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Impacting Social Change
Through Access to Computing Skills

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Impacting Social Change Through Access to Computing Skills

The best predictor of your opportunity in life used to be which country you lived in. That's not true anymore. Today, the best predictor is whether you have access to education and knowledge via affordable and relevant technology.

—Chose Choeu, Director of Government Affairs,
Microsoft South Africa Siyafunda Community
Technology Centre Opening, October 2008

As technology access expands in emerging and developed markets, computer skills acquisition is becoming increasingly crucial for social participation and economic advancement both for individuals and for nations. This paper explores three significant technology change drivers over the last decade that make basic computing skills education essential for individuals desiring opportunities in today's world. These drivers represent a profound paradigm shift in the way we define the potential for success—it is no longer a matter of geographical location but of *technology access*:

- Global Internet Access
- Web 2.0 and Democratic Access to Information
- Ubiquitous and Portable Computing

Specifically, this paper introduces each driver, discusses the opportunities and challenges each presents for different audience segments, and follows up with best practices, strategies, and examples of effective computing skills education efforts.

The final section identifies innovative concepts and examines larger collaborative initiatives in computing skills training that mitigate problems and accelerate change for learners in different geographies and different parts of society.

I. Global Internet Access

Introduction

Advances in hardware, software, and wireless technology have improved the reliability, speed, and capacity of Internet access. As the physical components of Internet connectivity become increasingly transparent, the user experience improves, fostering greater interest and participation in technology.

Speaking at the EG 2007 conference, technology writer Kevin Kelly states that the Internet is only about 5,000 days old,[1] but in that short time, users have become accustomed to doing things with a computer that they never would have thought possible 10 years ago—such as buy and sell practically anything. E-commerce has grown into a huge industry that generates over $132B in revenue worldwide, enabling large parts of the workforce to become geography-indifferent.

Although Internet use may be for commercial or job-related activities, it is increasingly likely to be used as a leisure or social communications tool. Users can, for example, access satellite images of the earth, check the weather anywhere, connect to national and international government resources, and more. On the Internet now, there are over 55 trillion links and more than 100 billion clicks per day. Over 2 million e-mails and 1 million

instant messages are sent per second. It is no wonder, then, that in only four years, the social networking site Facebook™ has grown to 90 million users (out of an estimated 1,500 million active Internet users),[2] stores 6.6 billion photos, and socializes in 21 languages.[3]

Opportunities

The Industrial Revolution began the movement of labor from rural villages to towns and gave rise to new cities based on manufacturing economies.[4] Today, the Information Age is connecting the world back to the village, reducing the need for rural people to leave their homes in order to seek out education and career opportunities. In the new paradigm, countries with the best use of technology and the best supply of skilled labor at the most competitive quality and cost are emerging as global winners. This massive base of learners needs computing skills to take advantage of newly evolving business opportunities. Large-scale initiatives that identify the most relevant skills and provide innovative delivery of education are increasingly in demand.

In developed markets, geography indifference brought about by global access has enabled the rise of a decentralized workforce. Workers can achieve results comparable to their in-office counterparts as occasional telecommuters or remote employees, enabling flexible work schedules, easing traffic congestion and reducing carbon footprints, and providing greater opportunities for global collaboration.

In emerging markets, geography indifference has created a thriving import and export market for jobs that have a remote capability, often referred to as "geosourcing." For example, the fulfilment process in many companies is transparent to the consumer and could be based anywhere in the world. On a large scale, ICT skills enable a labor base that in the past has had limited potential for skills development or transfer, and has been focused solely on manufacturing or agriculture, to become a workforce of

computer users, expanding existing business roles or creating whole new industries, such Help Desks, Call Centers, or PC recycling depots.

Although rapid advances in computer technology that influence economy create a learning gap for new entrants to the workforce, even basic information and communication technology (ICT) skills achievement enables individuals to pursue new work opportunities. This is especially critical in communities where, traditionally, communication infrastructure and access to technology has been poor. Farmers are able to use local Internet kiosks to connect with suppliers of seed, equipment, and fertilizers.[5] They can find new customers for their crops and establish a direct relationship with customers rather than accept lower prices from an exporter. They can validate value of their crops at a global scale and participate in the global economy, right from their traditional lands and home.

> In emerging markets, geography indifference has created a thriving import and export market for jobs that have a remote capability.

In this new paradigm, students are limited only by their imaginations. They can pursue whatever interests them by participating in distance learning; they do not have to travel hours to attend classes at an institution of higher learning. Nations are more able to create rewarding and challenging jobs for their top-tier students, staving the tide of "brain drain" of their best and brightest to the developed world. Chancellor G.P. "Bud" Peterson of The University of Colorado reports in a recent NSF workshop, "The number of people in the top 25% in terms of I.Q. in China is greater than the total number of people in North America."[6] This demonstrates an enormous potential skilled

labor force. Coupled with improved education resources and emerging knowledge-economy career opportunities, nations who provide their students with computing skills are poised to unlock a vast resource of talent and innovation to drive their economies forward.

