Leapfrogging Over the Status Quo:

E-Learning and the Challenge of Adult Literacy

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November 2002

Prepared for the meeting, ***Building Literacy Skills Through E-Learning****,*
with funding from the Atlantic Philanthropies

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Executive Summary

The U.S. economy and standard of living depend on being able to compete in the knowledge economy, yet the gap between the skills of our workforce and those that employers need increasingly constrains our nation's competitive advantage. Employers continue to cite workforce skills as a major problem, and there promises to be an even greater shortage of skilled workers as the baby boomers retire. The United States ranks ninth to fourteenth in the various literacy measures compared with the other high-income, industrialized nations. Almost half of U.S. adults who are employed have no education beyond high school.

Just under half of the adult U.S. population—approximately 90 million people—do not possess the levels of literacy required to perform the jobs of the new economy, yet only 8 percent of adults are enrolled at any given time in federal or state supported adult education and literacy programs. Fewer than half of those with income levels below $24,999 had used computers in any capacity in 2001, and fewer than half of those with incomes under $34,999 had used the Internet.[1]

These low levels of literacy, skill, and education put a brake on economic development, and they also limit the potential of adults for jobs and careers that pay wages to sustain a sufficient standard of living. Of equal importance, illiteracy hampers their ability to participate fully in their communities, in a democratic society, and in the digital age.

The adult basic education "system" in place to serve these adults is routinely described as fragmented and under-resourced, lacking sufficient funds, facilities, properly trained instructors, and connections to work. The combined state and federal funding per adult *enrolled* in a program is about $400.

Despite the tireless efforts of individuals and institutions in the public and private sectors to promote change, it is unlikely that federal and state governments will provide the substantial increases in funding required to accomplish more than marginal improvements. Our choice is to continue to use the traditional levers of public policy and the non-profit community to make incremental change, or to consider ways to follow advice often given to developing countries: use technology to "leapfrog" from the status quo to radically more effective systems. A breakthrough on this issue is as much in the national interest now as a breakthrough in math and science literacy were in the Sputnik era. Continuing as we are will handicap our economy and democracy.

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[1] National Institute for Literacy, National Coalition for Literacy, National Center for the Study of Adult Learning and Literacy, National Adult Education and Professional Development Consortium, U.S. Department of Education Office of Vocational and Adult Education, National Literacy Summit 2000: *Literacy Skills for 21st Century America.* Andrew Sum, Irwin Kirsch, and Robert Taggart. "The Twin Challenges of Mediocrity and Inequality: Literacy in the U.S. from an International Perspective." Princeton, New Jersey: Educational Testing Service, February 2002, p. 30. www.ets.org/research/pic/twinchall.pdf. Recent U.S. Department of Education statistics show that English language learners represent nearly half of the overall national adult education enrollment. In addition, there is an increasing demand for ESL instruction in areas of the nation that have not, until recently, seen large numbers of immigrants. Both trends increase the need for quality instruction and qualified teachers.

Technology is, of course, a tool, not a program or an agenda. But technology in the system of learning holds the potential to help close the skill gaps and to provide the learning adults need and want. Realizing this potential will require investment, imagination, and risk. Governments, educational institutions, and community organizations are necessary partners, but the often more unencumbered capability of private sector institutions—companies, foundations, venture capitalists—is perhaps even more critical in developing the concerted, path-breaking efforts that are required.

This report examines e-learning's potential for responding to the challenges of adult literacy and considers options for prompting significant, effective change in the systems for providing adult basic education. It focuses on the following questions:

- Are learning technologies available and in use that can be effective in raising the literacy and skill levels of adult learners who need basic skills and/or English?
- Are learning technologies available and in use that can be effective in learning management, providing support to instructors for professional development, and the exchange of useful practice, information, and curricula?
- What are the significant barriers to more extensive development and use of technology-enabled learning products and tools?
- What are the most effective and immediate ways to have an impact on adult education to the benefit of adult learners?

Based on a review of research, investigating the availability of technology-enabled products, and seeking out practitioners, program managers, developers, and funders, this study found that there are products, programs, and resources that are available and in development. It also found that the challenges to greater use of technology are tightly intertwined and include some that are unexpected. Specifically:

- Effective learning technologies are available for raising the literacy and skill levels of adult learners who need basic skills and/or English.
- Those that are most effective, either in supporting a classroom-based or a self-directed distance learner, are likely to employ multi-media, visual, and audio text, customized interactivity, and voice recognition.
- Environment and community remain important in supporting an adult's continuation in lifelong learning. Using technology to promote community-wide change, access to training, and jobs in IT also can serve as an effective spur to individual change.
- A variety of easily accessible resources for instructors provide training and support in using technology, lesson plans, curriculum support tools, and networks for communication with peers.
- Much of the technology-enabled learning available to teachers/instructors focuses on professional development and curricula designed for using technology in teaching, rather than for facilitating delivery of traditional professional development.
- While the cost of developing products and programs for adults and for teachers is not insignificant, neither is it always prohibitively expensive.

- Much of current product development is funded by the U.S. Department of Education, alone or in partnership with states, and by foundations. Private-sector providers of e-learning are more likely to offer in-kind support to non-profit and foundation initiatives than to develop their own products for the adult basic education market.
- Lack of sufficient channels for dissemination of information about products and/or distribution of the products themselves is a significant barrier to awareness and use. High turnover among adult basic education teachers and volunteer instructors exacerbates this problem.
- The costs of distribution, maintenance, and upgrading are rarely funded in grants for new products, leading to problems of sustainability or incomplete development.
- The lack of research and evaluation about the optimum practices and environments for using technology successfully with adults prevents greater use of technology, which in turn inhibits effective research.
- Both the necessary technology infrastructure and the capacity of teachers to use technology require significant upgrading. Building this capacity is as necessary as expanding R&D.
- The absence of a defined, cohesive target market among either individual consumers or organizational providers of adult basic education hinders business interest in developing products for this community. The continued lack of successful business models for Web-based products and services in all markets exacerbates this issue.
- Commonly held assumptions about e-learning continue to focus on its value as an add-on or supplement to traditional education, rather than on the opportunity e-learning offers to consider new environments, structures, and ways of learning.

These findings derive from a relatively small number of examples, most of which are new and in limited use. However, these examples are not tentative, first-generation initiatives with only an experimental purpose. On the contrary, the products are high quality, derived from cognitive research and extensive experience, and developed by individual organizations and consortia with commitments to adult literacy and to expanding access to and the quality of learning for adults in the United States.

Although the necessity of evaluation, developing context and practice, and other important work remains, these examples constitute a foundation for action, given the national crisis in adult literacy.

To move forward, this study recommends a focus on the following strategic issues:

- Creating a viable market for development and dissemination of e-learning technologies for low-literacy learners;
- Stimulating demand for e-learning products among the target markets; and
- Investing in building the technological awareness and capacity of targeted institutions providing education and training services to low-skill adults.

Specific actions for each strategy are provided at the conclusion of the report.

Learning in the Digital Age: Challenges to the American System for Adult Literacy

"E-learning isn't about technology, it's about a cultural revolution. We've entered an era where we're going to be bringing learning to people instead of people to learning."—Michael Parmentier, Director of Readiness and Training Policy Programs in the Office of the Secretary of Defense[2]

The Adult Basic Education System Under Pressure

Providers of adult basic education grapple with a shared set of challenges: limited resources, inadequate facilities, growing demand, and poorly paid, poorly trained teachers and volunteers. The population in need of these services has become increasingly diverse ethnically and culturally. English language education is the fastest growing segment of adult education, representing over half of all adult enrollments. Organizations increasingly find themselves called upon to provide a range of support services to their students: Immigrants face a wide range of personal, family, cultural, and work-related challenges; others face practical difficulties of lack of time, money, transportation, child care, and access. Despite the importance of employment, the adult basic education system remains, for the most part, unconnected to the larger world of workforce development and the continuing education that leads to necessary credentials.[3]

Individuals with barriers to work frequently look to the community-based and non-profit organizations that provide many of these support services for the information they need about jobs, training, certification, credentials, and other aspects of employment. Immigrants and those with low levels of literacy often find the official public and private-sector systems for employment and training confusing or ill-suited to their particular needs.

