http://www.abcnews.go.com/sections/tech/cuttedge/cuttedge000609.html
Molecular Geneius:
The DNA Computer
Sandra Semaan

What is a DNA Computer?
A DNA computer can be a spoonful, a potful, or a tubful of DNA that carries out complex computations. Today's conventional computers perform operations by using electrical currents to manipulate zeroes and ones on silicon chips. A DNA computer uses deoxyribonucleic acids (DNA) "encoded" with information formed in patterns of molecules known as nucleotides. Manipulating those nucleotides in various combinations creates the answer to complicated questions.

In a DNA computer, computations take place in a test tube. Scientists manipulate DNA to manufacture a set of DNA strands that represent all of the data points that could possibly be included in an answer to a particular problem. The DNA strands then link in all of the possible combinations of those data points. To find the answer to the problem, scientists then filter out all the DNA strands representing the "wrong" answers.

What are the benefits of a DNA Computer?
1. DNA memory is compact. A pound of DNA in three-foot square of water will hold more memory than all the computers ever made.
2. DNA computers can compute in parallel. While conventional computers perform operations one block of data after another, DNA computers can compute problems that are termed "massively parallel" and are difficult for the most sophisticated computers of today.
3. DNA computers are more powerful and efficient than silicon-based computers. A DNA computer can compute in six months what might take a conventional computer millions of years.

What are the drawbacks of a DNA Computer?
1. If DNA Computers are to be used for basic operations, they can be slow.
2. DNA molecules can fracture. Over a period of six months that it might take a DNA computer to solve a problem, the DNA system is gradually turning into water.
3. DNA operations are somewhat random. The components of a DNA computer are probabilistic.
4. A DNA computer is highly parallel. Though considered a significant benefit, each DNA molecule acts as a separate processor. While in conventional computers transferring data between processors in a multiprocessor computer is not difficult, this problem has yet to be solved in DNA computers.

Where did DNA Computers come from?
Leonard Adelman, a computer scientist and mathematician at the University of Southern California developed the first DNA computer in 1993. He tested its feasibility by solving the Hamilton path question also known as the traveling salesman question. Simply put, the problem asks: Given an arbitrary collection of cities a salesman has to travel between, what is the shortest route linking those cities? (For a detailed explanation of this experiment, go to: http://www.wired.com/wired/archive/3.08/molecular_pr.html). Several days after starting the experiment, Adelman had the Hamiltonian path for the shortest route between the cities.

What has happened since?
Earlier this year, a group of scientists at the University of Wisconsin was able to create a crude molecular computer "chip" made of a small glass plate covered with a thin layer of gold. The scientists coded DNA strands to contain all possible solutions to a problem similar to Adelman's but containing 16 possible answers. The team made several of the computers, each composed of about 100 trillion synthetic DNA strands that repeatedly solved the problem. Enzymes were applied to the "chip" to help eliminate the DNA strands with the wrong answers. This was the first DNA computer on a solid surface.

Though stable molecular computers are decades away, in the future they can be applied in anything from the invention of new drugs to cryptography to quantum mechanics.

References:
http://www.abcnews.go.com/sections/tech/Geek/Geek990719.html
http://corninfo.chem.wisc.edu/pictures/popsci.JPG
Founded in 1961, the Academy for Educational Development (AED) is an independent, nonprofit organization committed to solving critical social problems in the United States and throughout the world through education, research, training, social marketing and innovative program design.

For the Academy, communication is the cornerstone of many projects. AED has been a leader in using information, education and communication technologies (ICTs) to extend learning opportunities and improve education systems. Here are a few examples of our work.

**ED*ASSIST (Education Automated Statistical Information System Toolkit)**

**A New Approach to Education Management Information Systems (EMIS) Implementation**

This unique, state-of-the-art software program, developed by AED, is a baseline information system that reflects best practices worldwide in the collection, processing and dissemination of education data. The software is designed to help plan, collect and process the statistics that underlie wise strategy, sound management and responsible daily operations, and to afford all users easy access to the information in a single database.