In societies where women have limited opportunities for direct social and business contact, access to computing skills can be life-changing. Ease of access to the Internet, e-commerce, and training provide education and skills that unlock the potential for a career and open up the door to global information and resources. In developing economies where the role of parents or guardians may be a crucial component to supporting skills development among children, parental access to computing skills can have a significant positive impact on their ability to participate in their children's education. Likewise, remote learning opportunities can reach a section of the population for whom attendance in a formal classroom setting is not an option. This poorly served section of the population may prove to be a crucial component for nations needing a workforce ready for the new economy.

Challenges and Threats

Competition with Online Retailers

In developed economies, e-commerce has changed the face of retail sales outlets. Traditional brick and mortar retailers have had to adapt their businesses to remain competitive with a seemingly infinite number of online retailers (e-tailers), such as Amazon.com, who can compete with them on volume, prices, and item diversity. The growth of these companies open up a whole new shopping experience, and once the e-shopper gains the confidence that the Internet service is secure and reliable, the electronic mall is just a few clicks away.

Gender Imbalance

There has been a long-standing gender imbalance of ICT skills in all economies. A

recent University of Washington report found that in the EU25 group of The European Union, double the number of men had ICT skills when compared with women.[7] Often this gender imbalance is caused by traditional role setting or cultural traditions.

Online Vulnerability

The fact that the Internet brings the world to our front door does create risks for vulnerable or ignorant users. Will they understand how to protect themselves from a virus attack or know what a phishing site looks like? Consumers who are not yet adept at participating in e-commerce securely are vulnerable to Internet scams. Simple banking transactions or credit card purchases online feel more dangerous or risky to new users who are not certain of the safety precautions to take. Essential computing skills enable consumers to participate in e-commerce with a full understanding of the risks. Youth are particularly vulnerable to a new breed of predators on the Web, and educating youth and their families about how to use the Internet safely is essential.

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Examples of Effective Programs and Potential Best Practices

Many formal education and community learning programs include a focus on teaching Internet skills so that students learn about the benefits and opportunities that await them online *and* understand how to use the Internet effectively and safely.

Financial Literacy Assistance

Operation HOPE provides financial literacy assistance to the under-served in Los Angeles, Washington D.C., and New York City. In

addition to education and resources on mortgages, small business loans, credit cards, and checking, many Operation HOPE sites include a cyber café where clients can access computers and the Internet. The cyber cafes recently adopted Microsoft Digital Literacy to help their clients avail themselves of the Internet as they shop for mortgages, set up bank accounts, and explore small business loans. For Operation HOPE, basic computing skills development is an important step toward financial literacy.

Safety Courses

In Slovenia, The Microsoft Digital Literacy Computer Security and Privacy course has been integrated into a National Internet Safety curriculum for middle school students. In other geographies, this course has been adapted for use in Internet Safety Day presentations for school-age youth and their families. In Poland, the same course is being adapted for "silver surfers" (age 50 and older) to enable them to use the Internet with confidence.

Integration of Computer Technology with Classroom Education

In South Africa, the Students 2 Business Program launched a pilot last year with 67 schools in which Microsoft Digital Literacy is integrated in the base curriculum so that students use the Internet and other forms of computing technology as an integral part of their education. Students continue the required computer skills education in the General Education and Training program through eighth and ninth grade.

Training for Girls and Women

The Women in Technology Program in The Middle East and North Africa has provided a solution to the gender imbalance in IT skills in the region. Since the launch in 2005, over 2,700 women have been trained and 26 women's organizations have taken part in capacity-building activities. This program engages students in learning ICT skills to

reduce their fear of new technologies. Through a mix of training and support provided by both local and international partners, the program is on track to meet impressive targets in 2009.

For women who seek employment overseas, research shows that there is a 90 percent increased nations who provide their students with computing skills are poised to unlock a vast resource of talent and innovation chance for those having ICT skills. Although in the case of very low-skilled jobs there is not always a clear advantage, it is speculated that these skills act as a stepping stone that allows migrant workers to move from day labor or household roles to employment that is more promising. It is a measure of the increasing importance of ICT that these skills are even being included in the key metrics of success. There is a consistent likelihood the both male and female migrant workers will have significant increase in potential earnings of around 30 percent when moving to a more developed economy.[8]
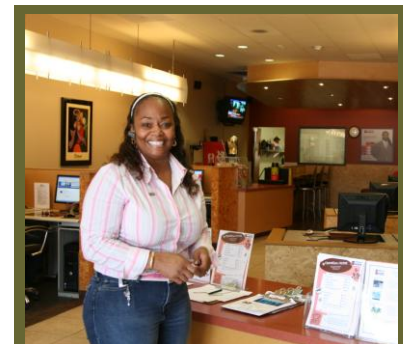
Los Angeles: Operation HOPE Cyber Cafe

In the developed world, new programs are building awareness and excitement for girls to engage in computing, which is helping to rectify the gender imbalance. In the UK, The Computer Clubs for Girls (CC4G), a schools program for 10–14 year olds, aims to make ICT a more attractive subject and encourage girls to explore computing disciplines like networking and programming as areas of formal study.[9]

II. Web 2.0 and Democratic Access to Information

Introduction

With new technology comes new computing applications and new opportunities to exploit the developments made possible by research and innovation. The increase in data transmission speed and satellite positioning, embedded devices, the reduction of unit costs for data storage, and the portability and reliability of hardware add to the power and availability of digital technology. Applications that were impossible just a few years ago, or that were the province of computing professionals, are now available for use by a mass consumer base. With computing power predicted to double every two years, the possibilities for participation and content or platform development by anyone are endless.