For program managers and instructors, navigating this array of challenges, often represented simultaneously by individuals in the same classroom, requires at the very least some understanding of an individual's literacy, written and spoken ability in English, and other skill levels. Tools to assess and diagnose these characteristics often require too much time to use or are overly general in the level of assessment they provide.

Tracking student learning and outcomes has become more critical for a number of reasons. Government agencies and other funders require detailed outcome measures as a condition of funding. Employers demand formal assessments that demonstrate the individual's ability to perform work-ready tasks. Assessment and feedback continue to be important for students themselves, many of whom lack the time or expectation to enter or continue in a program without regular evidence of progress.

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[2] Michael Parmentier, Director of Readiness and Training Policy and Programs, Office of the Deputy Undersecretary of Defense, U.S. Dept. of Defense. *Federal Computer Week*, December 18, 2001, www.fcw.com.

[3] Jobs for the Future, *An Analysis of Adult Basic Education and Literacy in New England.* A Report to the Nellie Mae Foundation (May 2001); National Institute for Literacy, et al., Literacy Summit 2000: Literacy *Skills for 21st Century America*.

E-Learning for Adult Literacy

In response to these challenges, Jobs for the Future launched an initiative to:

- Explore the potential of e-learning and related technologies for addressing the skill and employment needs of adults with low levels of literacy and skill; and
- Consider the changes in the provision of adult basic education that would be necessary to enable the successful use of e-learning.

This paper reports on an investigation of products, programs, and tools that are now or soon will be available and in use, both for teaching basic skills (including computer literacy), ESL, and workforce readiness to adults and for providing professional development and support to the instructors in the adult education system. The research also examined a sampling of programs that teach IT skills to low-skilled adults.

As a result of this work, it is clear that e-learning and supporting technologies can assist in expanding and enhancing the adult basic education system's ability to provide service to this population. It is equally clear that an expansion of the existing system on a scale necessary to serve the growing numbers of those who do not have access to it is unlikely, given financial and other constraints.

The examples in this paper are just that: examples. They do not constitute the extensive array of products, practice, and research that typically provides the foundation for radical change. There is no question that these and other examples require additional use and evaluation, in order to develop and understand the most effective environments, practices, modes of access, and other important issues that determine success in individual learning. It is also the case that traditional institutions too often are reluctant to use e-learning products or to test their potential, viewing them from within the perspective of "school."

The slow pace and incremental nature of change in the systems with responsibility for adult basic education is insufficient to deal with the national crisis in adult literacy or with the rapid introduction of new kinds of technologies. There is considerable information about how adults learn and how these characteristics may be integrated into e-learning. This paper contends that the risk of embracing e-learning now—before all the votes are in—as a central mechanism in educating low-skilled adults, is far less serious than the risk of continuing to rely on a system that does not and cannot serve the majority of those who need it.

The purpose of this paper is to provide a framework for discussion that will lead to proposals and actions beyond the traditional options among key players in this field: leaders in technology-enabled learning, government, business, venture capitalists, philanthropy, and adult basic education. The goals of this discussion are to consider:

- The potential of existing e-learning technology for expanding access to and improving the quality of learning opportunities for low-skilled adults who now participate in adult basic education;
- The most effective ways of implementing this expansion;
- New options for reaching the vast majority of adults who need education for literacy, English, and work and yet who remain outside of, or underserved by, the existing system; and

- Immediate and effective ways of enabling implementation of new options.

This paper provides an overview of the investigation and findings and detailed discussion of selected examples. The Appendix that follows includes “snapshots” of over 30 products, programs, and resources.

E-Learning's Potential: Asking Different Questions

What environments, structures, and opportunities for learning would we create using technology, if we did not have the systems now in place?

Technology has the potential to transform the means by which we learn and access information in the twentieth century in two important ways. First, technology enables us to do many of the things we already do faster, more flexibly, more efficiently and with greater access for all. Second, technology enables us to do things that we cannot now do, or to do them in ways that are significantly different. Technology makes possible an entirely new environment and experience of learning that goes well beyond the classrooms, curricula, and text-based formats to which we are accustomed.

E-learning is as much about information, communication, and the learning environment as it is about technology. We have only begun to develop and make use of the possibilities of the Internet and the Web. Access to virtual environments—seeing the interiors of museums, viewing urban and rural landscapes, exploring undersea, "visiting" a workplace—provides opportunities for individuals to gain some sense of places and things that can enrich a life and also raise their awareness of the education available to them.

Mitchel Resnick of the M.I.T. Media Lab argues that the view of computers and the Web as "information machines" misses their greatest potential for learning: use as "material" for making things. Computers offer the opportunity to learn while designing and creating everything from Web pages, to music, to art, to scientific simulations.[4]

Equally important, technology's capabilities prompt new questions about how learning occurs. John Seely Brown, a well-known scientist and philosopher of learning in the Digital Age, observes, "This past century's concept of 'literacy' grew out of our intense belief in text, a focus enhanced by the power of one particular technology—the typewriter. . . . [With] the Web, we suddenly have a medium that honors multiple forms of intelligence—abstract, textual, visual, musical, social, and kinesthetic."[5]

These perspectives are not yet widespread, nor is the infrastructure necessary to promote them. But the technologies that make them possible are available now. In considering how to expand the access of individuals to knowledge, skills, and information, it is equally necessary to consider ways of using technology beyond "support and delivery" for traditional education.

Technology and Adults with Limited Literacy and Skills

The electronic delivery of traditional classroom-based text, curricula, and communication supported by a teacher or instructor—often described as "online learning"—is the first generation of e-learning and the one that prevails in most corporations, postsecondary education institutions, and K-12 schools. Sometimes characterized as "e-reading" or "e-instruction," it offers flexibility of time and place to the benefit of many students and

[4] Mitchel Resnick, "Rethinking Learning in the Digital Age", in The Global Information Technology Report: 2001-2002. World Economic Forum and Harvard Center for International Development.

[5] John Seeley Brown, "Growing Up Digital" in *Change* (March/April 2000). www.aahe.org/change/digital.pdf.

employees, but it is effective primarily for individuals whose abilities and environment include successful experience in classroom learning, the ability to use computers and the Internet, on-hand technical support, self-direction, a willingness to ask questions, and an environment that reinforces the value of attention through incentives or penalties in the form of degrees/promotions or failing grades/employment consequences. It is not suited to low-skilled adults, who rarely have these capabilities or environments.

Much of the literature and professional opinion about basic skills, ESL, and workforce readiness education contends that the key to effective learning lies in approach more than content. The learner's background; experience with education and/or training and/or jobs; the attitudes and expectations of the learner; particular, not general, language; literacy and numeracy abilities; and practical issues of family, housing, health and child care all come into play. The means through which an individual is exposed to learning and information is another element in this mix. The ability to read text in English may not be the only initial route to knowledge.

What good technologies and good uses of technology offer is the potential to enable and support this more customized approach, whatever the shortcomings of a provider organization. The best instructors and organizations seek to offer individual attention for particular learning styles, opportunities to work and solve problems in groups, exposure to the world of work and employers, and a progressive but engaging and not intimidating learning experience. Well-designed simulations, interactive multi-media, and other technology-enabled tools can mimic many of these functions, expanding and enhancing the reach of the instructor. Using technology effectively to meet the needs of low-skilled adults will require supporting and engaging products, as well as new practices and opportunities in offering learning and information.

Existing products have these characteristics, but technologies in development, such as intelligent tutors and augmented reality, promise even greater effect. Web sites that are constructed to provide information in forms more suited to human inquiry that the menu-driven format of today are emerging, such as www.Historywired.si.edu. Prototypes of "Content-based" smart cards hold information or courses that an individual needs, accessible upon insertion into a card "reader" at specified locations. Such options can go a long way toward eliminating the necessity for investments in ever-expanding numbers of computers and software programs. Wireless technology, associated largely with cell phones and handheld devices, also enables individuals to connect to an ongoing course of instruction, a mentor, and Web-based practice and information without traveling to a technology center, library, or school. Expansion in the development of simulations and games designed for learning as well as entertainment will match the experience of children and young people.

The personal "touch" that is held up as the standard to meet often falls short in the real world of tight budgets, volunteer instructors, inadequate preparation, inhospitable physical environments, and other all too common realities. Technology can extend the capacity of the finest teacher and make up for some of the deficiencies of the poor teacher. And for the more than 90 percent of adults who lack access to education, any opportunity for learning—however inadequate when compared with a trained and attentive instructor—is better than none.