ED*ASSIST distills the lessons AED has learned in more than 20 years of work with information systems in education, health and demographics and continuously incorporates the lessons of its use in the field. At present, it’s available in English, Spanish and French. Once implemented, ED*ASSIST reduces the cycle of collecting, processing and reporting national education data from years to months.

At a keystroke, ED*ASSIST can deliver reports on topics ranging from student demographics and attendance to teacher training and availability, all broken down by geographic region and school year. At the user’s discretion, the program presents the information in tabular, graphical or map form—all colorful visual images that make their point in a split second and can be published as bulletins or reports or exported to a word processor or spreadsheet.

A traditional EMIS typically requires three to four years to implement. AED was able to completely implement ED*ASSIST in Nicaragua in four months. We provided training, technical assistance and the software toolkit, and continue to provide hotline support and will install software upgrades as they develop. ED*ASSIST also offers website support.

In Benin, the Benin Ministry of Education was able to catch up with a three-year backlog of reporting in less than a year, and with limited programming and staff. Statistics from a fourth year were added and Benin has begun to decentralize data collection to the regions.

Visit our website at www.aed.org/edassist.

**Leland Initiative**

The Leland Initiative is a five-year, $15 million project funded by the U.S. Agency for International Development (USAID) to increase Internet use for sustainable development in sub-Saharan Africa. Approved by Congress in 1995, the Initiative honors the late Congressman Mickey Leland, a legislator who was deeply concerned for Africa and who died in a plane crash in Ethiopia in 1989. The project as a whole addresses policy, hardware and utilization. AED’s task is to increase Internet awareness and use among USAID staff and that of its development partners.

AED operates on-site training programs to familiarize participants with the mechanics of the Internet, teach basic skills for using it and encourage them to think about how the Internet can contribute to their work. This last goal distinguishes AED’s Internet for Development efforts as unique.

Our training is typically a two-day program for about 20 people representing a given sector: health, education or agriculture, for example. We also conduct executive programs.
for ministers and other high-level decision makers, training for future trainers and occasional individual sessions. Through the Leland Initiative, AED has trained more than 1,000 people, nearly half of them women, from 10 countries.

**LearnLink**

This five-year, $25 million USAID-funded program advances development in any sector through the use of education, and traditional and state-of-the-art communication technologies. By linking individuals, groups and organizations, LearnLink uses IECTs to strengthen learning systems essential for sustainable development.

“Emerging technologies are affecting economic growth and social justice and exacerbating differences between rich and poor,” says LearnLink’s director, Dennis Foote. “We’re trying to ensure that the developing world shares in the benefits of the technological revolution.”

A few examples of LearnLink’s activities:

- **Improving Access to Information and Communication Technology in Secondary Cities in Haiti.** Contributing to USAID/Haiti’s objective to reduce poverty, this activity increases access to communications technologies by reinforcing the technical capabilities of Internet Service Providers and by creating community-based telecenters in key cities. The centers are viewed as precursors to the country’s eventual participation in global e-commerce.

- **Basic Education Support in Egypt.** This project strengthens and extends one-room, multi-grade schools for girls through teacher training, materials development and interactive radio instruction.

- **Ghana Community Learning Centers.** Three pilot community learning centers (CLCs) have been established throughout the country. Each CLC provides Internet and e-mail access as well as a variety of information, communication and education services through fax, CD-ROM and distance education. LearnLink also established CLCs in Paraguay and Benin. Many of the centers are located in low-income neighborhoods and are open to anyone in the community to use as one would a public telephone. (see "Ghana: Networking for Local Development--How you Can Use a Computer Without Owning One", *TechKnowLogia*, September/October 1999; "The Watering Hole: Creating Learning Communities with Computers", *TechKnowLogia*, May/June 2000; "High Tech/Grassroots Education: Community Learning Centers (CLCs) for Skill Building", *TechKnowLogia*, July/August 2000.)

- **NGO Strengthening/Sustainability in Ecuador.** This project provides electronic communication capacity for enhanced services and long-term sustainability to Centro de Estudios de Poblacion y Paternidad Responsable (CEPAR), an NGO that offers family planning information, research and services to partners in Ecuador and the Andean region.