Users of the Internet have experienced a fundamental shift in their relation to information: they are no longer passive consumers of it; they are *prosumers*—producers and consumers—of it.[4] Anyone can become a Web contributor. They can use social networking applications to blog, upload and share files, contribute to surveys, publish personal information, and mobilize public opinion in spheres ranging from TV audience participation programs to national elections. The Web's open access format allows participants to design their own uses of the Internet and author their own content. As of August 2008, roughly 400,000 developers and entrepreneurs had built 25,000 new applications for the Facebook™ platform, with 140 new applications being added each day.[3] The ability of Web applications to seamlessly interact and connect people and information is a powerful manifestation of design from the consumer up.

Opportunities

Voice and data services have converged to provide a new generation of Internet services. New developments on the horizon, such as cloud computing, will create jobs that have not yet been contemplated today; the attainment of base-level skills and knowledge now will provide the building blocks for constructing new competencies necessary for the future.

Web 2.0 applications have extended the social engagement and leisure content of the Web. The more that the Internet becomes a centralized "machine," the easier it will be for users to seamlessly move around depending on their Internet profiles. They will share information, link to favorite past-times, become educated, socialize, work, and collaborate. The ability for any group—business or social—to have a wide contribution from users exploiting Web 2.0 has powerful implications.

This free exchange of information on social networking sites also provides a glimpse of other worlds and other cultures. Education and relationship building are key components of understanding and ultimately equal opportunities for everyone, so social networking has an importance far beyond the leisure component. Through access to the Internet, we are able to see how others live; share aspirations, values, and communities; and become accessible to a global audience. This interaction and engagement can be the catalyst that prompts individuals to develop the computing skills that are so valuable for their education and in the workplace. The development of a better

South Africa: Microsoft Students2Business

informed and educated population leads to self-development, better standards of healthcare, nutrition and global news, and reduced inequalities.

The changing structure of the Internet, the World Wide Web, and the user-oriented design of Web 2.0 applications open up the opportunity for technology customization. In an emerging economy, consumers who are able to modify the technology will have more relevant local implementation programs. A software designer in a developed economy can design for an environment with which they are familiar, but those at the point of delivery in a developing economy will be best able to evaluate how it should work for them. We are no longer looking in a on a medium created and moderated by experts; we are all now the builders and maintainers of this new knowledge repository.

Challenges and Threats

Security

Unfortunately, many users of these exciting and new applications have bypassed the core competencies of computing; their level of computing knowledge has not always kept pace with the new social intercourse. Although computer literacy is not a key competency for gaming, chatting, and similar activities, enhanced computing knowledge and skills can provide a more complete and secure experience. By its very nature, social networking implies an exchange of information, but it is all too easy to exchange *too much* information, and often many small pieces of information can build a comprehensive big picture. Understanding of the need for caution and the basic requirements of security are essential for users of the Internet today.

Lukewarm Early Experiences

The convergence of technologies has opened up multiplatform applications such as the personal digital assistant (PDA), phone, tablet computer, and Voice over Internet Protocol

(VoIP), which allow anytime, anywhere computing. Without a basic knowledge of infrastructure and security as well as a conceptual understanding of hardware and software, however, users find it difficult to maximize the powerful potential of these technologies. Additionally, negative initial user experiences because of product ignorance will create lukewarm advocates of technology in the future.

Lack of Incentive for Seniors

For many "Silver Surfers," ICT is popular and a source of great enjoyment and empowerment in later years. However, for the majority of seniors who have a low disposable income, adoption of the latest technology is unlikely. Even in Denmark, which has one of the highest percentages of access to broadband in the world, the homes of older persons have a significantly lower percentage of technology. Many do not have the underpinning knowledge, the commercial imperative, or any other good reason to either adopt or improve ICT skills. Seniors encounter an increasing plethora of new technologies in their everyday life, which creates barriers to using them. The advantages of being "physically" safe when using online banking, for example, may be outweighed by the fear of being "logically" mugged through phishing, identity theft, or other criminal activity.

> We are all now the builders and maintainers of the new knowledge repository.

Slow Adoption by Teachers

In many developed markets, occupational standards for teachers are likely to be reviewed, at a minimum, on a three- to four-year cycle, which can leave teachers in permanent catch-up mode vis-a-vis trends in technology. By the time a revised syllabus reaches students, the technology approach will already be dated.