Defining E-Learning

For the purposes of this paper, "e-learning" is technology-enabled (video, software, or the Internet) instruction, content, access, information, assessment, and learning. This includes:

- Technology (drill and practice, interaction, audio/video) that extends and enhances the capacity of teachers with large and diverse classes;
- Technology that enables instructors to customize lessons to suit particular needs (authoring tools, Web-based resources);
- Vibrant and engaging content that can be critical to an adult's interest in continuing in education and in lifelong learning;
- New technologies that enable many adults to learn more effectively than in traditional classroom instruction (intelligent tutors, augmented reality);
- The opportunity provided by the Internet and the Web for communication, new ways of relating to information and knowledge, and visual and audio exposure to other places, people, and things;
- Technology that enables assessment of an individual's literacy, language, and skills faster and with additional qualitative measures; and
- Access for adult students to information about the community services that are often essential to enable them to get to work or classes (e.g., child care, transportation, health care, immigration, unemployment).

E-Learning Products and Programs for Adults

Criteria for Selection

This investigation of technology-enabled products, programs, and tools led to a focus on those that offered ***multiple learning paths, active engagement, and a real world context to the learner.*** These characteristics were recommended consistently as necessary components to encourage optimum learning and to the willingness of the adult learner to continue his/her education.

The critical questions for any product, curriculum, method, or other component in learning concern effectiveness, ease of integration into the learning environment, cost of development and purchase, and how well it achieves its purpose relative to a product or method already in place. In the case of technology-enabled learning, the issues of integration and relative performance include whether the technology increases student access and the quality of the education, whether there is enough support for a teacher's ability to understand and use it, and whether it has potential for wide distribution and sustainability.

The question of effectiveness in e-learning is not an easy one. There has been little research and evaluation about the impact of technology in basic education, ESL, and personal development on adults with low levels of skill and literacy. Most of these products and programs are new, and therefore most of the evaluations rely on relatively few pilot sites. In all but a few cases, such as the Pennsylvania pilots using distance learning for the PBS Workplace Essential Skills, e-learning continues to take place within the context of a traditional instructor-led, set curriculum, classroom environment. In consequence, available research and evaluation offer conclusions about using technology as an "add on." However, initiatives now underway, such as the multi-state IDEAL project, address learning in a technology-enabled environment and should provide valuable insights.[6]

Outcomes that determine effectiveness in adult learning for literacy, English, and work in the Digital Age also encompass factors such as success in acquiring skills for getting a job, negotiating the workplace, finding useful information using computers and the Internet, managing the practical aspects of daily life and culture, and developing the self-esteem and motivation that many of these adults lack. The evidence from this perspective is largely anecdotal, reported by programs that have served as pilot sites for new products, but it does suggest significant value in using computers, the Internet, and e-learning products.

For these reasons, this research tended to focus on examples developed, funded, or used by public- and private-sector organizations with significant experience in the field of

[6] The National Adult Education Professional Development Consortium, in collaboration with TECH21 partner, Jere Johnson, University of Michigan, is working to enhance and expand distance learning systems for adult learners. Fourteen states are currently collaborating to develop: 1) assessment systems for distance learners; 2) a handbook for distance learning teachers; 3) online courses for distance learning instructors; and 4) experiments to develop various components of a distance learning system. Early development of this collaboration was supported financially by U.S. Department of Education, Office of Vocational and Adult Education.

adult basic education. In almost every case, interviews were held with the program manager, product developer, or funder, as well as with the manager of selected pilot sites when possible.

Characteristics

Most of the products and programs are both derived from and designed for a structured, supportive environment, in which the individual is enabled and encouraged to struggle and to succeed, despite barriers. In addition, most are designed to support individual, self-directed study. Some of the new, Web-based programs (e.g., "English for All") are free to the user (at this time) and can be readily and easily accessed by a person with basic computer skills and some understanding of what he/she wants to learn. A number of these programs, such as PBS "Workplace Essential Skills," offer a student the opportunity to sign up with an "online teacher" who corrects and provides feedback on assignments and tests.

Other examples to watch that offer "unfettered" access to the individual are One Economy's "Beehive" portal site, with content tailored to the needs of the low-skilled adult, and the Bay Area Video Coalition's new DVD "Job Link" series, an interactive curriculum projected to be sold at a minimal cost of $25. An inherent difficulty in determining the challenges and degrees of success or failure in Web-based or consumer-oriented products is the absence of tracking mechanisms. As Web-based education for all individuals becomes ubiquitous, the systems now in use to track, test, and certify students will need to expand to support this online learning.

Most of these products are available on both CD ROM and via the Internet, with a few exceptions such as TV411 that began as television alone before expanding to include the other delivery systems. Even when individuals are able to access the Web-version for free, there is a cost for supporting materials and for the CD ROMs.

The programs, products, and tools selected for review have at least several of the following characteristics:

- They are multi-media.
- They mimic through simulation or stories a real-time/real-place learning situation.
- They offer tailored responses to an individual's answers or choices.
- They provide opportunity for repetition and practice.
- They reference or take place within a workplace and/or real life context.
- They are supported with print materials.
- They are aligned, when relevant, with state and/or federal education, language, or other standards (such as SCANS or CASAS).
- They are engaging and non-threatening.
- They focus on possibilities (in outcomes, in jobs, in abilities) rather than on limitations (low literacy, unemployment).

Goals

Most of these products and programs serve multiple purposes but have similar goals: to provide literacy skills, personal and family information and development, acculturation to national and local culture and communities, ability to learn, willingness to continue in lifelong learning, preparation for work and career. To lend some structure for analysis and discussion, they are grouped into the following categories:[7]

- Learning and accessing information through the Internet and the Web;
- Literacy (basic or GED) and workforce readiness;
- ESL within practical context of work/life/culture/civics;
- Workforce readiness with IT skills and competencies focus;
- Independent, self-directed learning; and
- Access and learning through community.

Selected Products and Programs

Learning and Accessing Information through the Internet and the Web

The ability to access and use the Internet and the Web is perhaps the most critical skill for individuals today, not only for work but also for full participation in the Digital Age, as it expands to include society, government, and community, as well as the economy. As Mitchel Resnick and John Seely Brown note, these technologies also offer opportunities to think and communicate and learn in ways that are no longer anchored to text.

For the moment, knowing computer basics is still a necessary first step, but the real value lies in learning about and understanding the capabilities, opportunities, and pitfalls of the Internet and the Web.[8] Practice and experience are essential for an individual to become comfortable with and cognizant of the span of possibility of the Internet and the Web. For this reason, Web sites that offer easily accessible guides through this new territory are of great value. One of the more interesting and engaging products that does so is a year-old Canadian portal site: ***The Learning Edge.***

The Learning Edge is a Web-based tool and content site for individuals of any level of literacy. Designed in newspaper format, the site opens with a simultaneous audio, animation and text explanation and introduction to the “front page,” with no need to log in or choose from a menu. A pilot project of the Canadian Wellington County Learning Center, the four “issues” that have been posted on the site since 2001 include stories about practical issues (health care), cultural and ethics issues (what to do with “found money”), and getting a job. There are also options for online chats, story contributions from individuals, and lessons in reading, writing, and math.

[7] In most cases, the product and programs belong to several (see “Snapshot” appendix for matrix).

[8] Conversations with Ben Hecht, One Economy Corporation and Bruce Lincoln, Institute for Learning Technologies at Columbia Teachers College.

Of special importance are *The Learning Edge's* stories about the Internet and the Web, such as those that use animated diagrams that demonstrate and explain computers, search engines, and Web sites. This feature is a first step in providing individuals with the tools, lessons, and examples needed to assess the value of information on the Web.

The number of Web sites that offer content that is easily accessible and of practical value to culturally and ethnically diverse populations is growing, but few sites provide the level of imaginative content and design that can engage individuals who do not have school or work-related experience with the Internet and the Web. In a survey of 1,000 Web sites, One Economy, an organization that introduces technology to individuals and communities, found that fewer than 10 percent were appropriate for adults with limited literacy. A 2000 study by the Children's Partnership found four significant deficiencies in the relevance of Internet content to low-income people: literacy barriers, language barriers, lack of cultural diversity, and lack of local information.