- **U.S.-Brazil Partnership for Education.** In 1997, LearnLink launched the U.S./Brazil Learning Technologies Network, or LTNet, an interactive, bilingual website that provides educators, researchers and policymakers working with educational technologies an effective means to meet, share experiences, collaborate and learn via the Internet.

Through these innovative types of programs, LearnLink is assembling a body of experience that is being shared with USAID, other donors, development partners and academicians around the world.

Visit our website at [www.aed.org/learnlink](http://www.aed.org/learnlink).

**Bridge to Advanced Technological Education and Employment**

In the United States, AED is working to help adults in high-poverty communities in Chicago and Detroit “bridge” into the booming technology employment sector through an intensive skills development program. The Bridge program, a partnership of community colleges and universities, civic organizations and industries, offers unemployed and working adults the tools they need to advance from low-wage jobs to higher-paying technology jobs.

The 16-week program is organized around problems and situations that resemble those encountered in advanced technology workplaces. It offers instruction in technical fundamentals and develops “soft” employment skills such as communication, teamwork and problem solving. Since the program began in March 1997, nearly 200 low-income adults have completed the Chicago Manufacturing Bridge at the largest program site, the Instituto del Progreso Latino. Of the graduates, 85 percent have secured entry-level skilled jobs with an average starting wage that is 15 percent higher than their wages before the program.

To find out more about AED’s work in the areas of health, education, youth development and the environment in the United States and around the world, visit our website at: [www.aed.org](http://www.aed.org).
There is abundant, perhaps excess, debate about the actual and forthcoming consequences of the development of information and communication technologies (ICTs) on education. Similar debates have taken place in the past: developments in transportation and postal services in the U.S.A. at the end of the last century, and a subsequent explosion in the offering of correspondence education, stimulated thinking about the future of classic schooling. More recently, from the development of television and other types of communications technology in the 1960s, the hope emerged that technology could solve many of the pesky problems related to learning and to access and delivery, quality control, and equality of the educational provision. When these hopes are driven by the potential of technology rather than by identification of educational problems and their possible solutions, they tend to remain unrealized. When technology is part of the tool kit of reformers who try to focus on improving an aspect of the teaching/learning process, then it can be a very powerful one. The thoughts that follow carry on from the thinking in the 1996 report to UNESCO of the International Commission on Education for the Twenty-first Century, Learning: the Treasure Within1. The aim here is to look at a few contemporary trends emerging from the ICT revolution and what this might mean for international co-operation in education.

Trend # 1: We are moving towards a society where knowledge is fast becoming the principal factor in the production of goods and services. Knowledge (generally evaluated for employment purposes by level of education) will be the principal asset of each individual.

Several comments are in order here. The expression, “the knowledge society” is, I believe, a somewhat misleading expression for the decreasing proportion of human physical labor needed for the production of goods and services and for the increasing component of “knowledge” that goes into production. In spite of the fact that almost everywhere the educational requirements for formal employment are rising, it is not clear, as some people seem to assume, that in the vast majority of jobs in highly developed economies, knowledge is a principal component.

The emergence of a tertiary sector is often equated with the use and application of knowledge and skills in work. This is only partially true: the fact that one no longer uses physical force for work does not automatically make that work more intelligent or requiring, by its nature, more skills. It would be hard to prove that a checkout clerk in a store needs a higher order of skills than, for example a mason or a cobbler. In the United States, the U.S. Bureau of Labor Statistics figures show that over the next five years, among the ten occupations with the largest job growth are included cashiers, retail salespersons, and truck drivers. True, job growth is also strong among systems analysts and executives, but the so-called knowledge society is also producing a substantial share of jobs that require a limited range and not very high level of skill.
These comments can seem very remote from the situation in poorer countries, where physical labor is still the mainstay of human production. Yet, changes are occurring very quickly, and the impact of streamlining manufacturing or agriculture is felt in the remotest areas of the world, in terms of falling wages and prices. Also, the difference in the economic value of high-skilled work and low-skilled work is increasing rather substantially, both within countries and around the world.