Social Isolation and Vulnerability

The Internet can be addictive, and the price paid can be social exclusion. Virtual communities and friends provide an escape or a substitute for a social network outside of the computer world, and instances in which in which Cyberspace or social networking has had unfortunate consequences have been widely published. However, when this is measured against the tremendous benefits that come with open communication, particularly for emerging economies, the risk/benefit balance is excellent.[10] Social networking is here to stay, and we must improve the education of the participants for their own enjoyment and protection.

Examples of Effective Programs and Potential Best Practices

Innovative Program Design for All Levels
The ICT industry must design innovative learning programs and delivery platforms to reach learners in environments that are familiar to them and remove barriers to skills development. Programs like AIESEC.org engage with students all over the world to help them discover and develop their individual potential to create a positive impact. AIESEC has created a learning portal online that is available to members and alumni to help them develop business-ready skills ranging from the ICT topics offered in Microsoft Digital Literacy to foundational courses in business management, marketing, and similar disciplines.
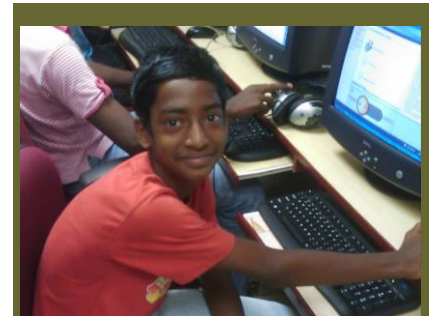
In several emerging markets, Microsoft Global Outsourcing has partnered with local organizations to train the under-served to better their chances for meaningful employment. Sutherland in Chennai is one such center in which students come from day labor roles like rickshaw pullers or housemaids to acquire the skills needed for office careers in retail. Sutherland provides the Microsoft Digital Literacy curriculum in

concert with soft skills and English language skills, and lines up interviews for their graduates with potential employers. They serve about 1,000 students a year at the Chennai location, and have opened another location in Kochi India to serve even more candidates.

The Microsoft iCafé Learning Portal programs in Thailand, India, Colombia, Russia, and the Philippines are providing opportunities for novices to gain exposure to and comfort with basic computing skills. In this collaboration, Microsoft Digital Literacy and other e-learning programs are offered at iCafé franchises to drive user access to computers and the Internet, and provide computer skills training in a comfortable environment.

Chennai, India: Sutherland Community Technology Center

Virtual Classrooms

The improvements in technology and infrastructure open up exciting new opportunities for remote learning, not only for the students but also for the programs. A student using social networking sites proficiently will have the computing and interaction skills to excel at e-learning and take advantage of unique learning opportunities in the classroom or at home. Programs that might not have enough enrollment at a single physical location can vastly expand their enrollment and justify the cost of providing a class by offering a virtual classroom that can reach many more students. For example, a single high school might have only three interested students, but by collaborating with four additional high schools, that district might increase the number of interested students to 30. Teachers who are not familiar with a particular topic can let students engage in independent virtual learning in the classroom by using computers

and the Internet, perhaps with additional mentor support.

III. Portable and Ubiquitous Computing

Introduction

Computing has come to our pockets. The growth in wireless broadband and third generation (3G) technology as well as large-capacity off-line storage capabilities, which allow huge amounts of data to be copied, stored, and then disseminated without physical connections, have led to a wide adoption of mobile computing devices such as mobile phones, PDAs, and leisure devices with anytime access. This convergence of computing technologies is often driven by "digital natives" who are not constrained by a traditional concept of computing in schools and business. The growth in social networking and the mobile nature of the participants are key factors in the development of the mobile world of computing. When we consider that in the US, more than half the young adults send and receive text messages daily, and 75 percent of mid teens own cell phones, it is apparent that there is a huge social base already active in the world of computing.[11]

According to Nielsen Online, in the second quarter of 2008, mobile Internet use in the UK increased 25 percent (from 5.8 to 7.3 million) compared with an increase of 3 percent (from 34.3 to 35.3 million) for PC-based Internet use. [12] Just as interesting is the fact that that 25 percent of these mobile users are aged 15–24 compared to 16 percent for PC-based consumers. Users of mobile devices constitute a younger user base, with only 12 percent of mobile computing users being over age 55. The predominant use of mobile Web access is to obtain immediate information about sports, news, and weather. The PC still leads the way, however, in e-mail, e-commerce, social networking, and internet surfing.

Opportunities

The advent of portable computing devices with substantial computing power and high storage capacity opens up endless possibilities for community education, economic growth, and health, especially in emerging markets. A village in a remote location can have the equivalent of 18 million books in the space of a briefcase or the equivalent of 1,000 pickup trucks of printed pages on a device the size of a small book. Just think what this availability of information can do for a community when a skilled tutor is added. As soon as citizens obtain the basics of computing skills, they can unlock all the knowledge they can access, such as application programs that teach literacy and numeracy, knowledge bases that help in the identification and treatment of disease, and business models for creating prosperity.