In response, One Economy (funded by corporations and foundations) established ***The Beehive*** portal site to provide useful, culturally diverse content at a literacy level and in a language that low-skilled adults can understand. The site is available in both English and Spanish, and both aggregates and develops content.

➢ *See also: Harlem Renaissance; ALRI's "E-Square."*

Literacy (Basic and GED) and Workforce Readiness

One of the more important objectives associated with adult basic education is convincing individuals to take responsibility for their progress and success (or failure) by engaging them in the activity of learning. Many of the products and programs included in this paper attempt to do so in several ways:

- The lesson/experience is situated in a context that is relevant to the learner and that provides necessary and practical information as part of the learning process.
- The quality and complexity of the media are comparable to that with which many of these adults are familiar—movies, television, and video or handheld games.
- They present education and information in a mode that enables the learner to have some control over the process: he/she can repeat the lessons or video, view the outcomes of tests and assessments, or hear correct pronunciation.

The ongoing television and video "series" developed by ***TV411,*** for example, centers on recurring characters in workplace and community circumstances that are relevant for the typical student in literacy and ESL education. For those who have no work experience or who are recently employed in a conventional work environment, these episodes provide a view not only of the workplace but also of the process of working there. The episodes include education about practical skills, such as reading a pay stub, creating budgets, and dealing with the health of a child. (The lessons in reading, writing, language, and communication are embedded in the episodes and correlate with most state curricula and with standards for GED preparation, SCANS, EFF, and others).

TV411 is available on CD-ROM and the Web, and new episodes are broadcast on over 100 public television stations. The Web-enabled options offer English and Spanish. Each of these programs is structured for an instructor-led environment, with lesson plans and other support for teachers. Each also enables individual, self-directed learning.

Simulations are more expensive than other media, but they are very effective in engaging adults in interactive, collaborative, learning environments that mimic the world of work and life, providing a "virtual" experience that even a class visit to a local business cannot duplicate. Simulations also can provide parameters for learning that are closely linked with the experience on view, offering the potential for education that can be effective without a highly trained instructor.

Classroom, Inc.'s simulation programs represent a variety of particular businesses and organizations, using realistic, animated graphic representations of people and their environment. Each program is structured so that individuals work together to interact directly with the problems or challenge of specific situations. The outcomes the group generates may or may not have the desired effect but must then, in turn, also be addressed.

Each simulation is carefully layered to teach specific levels of reading, writing, math, problem-solving, and a variety of soft skills—all correlated with relevant education standards. The simulations targeted to high school students are suitable for low-skilled adults and have been used with adults in several instances. Classroom, Inc.'s program is accompanied by extensive teacher training and materials.

> *See also PBS GED Connection and Workplace Essential Skills, The Study Place, California Distance Learning Project, and The Office. Entertech and SCANS 2000 CD-ROMS offer other types of workforce readiness simulations.*

ESL Within a Practical Context of Work/Life/Culture/Civics

Technology provides an excellent option for the necessary practice and drill associated with learning any language. There are a number of products developed for K-12 education that do this well. In addition to the knowledge of vocabulary, grammar, and usage that is required, new and second-generation immigrants also need to be understood appropriately at work and in the community at large. They need guidance in national and local mores and in navigating the public agencies they need for housing, financial assistance, and other services. In some cases, they may benefit from learning particular vocabulary relevant for available jobs, regardless of their level of proficiency in English.

***English for All*'s** Web-based and CD-ROM program includes five compelling, real-life stories in twenty, fifteen-minute episodes. Each episode features a multi-ethnic cast and a friendly Wizard, who explains language and skill content throughout each story. The site includes interactive student activities, streaming video (for broadband connections), Flash-based audio, and a course management system for teachers to track student progress. Print materials are available in PDF and downloadable without charge from the Web site.

The lessons in *English for All* track to the student's answers as well as to the episodes, which become progressively more difficult. The student may review his/her answers with those that are correct and view the videos and lessons repeatedly. The content is based on the California ESL standards and skill areas identified in the Latino Adult Education Services Project, and it is correlated to CASAS and SCANS competencies. The site also includes a Spanish a translation of most of the online text. A link to an online translator accommodates speakers of other languages.

Technology offers many options for flexible customization, and the ***Reading Partner*** is an extremely promising example. The *Reading Partner* is an IBM-developed and funded speech recognition technology and authoring tool. It combines traditional "practice and drill" characteristics with customized audio and text developed by instructors or managers. Derived from a similar tool designed and used successfully with elementary school students, *Reading Partner* provides audio text recorded by the instructor(s), as well as the interactive capability to record the student's voice as he/she responds to questions.

The tool enables visual as well as text-based depictions and is especially appealing to adults who are hesitant to read or speak aloud in front of others. The authoring aspect of the tool allows the instructor to develop "books" customized to suit the needs of the students, whether acculturation, family- or work-related, or other issues. *Reading Partner* can be adjusted to the skill level of emerging readers by increasing the amount of text that is "chunked" for practice reading, as well as the sophistication of the vocabulary.

Reading Partner serves both teachers, as an authoring tool, and adults who need to improve their reading ability. It is included as an example in this category for ESL in large part because a number of pilot sites used it for that purpose. In particular, the Rochester, Minnesota Workforce Development Board—Workforce Development, Inc.—not only developed "books" for students in ESL but also customized vocabulary and context to the requirements of a local employer ready to offer jobs to the graduates.

Many adult students in literacy and ESL programs also are often anxious when they are confronted with print, particularly in a public setting. Managers in the pilot sites reported that the interaction with computers and this technology engaged and excited the students, who often remained after class for further practice. It also provided a familiar environment: the "books" were relevant to the particular circumstances of the students. This type of tool adds to an instructor's ability to offer "individual" attention and to address particular nationalities.

One of the benefits of video, particularly for ESL students, is the ability to view a segment repeatedly until both the words and the story line are understood. Some literacy courses reject audio in order to focus on reading skills. Others like *English for All* and the *Reading Partner* include audio in order to ensure correct pronunciation and to assist in developing skill in everyday spoken English.

➢ *See also: Crossroads Café, California Distance Learning Project, Project Connect.*

Workforce Readiness: IT Skills and Business Competencies

Entertech is a "high end" simulation product, providing 45 hours of programs designed for potential entry-level workers in high tech manufacturing. It was developed over several years in Austin, Texas, in response to a series of discussions with employers and representatives of other organizations concerned with the lack of entry-level workers in IT. The discussions concluded that the most effective preparation for work in manufacturing and particularly IT was an apprenticeship program, but this is expensive and lacks flexibility. Simulation offered an alternative.

The program focuses on soft skills and group interaction, and the learners must work in teams. *Entertech* is Web-based, but the program's developers chose to structure it for a

teacher-supported, classroom environment out of concern for maintaining student interest for such a long, sustained course. One of *Entertech's* more innovative aspects is embedded assessments ("stealth" assessments) that track a student's performance periodically, providing feedback to both students and teachers. *Entertech's* architecture also provides for alternative follow-on questions, tailored to the individual's answer.

The Bay Area Video Coalition is experimenting with a product suitable for the consumer market: its new ***JobLink Interactive Learning Series*** on DVD. The five DVDs (two are on the market) integrate lessons from two successful programs that BAVC has delivered previously on site: a "bridge program" to bring skills up to a level sufficient for Web development training (developed jointly with Goodwill Industries of San Francisco) and a 16-week immersion Web development training program. Translating the courses to DVD makes this training available to a much larger group of individuals, either through training providers or individually.

BAVC has designed the series for use by individual students as a self-paced learning application or for additional practice after classroom instruction. The series has been structured with the new learner in mind, providing clear, simple explanations with a strong focus on hands-on practice; accommodation of multiple learning styles including text-based and audio/visual explanations; and extensive exercises and quizzes to bolster knowledge retention. Each DVD is divided into chapters that can easily be integrated into an existing classroom curriculum.

The DVD is being marketed for $25 each, but despite the low price, market promotion and dissemination is a challenge. Like many of the new products—many free on the Web—the non-profit organizations that have developed them have little experience or funds to support marketing and distribution. BAVC hopes to have assistance in this endeavor from one or more companies with this expertise.