What is undeniably true, is that literacy and numeracy are essential for full participation in contemporary society: work, public life (citizenship, democracy), family life, consumption and so on. Consequently, whereas the knowledge content of jobs is not necessarily high across the board, the level of education needed to participate as a citizen in a modern democratic society is unquestionably rising. Furthermore, a solid basic level of education is the best predictor for pursuit of further learning opportunities, and that is increasingly indispensable for both economic and personal adaptation to a fast-changing world.

What are the consequences for international co-operation and for UNESCO? They are several:

* It is the role of international organizations to continue to militate for the application of the right to education, and to extend this right to a longer period in all parts of the world.

* Educational policies and practice must take into account the increased need for knowledge to participate in contemporary society and study ways in which organized education can meet this need, all over the world.

* We must better understand and make known the connections between initial education and further education, in order to expand second (and third) chances for those who have not taken full advantage of initial educational opportunities (that is to say, the vast majority of people).

Trend # 2: The place of formal education in the constellation of educational provision will fundamentally change, as more short-term, on-line, informal, and on-the-job educational offers are available and used. Education will increasingly become a commodity, including in the poorer countries.

People look on this development with mixed hopefulness and alarm, depending on where they sit. Those who are well prepared and have access to many sources of information see expanded choice as yet another opportunity, and they are right. Commercial interests quite rightly have identified another area of consumption that opens seemingly limitless possibilities for expansion. Those concerned with the expansion of education beyond the limitations of space and time are excited about the possibilities of being able to reach potential learners anywhere, anytime.

But, I believe caution is in order on three counts:

First, with the expansion of private, commercial provision of learning opportunities, the notion of education as a public good can become blurred.

Second, expansion in commercial learning opportunities will very likely be heavily weighted in areas that are directly and clearly related to the economy. This is to the possible detriment of basic general education that provides the foundation for further learning, and the thinking and analytical skills that makes further learning possible and profitable.

Third, equity is not a concern of the market, which means that ensuring educational opportunities in fields or for groups that are unprofitable must remain a concern of the public sector, and care must be taken to ensure that these are not neglected.

What are, here, the implications for international organizations, and particularly UNESCO?

* A reflection is in order about the role of the state in the provision of education, made all the more important as educational offers leap across boundaries in a way that has not happened before. Careful thought is needed about how the decisions will be made to leave some aspects of education and training to the marketplace and what is the essential role of governments to ensure universal access, equal opportunity, and high quality. International organizations can help in posing the questions of equity and access, in suggesting norms and standards, in examining the financing and provision of education that the marketplace does not want to take up (special needs education, or life skills education, to give only two examples).

* It is the job of international governmental and non-governmental organizations to reflect and speak about the long-term consequences of societal changes. Many countries, faced with urgent day-to-day needs, can be tempted to feel that it is a luxury to look at long term trends, or that they have not the resources to take care of today’s problems and think about the distant future at the same time. Organizations like UNESCO play a useful role in studying these trends and reminding both decision-makers and the population at large of what they mean.
Trend #3: With the increase in the expansion in the quantity and sources of information, gatekeepers will become more important. Validation of information, and information about information, will become more and more important issues.

In mass media we have already seen a blurring of the distinction between truth and fiction: photos and films are altered and presented as part of the news, hearsay is reported as fact, and so on. With the Internet, the freedom to circulate information without authority or credentials has resulted in a massive liberation of constraints, both positive and negative. The credibility of much that one sees and reads has to be independently explored and verified, and the ability of the recipient to separate truth from fiction is very important. In the field of education, the same principles will hold true: individuals will have a greater burden in trying to discover whether a course is of good quality, whether it will indeed deliver what is promised, and whether sources used for research are authoritative or reliable. The multiplicity of offers and opportunities will make “consumer protection” more important, as the “market” is more and more fragmented and the power of consumers is dispersed over a wider spectrum.

What are the consequences of this for UNESCO?

* Traditional partners for UNESCO have rarely included the economic sector except as a manufacturer and provider of material needs. As the provision of learning opportunities moves substantially out of the state sector, particularly in adult learning and distance learning, UNESCO will have to rethink these issues. There are new regulatory issues, questions of universality of access, quality, and so on, which must be dealt with.

Trend #4: The gaps between the info-rich and the info-poor will grow. No matter how much we may wish it weren’t so, this is undeniable. Awareness of the acuteness of the problem is, fortunately, also growing. The recent declarations at the close of the G8 summit in Okinawa are a vivid example of this awareness.