Mobile computing is more likely to be a lighter consumer of energy and capable of operation where no stable utilities supplies exist, especially important for an emerging economy. Computing is accountable for 5 percent of global power consumption, although there is an accepted imbalance in this data because computer ownership is highly concentrated in developed markets.

> As soon as citizens obtain the basics of computing skills, they can unlock all the knowledge they can access.

Portable computing and miniaturization have changed job roles for an increasing number of occupations. Even traditional low-tech activities are affected as employers seek to maintain a commercial advantage through new processes or working practices that have an ICT element. The vehicle mechanic can confer with the remote workshop diagnostic engineer, the car park attendant can collect an on-the-spot fee, the farmer can send a photograph of a diseased crop to an expert living on the other side of the world, an educator can engage children on a field trip in a classroom discussion, and the doctor can

have both an audio and visual link to a mother with a sick child.

The user-friendly way in which these sophisticated computing technologies are delivered removes fear and other barriers to using them. In developing economies, technology has been introduced to a whole new generation of computing users via television, the mobile phone, and gaming consoles. A five year old speaks knowingly about connection types for interfaces or explains to parents how to interact with a game. For a child, a computer is a *tool* for unlocking diverse knowledge sets rather than a finite knowledge set in and of itself. This adoption and familiarity often gained through early exposure to computers masquerading as toys illustrates a level of technology acceptance that educators can easily build upon in primary education. Young learners easily acquire a basic skill set that educators of digital literacy can then develop at the elementary stage.

This acceptance is also seen in developing economies whose citizens have a late exposure to technologies; the mind is fully open to whatever benefits can be gained without the influence of preconceptions and objections from others in the community who have resisted change.

In a climate of financial constraints, governments may increase work placement efforts, many of which will contain a significant ICT component in line with government objectives. Who would have considered that the use of application software and technology could become so important to Detective Orrlando Mayes, a highly trained Sacramento police officer, in the fight against crime? As Detective Mayes says: "Without basic computing skills, you wouldn't make it on patrol, because it's all integrated in to the job."[13]

Challenges and Threats

Compromised Privacy

The miniaturization of computing devices and large-capacity data storage has produced a whole new and fairly recent phoneme. Individuals are unlikely to lose a vanload of patient medical records or a truckload of customer bank account details, but for data contained on a memory device the size of a coin, the risks are clear. The majority of cell phone users do not even take the minimum basic security precautions yet store highly personal information on these phones, including calendar dates, names and addresses, passwords, photographs, and financial information. Add to this risk the open nature of connectivity, and the security issues become substantial.

Philippines: Angat Ka! iCafé e-Learning Program

The personal design of portable computing devices can also lead to an invasion of privacy. The ease of recording, replicating, and disseminating images or data provides instant global publicity which may, or may not, be desirable.

Career Shifts

There is a continued and growing need for workforce development for those individuals experiencing a career shift or change in job description as new technologies are implemented. For example, changes in payroll administration and security issues can demand that employees change to Internet banking, or that time recording is carried out on-line. Employers are unlikely to include all the necessary training to alert employees to the relevant security or conceptual skills.

Examples of Effective Programs and Potential Best Practices

An example of just how integrated and essential portable computing is in government service jobs, in the United States, The California State University department of Continuing Education offers courses in vocational education to help trainers of all disciplines integrate technology into their classes. Participating trainers come from a variety of civil service disciplines, including police, fire, and government, and learn about using ICT to train staff effectively.

Consumers new to computing need to know how to handle the powerful technologies that are becoming so prevalent in today's society. For example, the most recent version of the UK National Occupational Standards (NOS) [14] includes a unit that aligns with courses addressing the use of social collaboration or interaction sites such as Facebook™, Microsoft MSN™, or e-Bay™. Such units provide not only a vehicle for teaching "collaborative technology" in a modern context, including (typically) social and security implications, but also articulate how the learning content relates to the practical application of new technologies. It is vitally important to deliver courses in these new and attractive formats.

IV.   E-skills: Cutting Edge and Collaborative Opportunities in Education

Introduction

In the past, the spread of technology and the ensuing social change took many years or even generations. Consider, for example, the timeframe for the dramatic shifts brought about by the Industrial Revolution. Today, the spread of computing technology and the social change it is inspiring is occurring in a far more compressed timeframe. There are billions of people who need computing skills, but we do have the tools and technology now to spread basic computing skills from the

developed to the developing world quickly. Remember that only 5000 days ago, we did not have the Web. Where will it be in 5000 more days?

We might not be able to answer the question of what the Internet will be in the future, but we can lay the groundwork for the proliferation of computer skills education and access so that citizens of both developed and emerging markets are ready to benefit from the next wave of change. Enhancing infrastructure; developing basic global standards for ICT curriculum; creating initiatives to support relevant local programs; and promoting ICT skills as essential to the health and wealth of a community. These are the ways in which governments, educational institutions, and private industry can work together to mutual benefit and effect profound change.