- *See also: SCANS CDROM simulations; ASPIRA CTC programs; One Economy's digital communities; National Urban Technology Center; Harlem Renaissance.*

Independent, Self-Directed Learning:
Games, Tutors (Human and "Intelligent"), and Augmented Reality

The lure of "intelligent tutor" technology lies in its promise to respond to the particular needs of a particular individual at a particular time, and to remember and adapt information about the individual—learning styles, knowledge foundation, communication techniques—for ever more customized and effective use. This technology is not yet fully available, but the importance of this kind of support has led a number of online programs suitable for individual, self-directed learning to provide guidance and/or feedback through the "as needed" service of a teacher online.

GED Connect *and* ***Workplace Essential Skills***, each produced by PBS Literacy Link, offer access to teachers recruited by PBS from schools around the country. The service is free, currently supported by PBS funds. The student sends completed work to the teacher for correction and feedback.

Smarthinking's "live tutor" system is another version, and one that seems to have found a successful business model. In *Smarthinking's* model, carefully screened and specially trained subject-matter experts (teachers, professors, graduate students, others), are

available 24/7 to coach students who have questions or need other kinds of help—including math and writing. An organization "buys" a certain number of hours of tutor time, and individuals draw down on it as needed.

Games are proving to be particularly successful in motivating individuals to learn and in providing the learner an opportunity to react and respond to a variety of environments and circumstances. In addition, the ubiquitousness of games among young people argues for their use in engaging and teaching individuals. Games are among the most expensive of technology applications to create, but the U.S. Army has begun to develop games for a variety of purposes.

America's Army consists of two games to encourage recruitment among young adults. The first game enables multiple players to log on through the Internet and take on the roles of U.S. soldiers teaming up to battle terrorists; the second presents players with the opportunity to progress through a virtual career in the Army. Each is available through free download or CD-ROM. The army anticipates recouping the high cost of development—about $7.6 million —through successful recruitment and cutting down on the number of recruits who sign up but quickly change their mind and leave during training. These games may pave the way for more consideration of the learning and economic potential of games for the low skilled adult market.

➢ *See also ICT Games Project; Quantum Intelligent Tutor.*

Access for Individuals through Building Community

Despite the gloomy picture of much of the adult education system, many nonprofits and CBOs are using technology not only to deliver services but also to enrich communities, connect with employers and jobs, and develop leading edge technologies and applications of e-learning. In many instances, programs or community-wide strategies were developed that incorporated particular products or tools. Such organizations view full participation in the digital economy as the key to short- and long-term success. The close connection among access to technology, literacy and certifications, and the computer and Internet skills required for most jobs, and particularly the high-potential IT jobs, makes a convincing case for this type of approach.

The National Urban Technology Center works through partnerships with community-based organizations to create a nationwide network of computer training centers (CTCs) and groundbreaking curricula that empower job seekers and inspire youth achievement. *Urban Tech* also delivers turn-key computer training centers connected to the vast resources of the Internet, industry standard curriculua, and technical assistance for operating successful computer training centers.

➢ *See also: ASPIRA's CTCs, One Economy's Digital Communities, Harlem Renaissance, Technology for All – Houston.*

E-Learning Products and Resources for Teachers

Technology and Teachers/Instructors

The issues that confront developing and using e-learning with low-skilled adults hold true for most teachers as well, who also require ease of use, information that is anchored in the context of their work, and supportive environments.

There is little online access to professional development and support for *traditional* teaching practice for adult education teachers. Not surprisingly, this appears to be a result of the fact that teachers who are uncomfortable with using technology, and therefore look to resources without a focus on technology practice, also are uncomfortable in seeking help online or in multi-media products. There is movement in this direction, however: Pennsylvania State University's World Campus now offers an online Master's Degree in Adult Education. A partnership led by the National Center on Adult Literacy is preparing to release online and on CD-ROM the "Professional Development Kit." The kit offers professional development and other resources to teachers, using technology for delivery but not in the teaching process.

Instructors interested in using technology in education have two options: Each of the e-learning products referenced here includes substantial materials to support instruction, and many offer on-site and online training and network support. Secondly, there are a number of portal sites for resources on the Web, led by the Outreach and Technical Assistance Network, initiated and supported by California and Sacramento County, that provide information on research, policy, lesson plans, networks, detailed guides to using computers and the Internet, and links to other sites. Given that a number of Web sites provide subject- and grade-specific games, lessons in and for different languages, and other activities without provenance, linking to sites recommended by organizations such as the Outreach and Technical Assistance Network is important.

A number of new and soon-to-be released products focus on professional development using technology for particular subjects. The Lesson Place and the ESL/Civics Link Web site, among others, are being tested in field sites and may offer additional examples of practice and effective use.

Peer to Peer Practice and Support

Many teachers consider that information and examples of good practice provided by peers is one of the more valuable options for professional development. ***Captured Wisdom,*** a seven-part videotape series, is also available on the Internet. It includes captioned video vignettes, transcripts, and innovative and replicable activities. These are shown, described, and discussed by front-line classroom educators and learners so that other teachers have the experience of visiting the class and talking directly with the learners and teacher. Questions developed by focus groups of teachers are used both in the videotaped discussions and in accompanying material. When used as a vehicle for professional development, *Captured Wisdom* is especially useful for stimulating teachers to think about and question the approaches of other teachers and the ways they might adapt what they see and hear for their own local education contexts, learners, equipment, and curricular and instructional goals and plans.

> *See also: Lesson Lab, Professional Development Kit (PDK), Coalition for Limited English Speaking Elderly/CLESE.*

Lesson Planning and Authoring Tools

One advantage of technology is the ability to customize instruction to the needs of individual learners. This is of particular value in the adult education system, with the extensive diversity of the population.

The Lesson Place, available on the Web and CD-ROM, enables teachers with no skills in programming to create a wide variety of multimedia learning activities. Using simple forms and careful audio and text-based explanation, the tool can automatically create several types of activities from the same set of information, including lessons, quizzes, games, and exercises, using words, pictures, and sound. Students registered in the class can do daily class assignments or find learning activities on their own. Student records and work are saved on disk, and teachers can track progress.

> *See also: Reading Partner, Lesson Lab, ESL/Civics Link.*

Laying the Foundation for Sharing Knowledge

The U.S. Department of Defense's Advanced Distributed Learning Initiative (ADL) was established in 1997 to develop a DoD-wide strategy for using learning and information technologies to modernize education and training and to promote cooperation among government, industry, and academia to develop e-learning standardization. The most notable of these partnerships has developed a model (the Sharable Content Object Reference Model—SCORM), that provides the framework and reference that enables content, technology, and systems using this model to "talk" to one another, ensuring interoperability, reusability, and manageability, and providing a sound economic basis for investment. New initiatives to develop content and curriculum in K-12 and postsecondary education are underway that ultimately will enable any teacher using any system to tap into such information resources.[9]

Online Resources

In addition to the ***Outreach and Technology Assistance Network***, other sites have become increasingly robust. The ***National Institute for Literacy*** Web site offers "Special Collections" and an innovative list serve for instructors interested in using technology with adults. The ***Adult Learning Resource Institute*** is an initiative of the Graduate College of Education at the University of Massachusetts at Boston. It is one of five regional support centers of the Massachusetts System for Adult Basic Education Support. In addition to information and links, the *Adult Learning Resource Institute* also offers practical sections for adult learners, such as "E Square".

The new ***Tech21*** collaborative initiative builds on and includes these and other Web resource organizations. *Tech21* is meant, in part, to serve as a central repository of products, practice, programs, activities in development, news, and networks in an effort to mitigate the tendency of organizations to develop in isolation products that serve the

[9] . Distance Learning Resource Network (www.dlrn.org); Wisconsin Academic Co-Lab (http://www.adlnet.org/index.cfm?fuseaction=colabacd).

same purpose as others that already exist. Further, *Tech21* will oversee field tests of particular products, a potentially effective mechanism for speeding up promotion and distribution.

Assessment and Feedback

New tools from Educational Testing Service and the Center for Applied Linguistics are in final stages of development. The ***PDQ Profile*** from ETS is a computer-based assessment of adult literacy that includes conceptual abilities as well as prose, document and quantitative abilities. The Center for Applied Linguistics is developing a ***Computer-Assisted Oral Assessment for Adult English Language Learners*** based on the Basic English Skills Test (BEST) oral interview. The new test will be administered face to face with an administrator who enters scores into a computer. The software selects the next test question, adapting the difficulty level according to the scores that are entered. It also will be able to distinguish measures of progress over short periods of time, as each time the test is administered it will generate a different set of questions.