At the same time that we are still struggling unsuccessfully to get access to schooling for all children, computer technology is very rapidly becoming an integral part of the educational system in the wealthier countries. Our efforts must go into making this trend towards growing rather than shrinking gaps as brief as possible, and begin reversing the trend in the near future. Nevertheless, we still live in a world where in the United States over half of the population has access to a computer and the Internet at home, and where over half the people in the rest of the world have never made a phone call. Although it is tempting to view technologies as a new miracle cure that can replace or bypass the development of a solid, broad-based educational system, this is unlikely to be so. Furthermore, poor countries, we should not forget, cannot afford expensive mistakes: understanding this, and proceeding on the basis of knowledge rather than intuition is essential.

Again, what does this mean for international cooperation?

* A priority task is to examine not only the potential for technologies in education but also the need for technologies in specific educational settings, the added value in terms of quality, additional opportunity or cost-benefit, and the obstacles to be overcome. International organizations have the moral obligation to simultaneously help make modern means of communication a part of all societies; they must also try to protect poor countries and communities from making expensive mistakes.

Trend #5: There will be significant changes in the sequence of activities, or the use of time, over individual lifetimes. With the tragic exception of parts of Africa, life expectancy is continuing to increase very significantly, and the span of time over which people work will decrease relative to their life spans. Changes in the place of work, in the distribution of time spent working, and in the distribution of education over lifetimes will undoubtedly break the linear sequence of education, work, and old age/retirement, for increasing numbers of people.

It is a truism to state that initial education and training will no longer serve us throughout life. This development will of course require better responses in terms of learning opportunities, all over the world. It will also reinforce the importance of a solid basic, initial period of learning that prepares the ground for further learning throughout life: if individuals are to take up further learning opportunities they must have a positive attitude towards learning, and they must feel they have a chance of succeeding. They must also have a broad general base to which to attach further learning experiences. Initial education will need to be less, rather than more, specialized, in the view of many observers. As individual
learning becomes more fragmented in time, and in many cases more task-oriented, initial education will keep its importance as a foundation for further experience.

What is the role of UNESCO and other international organizations in this context?

* UNESCO has long advocated the concept of learning throughout life. An educational credit for each individual, to be drawn upon throughout life, was proposed in the report of the International Commission on Education for the Twenty-first Century. Since then, the United Kingdom has begun to implement a scheme of individual learning accounts precisely with the aim of putting into practice the ideal of learning throughout life. The concept and other such initiatives will be examined, and we shall try to extend the knowledge base on both the possibilities and the realities in this area.

* It is in periods of great change that public institution and organizations of international co-operation have the greatest role to play. They can act to expand the knowledge base, to share information, and to help decision-makers acting at the national or local level put their own situations in context. They can serve better than the marketplace as the poles of stability and memory that are needed to temper unbridled innovation and change. Furthermore, with the structure, the offer and the content of education evolving rapidly, it is all the more necessary to emphasize education as a continuum, made up of formal and informal learning, all the elements interacting and influencing each other. More needs to be done to ensure that qualification and certification of learning and experience works in the same way. Mobility of education and of learners means that international co-operation is needed to develop both understanding and recognition of new types of learning.

Into the Future

We are clearly only at the cusp of immense changes in the content and means of information and communication, that will have ramifications we cannot begin to imagine on all areas of human activity. Just as the automobile, at first viewed as just another means of transportation, came to influence all areas of human activity, from the habitat (style of architecture, location, and so on) to the distribution of occupations (disappearance of the whole range of activity related to animal husbandry or carriage manufacture for example), ICTs will influence areas of our activity that we can only imagine now. And, of course, some of the influences we can imagine will not come to pass, and others, far removed from what futurists thought about, will emerge as major trends. We are too close to the advent and adoption of new technologies in our lives to imagine what kinds of impact they will have on human relationships. The fundamental reason

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1 This article is adapted from a paper by the author for an internal staff seminar at UNESCO on the same topic. It reflects the opinion of the author and does not necessarily reflect that of UNESCO.