Sacramento, California State University Sacramento College of Continuing Education

In emerging economies in particular, the acquisition of basic computing skills is seen as so important that governments are anxious to work with a wide range of partners, particularly partners in developed economies who have already embraced many of the technological changes. This very support will potentially create the competitors of the future for developed economies, but competition in this context can only be healthy. The transference of education and skills can be a far more effective way for developed nations to provide aid than long-term physical support.

The Digital Divide and the Urgency for Education

Taking a look at where we are now suggests where we need to go in terms of building and promoting ICT skills development:

- Three-quarters of the 2020 UK workforce have already left compulsory education and 50 percent remain untrained in the use of computers.[15]

- Thirty-seven percent of the EU population have no basic computer skills.[16]

- About one-fifth of the world's population have access to computers, and this is highly concentrated in developed markets.

- PC access in emerging markets is growing three times faster than in developed markets, with a significantly higher number of first-time PC purchasers.

Statistics show that those who are digitally literate become more enabled, and those with fewer skills become further disadvantaged as technology advances. This poses a very real problem, because many of the existing infrastructure and process changes are promoted and implemented by digitally literate persons. Social disengagement and exclusion in line with technology developments is an unwanted side effect of the advances and enhancements to technology and related applications. The following London report characterizes this perfectly.

On December 5, 2006, in London, Lord Sandy Leitch published his comprehensive and alarming report on UK Skills, addressing what the UK's long-term ambition should be for developing them.[17] A conclusion was that "Our nation's skills are not world class and we run the risk that this will undermine the UK's long-term prosperity. Productivity continues to trail many of our main international comparators. Despite recent progress, the UK has serious social disparities with high levels of child poverty, poor employment rates for the disadvantaged, regional disparities, and relatively high-income inequality. Improving our skill levels can address all of these problems." The recommendations from the report formed a blueprint for providing "economically valuable skills" to the nation. The report has been regarded as so important that it will likely shape the education system in the UK for many years. One key recommendation was that the development of basic skills is so central to the economic and social strategy of the UK that "All basic skills courses should be free to candidates."

Traditionally, the terms "basic skills" or "skills for life" were widely assumed to cover only the skills of adult literacy and adult numeracy. In today's society, however, essential computing skills are just as important as literacy and numeracy, particularly in the workplace. An important outcome of the Leitch report was the identification that a lack of basic skills (including ICT skills) can have a very high social cost. A 2007 UK government whitepaper gave the firm commitment to make ICT a cornerstone of education alongside literacy and numeracy. [18]

> Statistics show that those who are digitally literate become more enabled, and those with fewer skills become further disadvantaged as technology advances.

Inclusion of Excluded Populations

However good the education system and however solid the curriculum, there will remain those who are hard to reach. When we discuss the acquisition of basic ICT skills, we have to consider *disguised exclusion,* in which individuals reject technology outright because of ignorance, fear, or poor skill levels, and this should in part drive how ICT

education is conceived and delivered. Lack of basic computing skills today is beginning to carry the same social stigma as illiteracy.

Large sections of the population in developing economies can be excluded because they do not have enough education or possess an awareness of the benefits of computing. If basic needs are not satisfied, such as hunger or safety, a rational consideration of the power of computing is difficult. Even when basic computing principles are introduced at an early age in schools, not all students have the necessary maturity or comprehension to assimilate this learning. The school curriculum moves on and children are left behind. A modern approach to education and skills development may have some of the answers.

In these situations where exclusion of populations is likely, decision makers at all levels who have access to modern curricula and educational options will be able to influence change for even the lowest-level learners. Modern curricula can address *relevancy*, that is, the myriad needs, levels, aspirations, locations, and challenges of all potential learners—such as the individual with cognitive or physical disabilities who struggles to learn; the rural family who is isolated; the frustrated school dropout bored by conventional education; and the senior citizen too intimidated by an increasingly technical world to purchase a train ticket online. It is worth noting this sobering statistic as a call to action: In India, fewer than 5 percent of the workers who join the economy receive formal vocational training. With 10 million workers expected to enter the workforce in India over each year between 2010 and 2020, the task of skills development is formidable.[19] Broadening the base of the skills triangle will inevitably enable higher-level learners to become the innovators of the future who can drive social and economic improvements for everyone in an economy.

Government Support and Investment

A core platform of most governments is that the increase in computing skills is likely to lead to better productivity and new ways of working, opening up opportunities that may not even be identified without these new skills. Seventy-seven percent of jobs in the UK now require IT skills, and this number rises to ninety percent for managerial staff. Over one third of employees regard Internet access as vital for their employment.[20]

Governments are also attracted to the idea that a better skilled workforce can provide the levels of innovation and creativity that stimulate the job market and reduce the need for central welfare support. Unemployment frequently equals loss of esteem and depression for individuals and sections of the community, which then has an effect on the health of a nation. In the UK, an estimated 20 percent of the national productivity gap is directly related to a shortage of skills. Clearly, a lack of basic skills has a higher cost than just unemployment.