Mind Cue is an interactive Web-based tool designed to assess the learning styles and optimum learning method and media for an individual. As students complete the assessment, reports are immediately available to them, their teachers, or their parents as the school or the instructor judges it appropriate. Coordinators can log on at any time to check the progress of any student or group of students, thereby pinpointing strengths or relative weak points. The group supervisor can, in turn, review the assessments of an entire level (such as sixth graders or freshmen) to determine the strengths and learning patterns for entire student populations—a handy tool when considering a new text or a different approach to teaching a particular subject.

Barriers to Expanded Development and Use

Effectiveness

There is little research and evaluation about the effectiveness of e-learning with low-skilled adults. Assumptions about effectiveness are derived from the K-12 and postsecondary arena or from characteristics associated with effective adult education in traditional environments. The bulk of the research at the postsecondary level has concentrated on assessing comparability of learning outcomes between students in classrooms with an instructor and those using some form of distance learning with instructor support, concluding there is "no significant difference."[10] Product funders and developers and funders usually initiate pilot tests and evaluations: this process is unquestionably valuable in terms of the consumer, but not enough to justify change across a system.

Technology often serves as a lightning rod for many ongoing arguments within the education community around purpose, cognition, and approach. This includes the tension between those who espouse education for literacy as the means to enrich the lives of adults and those who argue for the importance of situating education within the contexts of work and "real life". It also encompasses arguments over the constructivist versus transmission modes of structuring content and teaching, as well as over the importance of cooperation and collaboration as an outcome of learning.[11] The absence of sufficient research, evaluation, and practice in e-learning encourages partisans on all sides to use technology in the service of their arguments, muddying the discussion.[12]

One of the foremost challenges in assessing the value of e-learning has to do with the dearth of opportunities to measure and evaluate impacts in an environment that is expansive and open to possibilities of new ways of learning. Several projects underway should provide some valuable information about important issues: the effectiveness of various kinds of technology, the particular environments in which it works well, and the best methods of providing teachers with the experience and knowledge and support that they need. A new, multi-state initiative to increase access for adult learners to education and training using "distance instruction" plans to develop guidance in five areas: recruitment, orientation, access and support, communication with students/teaching, and

[10] Sloan Asynchronous Learning Network; Pew Learning and Technology Program. "Innovations in Online Learning: Moving Beyond No Significant Difference". Carol Twigg. (2001). www.center.rpi.edu/pewsym/mono4.html; Rand Arroyo Center. "Rebuilding the Schoolhouse: Making Army Training More Efficient and Effective" (July 2001).

[11] Life-contextual/decontextual in John Bransford, et al., editors, How People Learn: Brain, Mind, Experience, and School. National Research Council, 2000.; Dialogic/monologic; education v. work-related education in NCSALL Research papers and in Mary Russell and John Sabatini, "Technology-mediated Professional Development," *TechKnowLogia*, November-December 2002, p. 22 (www.techknowlogia.org).

[12] Much of the technology used in adult English language literacy classrooms consists of computer-assisted-instruction (CAI) software that fits the instructional technique of the teacher roaming from one learner to another, helping each person through individually paced curriculum. As a result, a large majority of adult learners and teachers "perceive technology to be isolating, rather than facilitating social interaction and collaboration." Mary Russell and John Sabatini, .

tracking students and assessing their performance. In each case, certain activities and considerations depart from traditional classroom practice.[13]

Capacity

Using technology for access to learning and information requires some ability to use computers and the Internet. Despite growth in use on both sides of the "Digital Divide," significantly lower percentages still track with race, education, income level, and employment. The lowest percentages are associated with those who lack a high school diploma or GED: only 17 percent used computers, and only 12.8 percent had used the Internet. In a significant contrast, 47.3 percent of individuals with a high school degree or GED used computers, and 39.8 percent used the Internet. It also noteworthy that percentages of use rise with the descending age categories—a reminder that 18-25 year olds frequently have had a different experience of technology than those who are older, and its use often is essential to engaging them in learning.[14]

As electronic communication and access to information become more ubiquitous and more common for individual use at all income and educational levels, organizations that cannot provide a technology-enabled environment run the risk of being marginalized. It is clearly a matter of public good to ensure that community-based organizations and other nonprofits can build technological capacity, given the important role they play as points of access and support for disadvantaged individuals and families. However, it may be that support should be directed toward organizations that can use technology to provide multiple services—information on employment, training, housing, and health; public access to computers and the Internet; mentor support; and education. The challenge is to assess which organizations offer the most promise for continued effectiveness and to direct support to their development.

In large part, teachers and instructors in adult education remain, like their colleagues in postsecondary education and training, wary of the overly-hyped promise and threat that "e-learning" is a sufficient substitute for instructor-mediated education. Even those who use and are committed to e-learning have difficulty finding the time to download information from the Web, review a CD-ROM, or develop a lesson plan with new authoring tools. Without training, support, and effective equipment, most teachers will continue to find it difficult to offer e-learning as an option.

Cost

The cost of developing and maintaining effective technology-enabled tools and programs is not insignificant. The President's Information Technology Advisory Committee's Panel on Transforming Learning estimated that it could take as many as 200 hours to develop

[13] See note 6. Also, "Project IDEAL" description forwarded by Dr. Jere Johnston, project lead, University of Michigan.

[14] U.S. Department of Commerce, *A Nation Online* (2002). http://www.esa.doc.gov/508/esa/nationonline.htm. The 2001 data on Internet use in the United States describes a widening gap moving from childhood to over 50 years old: 68.6 percent for 9-17 year olds; 65 percent for 18-24 year olds; 63.0 percent for 25-49 year olds; and 37.1 percent for ages 50 and above. Paul Elsner, former Chancellor of Maricopa Community College, notes that "there are estimated to be 800 million teenagers and young adults who have been born into the highest video and audio standard ever known," yet continue to be placed in classrooms dominated by static text-based instruction. (www.paulelsner.com).

effective interactive software.[15] By the same token, many highly effective and useful tools and products are developed for no more than several hundred thousand dollars. While this is not insignificant, neither is it prohibitive.

Most of the examples here have been funded by the U.S. Department of Education's Office of Adult and Vocational Education, by consortia of state and local governments, or by corporate foundations. The quality, creativity, and reach of these products demonstrates the value of these funding commitments. The challenge remains in the promotion, distribution, and support for use and practice. Few of the grants have included funds beyond development, pilot tests, and evaluations of the pilot sites.

The challenge of promotion is not only one of an up-to-date source for information about new products or programs—the Outreach and Technical Assistance Network and the new Tech21 initiative both offer this. It also includes the target marketing that ensures a product reaches its audience—whether its state agencies, non-profit organizations, housing offices, community colleges, or community technology centers.

Distribution for many of the new products that are Web-based and have no cost for participation on the site or for downloads is less an issue of purchasing and getting the product into the hands of organizations and instructors, and more one of solving the time and lack of training constraints of the teaching population. To move beyond this often-intractable problem, it may be necessary to look to organizations outside of the adult education providers for more feasible means for distribution.

In addition, many non-profit organizations that initiate product development have little experience in marketing and distribution. Some funders may be able to provide advice and in-kind support in these areas. Given that few funders can assume all such costs, partnerships are a promising solution.

More to the point for providers of adult basic education is the cost of the supports required for adults using technology in education. Many practitioners comment on the extra work required of the teacher—the additional time and mentoring necessary to help adults reach a "comfort" level with technology in order to use it effectively. Others consider that these difficulties are exaggerated and find that adults learn to use technologies with relative ease when it leads them to information that they need or want.

The consensus among practitioners and researchers is that the most effective programs for low-skilled adult learners are multi-media, with a tendency to operate poorly or not at all without high-speed computers and Internet connection. This capacity is beyond the reach of many organizations, despite donations from corporations and foundations and the continued drop in the price of hardware.

Certification

The market value of education in the economy increasingly depends upon certification and degrees. Online learning in preparation for the GED or other articulated assessments is a straightforward proposition of taking the test onsite. Other kinds of learning are not so easily captured. The same issues about certification that bedevil

[15] President's Information Technology Advisory Committee, Panel on Transforming Learning. *Using Information Technology to Transform Learning* (2001).

business, online universities, and other organizations interested in demonstrated skill are of concern in adult basic education.

Can We Stop Looking and Leap?

This nation has struggled to provide education, opportunities for work, and ongoing knowledge and skill development to all of our citizens, yet few would argue that we have succeeded. While a small but growing number are experiencing the integration of work and learning in very new ways, too many still lack access to learning and work opportunities that can help them advance in the new economy.

The remedies are well known and have been proposed consistently: more resources for plant and equipment, instructor training, outreach, and for the multiple life and work needs of adults with low levels of literacy, skill, and wages. These resources have not been forthcoming, and the current political landscape does not augur well for change.

Given the worsening ratio of the numbers of those in need to the capacity of the system, together with the expansion in skill requirements for jobs, continuing to focus efforts only on expanding and supporting the existing system will yield little. E-learning, however imperfect and untested, offers an additional, if not alternative, option.

The purpose of this paper is to generate discussion, using examples of e-learning whose quality provides justification for rethinking and refocusing how the public and private sectors approach the challenge of adult literacy. These examples do not constitute the weight of evidence necessary for immediate and wholesale acceptance, nor do they yet constitute an industry that is providing the quantity and variety of products necessary to serve the millions of adults who need basic education. However, the examples do demonstrate a number of key indicators, such as: increasing levels and robustness of activity in the field, increasing quality and sophistication of products and their use, potential for use outside of the traditional adult basic education providers, and equal or improved learning outcomes in initial evaluations.

The points raised here are not intended to dismiss the essential value of instruction and instructors; of curriculum developed and validated by individuals who understand the principles of learning and who have experience in the field; or of environments in which learning is not only made possible but also made easy. Rather, they suggest that we begin to think about learning outside of these familiar spaces and familiar processes.

There is considerable reluctance among program managers and educators to rely on products that offer learning outside of a formal support structure. To some degree, because the centuries old model of learning is based on “school,” the notion of trusting individuals to learn on their own strikes at the heart of long-held beliefs and institutions. While understandable, this perspective inhibits the development of alternative learning environments that can support self-directed options.

This brief exploration and analysis of e-learning products and potential is meant to be provocative. Its assessments and predictions are generous and presumptive. Even within this framework, there are more questions than answers.

- Are there patterns in the types of media, purpose, or target audience?
- Are the typical funding and developer models—partnerships among the U.S. Department of Education, state funds, corporations, organizations, and agencies with commitment to e-learning—useful for replication, or are they simply circumstantial?

- With a few exceptions (TV411, Crossroads Café), most of these products are less than three years old. What are their challenges in terms of distribution and sustainability?
- There are many barriers to rapid and widespread adoption of e-learning products, both within and outside the adult basic education system. What are the best strategies for overcoming these barriers—or going around them?
- Which aspect of "potential" will be of greatest interest to for-profit e-learning developers and service providers: Type of product (games)? Particular segments of the adult basic education providers (government agencies, community-based organizations)? Aggregated segments of the low-skilled adult consumer population? New models for providing a profitable service ("live tutors")?
- Which component of this system is the best initial target(s)? State and local government (California has led the way in this)? National nonprofits with local reach (Goodwill, National Urban League)? Corporations and foundations?

Finally, and perhaps of greatest importance: How do we increase awareness of the complex issues around technology in a shorter timeframe? And how hard can we push action towards the future without risking equally necessary action in the present?

The recommendations that follow are a first step in responding to these questions. They are designed to provide support to the existing leaders and leadership organizations in this field and also to initiate action for change.

Recommended Strategies

The experience of product development thus far suggests a number of strategies that could be employed to address the challenges identified and harness the potential of e-learning for improving adult literacy rates and growing the skills of the U.S. workforce. We have organized the seven strategies below into three overall categories:

- Creating a viable market for development and dissemination of e-learning technologies for low-literacy learners;
- Stimulating demand for e-learning products among the target markets; and
- Investing in building the technological awareness and capacity of targeted institutions providing education and training services to low-skill adults.

Creating a viable market for development and dissemination of e-learning technologies for low-literacy learners

Expanding the market will require simultaneous actions on multiple levels, in each case seeking to "aggregate demand" within specific potential groups of users: targeting those user groups for which demand can be aggregated; leveraging federal policy to spur product development; and disseminating information through efficient channels.

1. Expand the market by focusing on target user groups.

Strategies to support the use of e-learning technologies at scale will be most effective if they engage the publicly funded adult basic education and workforce development systems, employers of low-skilled workers, and community colleges. In each of these three "systems," demand for instructional tools can be aggregated and the need for technology-enhanced learning is high. And for each of these potential users—or developers of e-learning products—the effective use of technology-enhanced instruction at scale could dramatically improve learning outcomes and skill development for low-skill learners.

- *The publicly funded adult basic education and workforce development systems:* These systems are critical access points for low-literacy adults seeking additional training, yet they currently have limited capacity to serve the large numbers of adults in need of their services. Because they are fragmented and under-resourced, more effective integration of technological tools could substantially boost their capacity. While publicly funded adult basic education and workforce development systems are unlikely to take a lead role in driving the creation of a market for e-learning technologies, they are critical partners for developing, testing, and disseminating new products.
- *Employers of low-skilled workers:* The employer community represents a major potential market for e-learning technologies. While many employers offer e-learning tools to skilled employees, few have transferred these technologies to enhance skill development for their low-literacy workers. Two key factors will make the need for e-learning technologies rise in importance for employers: the skill shortage, which is projected to get worse over the coming years, and the fact

that immigrants with ABE/ESL needs will be the key sources of workers for the future.

- *Community colleges:* While community colleges continue to offer access to degree-granting educational programs for low-literacy adults, in recent years they have dramatically increased the scope of non-credit skill development and customized training programs, including those designed for employers of low-skilled workers. The non-credit divisions of these colleges may well view e-learning technologies as a route to providing more innovative, more efficient training services to the private sector and to low-literacy learners whom they serve. Community colleges in regions with large numbers of immigrant workers, where incentives to improve workforce performance are high, may well be interested partners in the development of innovative e-learning strategies.

2. Leverage the public policy/federal role.

Public policy can play a strong role in driving market development for targeted user groups, accelerating the development and dissemination of products that target low-level learners. The federal government has played, and must continue to play, a major role in encouraging product development and "stimulating a market." At present, most of the products developed for low-level learners are funded by the U.S. Department of Education (alone or in partnership with states) and by foundations. These investments have largely led to "one-of-a-kind" developments. However, grants for new products rarely include the cost of distribution, maintenance, and upgrading, leading to problems with wider adoption and sustainability.

To spur product development, the federal government could adopt a number of action steps:

- *Provide incentives to expand and establish strategic public/private partnerships for product development that will provide intellectual as well as financial resources.* For example, the U.S. Departments of Defense, Labor, Education, and Commerce could partner with leading-edge product development groups, such as the M.I.T. Media Lab, to explore ways that their ideas and products can be used by low-skill adults.

- *Motivate the formation of collaborative partnerships for prototype development and beta-testing.* Because the effectiveness of technology for low-literacy adults depends strongly on the context for delivery, the best product development often occurs through collaborative partnerships among developers or technology experts, community colleges, and community-based provider organizations.

- *Explore ways to leverage the extensive research, development, and implementation of e-learning by the U.S. Department of Defense,* including the department's experience in developing products according to learning object-oriented standards.

- *Engage community colleges in partnerships to establish accessible and technology-enabled learning options for the adult learner.* One promising model is the "satellite" learning center—in a mall, library, community technology center, or other site—that is linked virtually to the colleges. In general, it is important to enhance the capacity of community colleges as an institution for expanding access to technology and technology-enabled learning options.

- *Develop financing strategies to sustain and subsidize privately-developed e-learning products so they become relatively inexpensive for use by low-skill adults and their service providers.* It is essential to tap the creativity and expertise of the private sector. While government, educational institutions, and community organizations are necessary partners for product development, more flexible private sector institutions—companies and venture capitalists, as well as foundations—may be better able to spur the path-breaking efforts that are required.

3. Strengthen dissemination channels.

To design strategies for the active marketing and dissemination of existing products, bring foundations, corporations, federal agencies, and other national organizations that fund the development and piloting of e-learning technologies together with the decision-makers for major distribution channels to various adult basic education systems.