> Broadening the base of the skills triangle will inevitably enable higher-level learners to become the innovators of the future who can drive social and economic improvements for everyone in an economy.

When we think of the growth areas in emerging markets, we see a clear benefit in programs that have systemic support from government, NGOs, education, and industry. Holistic approaches are most effective as they take into account the full ecosystem including key success factors like access to education, a vibrant economy, and investment in infrastructure. Paradoxically, it is often nations without these attributes that will benefit most from support.

An example of a collaboration across agencies, government, and industry is the Microsoft "Green Laptops Project" in Uganda. This is an example of a regional initiative to bring computing to the under-served. In partnership with UNIDO, Microsoft collaborated with government and local industry to enable computing skills education and computer access to students across Uganda. Working with the local culture and resources is crucial to success to ensure optimal relevance, adoption, and implementation.

Lord Leitch's assertion that all basic skills courses should be free does not imply that there is no cost associated with providing the learning programs. What it does mean is that we should look at how technology and innovation can enable lower-cost delivery that traditional education. Likewise, a key tenet for success is exploring how to innovate within the existing educational infrastructure. For example, e-learning and distance learning programs may be more scalable and sustainable than printed textbooks and traditional instructor-led classrooms over time. The expense of changing infrastructure, content, and delivery can be seen by governments and other stakeholders as an investment. Integrating ICT skills development with existing academic or work-based programs, or certifications can be promoted to students as a value-add to the original program. Many strategies have benefited from "free if you pass" or "deposit and money back when successful" incentives alongside the many other incentives and learning techniques used by skilled teachers. Providing these skills is so important on a global scale that cost must not be a barrier.

Innovative Programs That Make a Difference

The initiatives discussed in this section exemplify the impact of innovative programs that pull together government, education, and industry. Notice how some of these programs reflect a transfer of knowledge that works outside of the traditional teacher-student relationship. Global curriculum

standards combined with local understanding of student needs can lead to very effective programs.

As Tony Wagner suggests in his book, *The Global Achievement Gap*: "In today's competitive global knowledge economy, all students need new skills for college, careers, and citizenship.[21] To fail to give all students these new skills leaves today's youth and our country at an alarming competitive disadvantage—schools haven't changed; the world has.

Government/ Industry/Education Collaboration

Portugal, CITEVE Employability Project. The Technological Center for the Textile and Clothing Industry (CITEVE) launched an IT training program in collaboration with Microsoft. Trainees use Microsoft Digital Literacy to re-train from the declining traditional manufacturing role to prepare for

Africa: Learners acquiring computer skills

information worker jobs, which are on the rise.

Context-Based Training

In central Africa, a municipal government identified that people with local knowledge were needed to make promotional films for ecotourism and wildlife conservation groups abroad. The ideal creators for the film content were local residents since they had lived with the wildlife and understood their habitat and behaviour. However, before any filmmaking could happen, the local citizens had to learn how to use digital recording and media management tools. Adding a basic computing skills course to media skills training

gave the residents the opportunity to create a local industry that addressed a global market need. Context-based training that includes ICT skills and that is aligned with local job opportunities optimizes a program for success.

Parents in Student Education

We have all seen parents who struggle to come to terms with the knowledge that they are not equipped to support their children in school. The realization by a parent that their lack of skills can be a barrier to supporting the development of their children can be very cruel. In today's information society, ICT skills are increasingly necessary not only for students and teachers in the classroom, but also for parents to stay involved in the children's education. In the US, most teachers and parents communicate with each other via the Internet or e-mail. In some states like Texas, parents who do not have essential computing skills are at a disadvantage for maintaining an active dialog with their children's teachers. **The Parents Alliance PACT Program** provides parents with computing skills education with Microsoft Digital Literacy, and enables them to participate in the conversations that affect their children's education.

Students in Student Education

Industry has supported the concept of **"Student Help Desks"** in schools in which students work both to support their peers and to provide an additional resource to the teaching and system support staff. In some cases, this student support has been extended to parents and local residents, providing an excellent example of the holistic approach to student learning using both teaching and non-teaching staff. A considerable by-product of this strategy is the increased confidence and responsibility that the participating students develop, especially those who previously had a more disengaged or disruptive influence in the school. Similar active programs, particularly the New York–based MOUSE initiative and The Student Help Desk

competition in Hong Kong, allow students to sharpen their work-related skills.

Chile, Jóvenes sin Límite seeks to improve the employment opportunities of young people by training them with basic computing skills using Microsoft Digital Literacy. The curriculum is delivered online through the ATACH NGO Web site, a network of 130 telecenters across the country. Program impact is expected to reach 15,000 by the end of 2008.

Retraining and Senior Training

For some, the employment and financial changes in society will enforce an extended working career or encourage a re-entry to the workforce. Poor ICT skills can lead to manual or low-paid activities, whereas more sedentary or administrative ICT employment could be a better work alternative. Consider also the needs of the aging population in developed markets.