Stimulating demand for e-learning products among the target markets

The expansion of e-learning technology is hindered by a lack of demand, stemming from a lack of awareness, a weak evidence base, and limited access to few products. Addressing these challenges is critical. As more users learn about and gain access to these tools, more information on the effectiveness of various e-learning techniques can be obtained. More effective tools will result, creating a stronger demand for the products.

4. Efforts to reach scale and expand markets must address the limited awareness among potential users of the potential value of e-learning products.

One effective strategy to build awareness would be to publicize existing local models of successful cooperation among employers, community-based organizations, and other non-profit organizations that are using technology to respond to the needs of adult learners and job seekers. A second strategy is to support and publicize portal sites like Tech21.org, both within and outside the adult basic education community. A third strategy is to build the capacity of providers to establish a more widespread infrastructure for access to and delivery of e-learning instruction, such as programs that loan laptop computers for the entire period during which individuals participate in technology and learning programs.

5. Encourage the federal government to design and fund short-term action research initiatives and demonstration projects in order to build a stronger base of evidence supporting the most promising applications of e-learning technologies for low-wage skill learners in these targeted markets.

Some potential initiatives could include:

- *Working with national non-profit organizations that have local chapters or offices* (e.g., Goodwill, National Urban League) *to develop an active, integrated, technology-enabled program*, install it across the country, and document learning outcomes;

- *Testing new ways of delivering adult basic education and English as a Second Language services that incorporate e-learning technologies* to increase the efficiency and reach of community-based adult education programs;

- *Working with the Educational Testing Service and other organizations to help develop and build support for online testing and assessment tools* for adult basic skills, ESL, SCANS, and other certifications that can help to document the learning outcomes of e-learning applications; and
- *Assisting these organizations in facilitating the use of their centers and other locations to offer this testing.*

6. Provide incentives for user groups to pilot new products.

Incentives for providers to innovate could include policy models such as California's 5 percent Distance Learning Project, which allows adult education programs to use up to 5 percent of their block entitlement for innovative techniques and non-traditional instructional methods with new technologies.

Firms also need incentives to encourage employer-provided training opportunities for non-college workers. However, small businesses, in particular, may face financial constraints; some states have developed successful customized programs that provide financial incentives.

7. Increase financial resources available for individuals to access e-learning opportunities, through Pell Grants, the Higher Education Act, and individual loan programs.

- *Pell Grants and the Higher Education Act:* The major sources of federal funds for individual education and training are the Pell Grant program and various loan programs authorized by the Higher Education Act. However, the resources and regulations associated with these sources will not, in their current state, support expanded use of e-learning strategies. The rules of the Higher Education Act do not allow funds to cover new learning opportunities for modular (or part-time) learning programs and will not cover new providers of education and learning that arise to serve this population. Nor are state funding rules for community colleges and higher education institutions geared toward full-time students; they, too, may discourage serving a broader population.
- *Individually supported training***:** Dislocated workers and other adults seeking greater training opportunities may support the costs of their education programs through loans. Regulations associated with other educational loan programs should be reviewed to assess how they can support part-time students using non-traditional learning strategies. Asset-building approaches and Individual Development Accounts may also be ways that individuals can accumulate the needed income to support their education.

Investing in building the technological awareness and capacity of targeted institutions providing education and training services to low-skill adults

Building capacity is as necessary as expanding R&D. Both the necessary technology infrastructure and the capacity of instructors to use technology require significant upgrading. Meeting these challenges will require the innovative thinking of many partners, including federal and state government leaders, employers, community colleges, education systems, foundations, and other community organizations.

Developing recommendations in this area will be an important next step in the effort to develop e-learning's potential.

Resources

Inter-Alt Web Cast: http://cie.ci.swt.edu/interalt/Training.html

California Adult Education Technology Plan: 2001-2004

California 5 percent Initiative: A Review (2/01). www.cdlponline.org/pdf/5pctInitiativeReview.pdf

The California Adult Education Innovation and Alternative Instructional Delivery Program 2000-2002: A Review (7/02). www.cdlponline.org/pdf/innovationPrograms00-02.pdf)

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Cyberstep Design Framework: Learning with Technology: Adult Learning Principles and Usability Standards (www.cyberstep.org). Cyberstep is a partnership of four literacy service innovators addressing the challenge of creating and distributing multimedia learning materials for the hardest-to-serve ABE and ESL adult learners (Sacramento County Office of Education, LA Unified School District, Adult Media Literacy Alliance, Aguirre International).

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National Institute for Literacy State Policy Update: How States are Implementing Distance Education for Adult Learners (2/14/00). www.nifl.gov/nifl/policy/distance.htm#End

National Literacy Summit 2000: *From the Margins to the Mainstream: An Action Agenda for Literacy.*

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Acknowledgements

The author and Jobs for the Future wish to thank the following individuals who provided their knowledge, experience, and time in helping to develop this project:

Peg Bauernfeind, Workforce Development, Inc., Rochester, Minnesota
Ashley Del Bianco, Tech21
Ron Blackburn-Moreno, ASPIRA
Patricia Bransford, National Urban Technolgy Center
Henry Braun, Educational Testing Service
Judy Brown, University of Wisconsin Co-Laboratory
Stephen Cervieri, Distance Learning, Inc.
Katherine Endacott, Class.com
John Engman, CompTIA
John Fleischman, Outreach and Technical Assistance Network; Cyberstep Partnership
Dexter Fletcher, Institute for Defense Analyses
Keith Fulton, AOL Time Warner
Chris Gergen, Smarthinking
Doris Gonzalez, IBM Corporate Community Relations
Mitch Gordon, LessonLab, Inc.
Tamara Gould, Bay Area Video Coalition
Emily Hacker, FEGS, Bronx, NY
Janie Hale, AlphaSmart, Inc.
Ben Hecht, One Economy (Beehive)
Christine Hemrick, Cisco Systems
Michael Hillinger, Lexicon Systems (The Office)
Melinda Jackson, Entertech
Jerome Johnston, University of Michigan Program on Teaching, Learning & Technology
Peggy Kinder, West Ed (Distance Learning Resource Network)
George Koch, Advanced Distributed Learning Co-Laboratory
Madeline Lacovara, Classroom, Inc.
Derek Leebaert, Intellicue
Bruce Lincoln, Columbia Teachers College, Institute for Learning Technologies
Laurie Lindbury, SFWorks
Cynthia Liston, Regional Technology Strategies
Noreen Lopez, PBS Literacy Link
Mary Lovell, U.S. Department of Education, Office of Vocational and Adult Education
Lindsay Kennedy, The Learning Edge
Frank Mayadas, Program Director, Sloan Foundation
Martha Nortrup, U.S. Department of Education
Harvey Ollis, U.S. Department of Labor
Margie Oppenheimer, Literacy Volunteers of America/Verizon Technology Initiative
John Park, Intellicue
Dennis Porter, California Distance Learning Project
David Rosen, Adult Literacy Resource Center
Rick Roy, Workforce Development, Inc.
Marian Schwartz, TV411 (Adult Media Learning Alliance)
Jim Torrens, Jewish Vocational Services of San Francisco
Sam Tuttleman, Goodwill of San Francisco
John Villamil, ASPIRA
William Walker, Naval Surface Warfare Center Indian Head Division
Elaine Williams, Goodwill Industries International, Inc.
Janet Zobel, National Urban League

List of Snapshots

ACT Centers

ASPIRA

Beehive

California Distance Learning Project

Captured Wisdom

Classroom, Inc.

Crossroads Café

EArmyu

English for All

EnterTech

ESL/Civics Link

Goodwill Virtual Community

Harlem Renaissance

Job Link Interactive Learning Series on DVD

Lesson Lab

MindCue and Career Cue

National Urban Technology Center

One Economy

Outreach and Technical Assistance Network (OTAN)

PBS Workplace Essential Skills and GED Connection

Professional Development Kit (PDK)

Project Connect

Quantum Intelligent Tutor

Reading Partner

SCANS 2000

Smarthinking.com

Tech 21

Technology for All—Houston

The Learning Edge

The Lesson Place

The Office

The Study Place

TV411

U.S. Department of Defense—Selected Examples

World Campus Master's Degree in Adult Education