US: Parent's Alliance PACT Program

In all these cases, accessible and low-cost training is imperative. In Denmark, for example, the **Aeldremobiliseringen** project provides a "seniors training seniors" model adapted from the elder hostel concept. Leveraging retired seniors as teachers creates parity and a common bond for learner and instructor, and enables relevant knowledge transfer.

The South African Department of Correctional Services use Microsoft Digital Literacy for schools in crime-ridden areas as well as within prisons as part of their rehabilitation and skills transfer/development program to assist offenders to be better integrated back into society.

Likewise, the **Wynne Computer Recovery Program** with the **Texas System of Criminal Justice** trains inmates on essential computing skills as well as hardware and software technician skills. Students in the program refurbish donated PCs, which then are given to local schools.

Prerequisites, Assessments, Vocational Training, and Certifications

ICT can often provide students entering higher education (HE) with the tools that are essential for administrative tasks, coursework, communicating, and accessing research information. In fact, a certain level of basic computing skill is often a prerequisite for students entering higher education, particularly those who plan to study in a language different from their native tongues. At Qatar University, having a certification that demonstrates a basic competence in ICT prior to entry is mandatory.

UNESCO forecasts a significant potential shortfall in teachers in both the developed and developing economies. It is a concern that the greatest deficit is in countries that also have the greatest financial constraints.[22]

Chile, Plan TEC Plan TEC (Technologies for a Quality Education of the Ministry of Education) integrates components of Microsoft Digital Literacy into the learning modules of a national basic IT competences course for teachers. Through Plan TEC, the Chilean Ministry of Education will train more than 100,000 teachers with this basic course. It will be available free online to all instructors to help improve their basic IT skills and enable them to better integrate ICT in their classrooms.

A regular criticism of the academic system is that its students spend too much time learning theory, and not enough time learning the necessary work-related skills. An education system can address this through the introduction of vocationally-related curriculum. In many countries, certifications

are approved as contributing units to national qualifications. In countries without these links, certification disenfranchisement can result, with students not receiving credit for their achievements within the system. This can have a major affect on the student, and on the education system for which large components of student learning are not included in national targets and achievements.

Online, Remote, and Mobile Learning Solutions

A wholesale move to virtual learning in the developed economy that has a comprehensive education infrastructure in place is unlikely. However, what is likely now is the more widespread engagement by students with the online community. The processes and operation of the online community are less alien, and once students are established users, the benefits of flexibility and resource saving soon become clear.

Texas: Wynne Computer Recovery Program

E-Learning has been available in many forms for a considerable time with limited impact. The use of e-learning in the developed economy was generally most successful when substantial student support was provided. In this way, e-learning becomes a component of a blended learning solution that includes niche programs for those students with particular access needs. In the developing economy, all programs that provide connectivity and access to computing must also provide mentoring and support in equal measure. Even if "tuition" for such a program is no more than a "train the trainer" with a cascading model of mentors, the effects will create a "village"

approach, with communities creating a collective learning and support model.

In emerging economies with a limited infrastructure, a shortage of teaching staff, and a large population, the benefits of remote learning are self-evident and in some situations, remote learning and virtual classrooms are the only option available.

For example, the **Microsoft Unlimited Potential Group** together with **Microsoft Learning** worked in cooperation with the **India's National Citizen Service Center Program** to pilot an offline Microsoft Digital Literacy certification program in rural internet kiosks. Started in 2008, the pilot has since successfully trained and certified thousands of villagers from nearly 300 villages in Haryana, India on basic computer skills. The certification program not only satisfies the high amount of unmet demand for local computer skills training, it also offers kiosk operators and franchisees an invaluable service to attract new customers, increase their revenues, and improve their chances for financial sustainability.

The **Aulas Moviles** mobile classroom project in Mexico can provide a possible solution. This program was deployed in two Mexico states to take ICT skills training to poorer areas. A bus loaded with eighteen computers and satellite access takes valuable skills training directly to the teachers and students who need them most. Each mobile class room is equipped to train up to three and a half thousand people every month.

Taking ICT Learning into the Future

The provision of basic computing skills may not directly save the world, but it will lead to greater access—access to others, to education, to *options*. Programs and initiatives that drive this awareness of and connection to global knowledge by supporting basic computing skills development are essential to the ultimate economic and social health of both emerging and developed economies. This has been illustrated time and

time again—that by benefiting one individual, we benefit a community, a nation, the world. Isolated, small-scale efforts can have tremendous impact as the examples in the discussion of change drivers has shown, but the combined collaboration of educational institutions, government organizations, and private industry truly has the greatest reach and potential for large-scale, innovative, and sustainable programs. This joining of forces can ensure the necessary infrastructure is in place for success and global education.

This grand effort to educate needs ICT evangelists and leaders with knowledge and vision who understand the power of computing to change lives forever. Every sector of society has a role to play. No one sector can provide it all—the infrastructure, the global curriculum, the localized programs, and the thirst for knowledge. We should never underestimate the impact on social change that is directly associated with the provision of connectivity and basic computing skills and the importance of our own individual contribution.

Mexico: Aulas Moviles

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